ACADEMIA: ALL THE LIES

WHAT WENT WRONG IN THE UNIVERSITY MODEL

AND WHAT WILL COME IN ITS PLACE

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This book is dedicated with deep love to our young grandchildren

Dor, Rom & Libi

In the hope that they will enjoy challenging and effective learning environments.

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Introduction

Landscape-altering shockwaves are a feature not only of nature, but are also found in human society. The source of the powerful energy propelling them is nearly always the bursting on the scene of a new technology which dwarfs whatever came before. It rapidly changes entrenched social patterns, and leads us to a crossroads characterized by a mixture of desperation and hope, conservatism and innovation, passivity and activity – and especially instability and uncertainty. Charles Dickens best described such sociological circumstances in his classic historical novel "A Tale of Two Cities" (1859): "It was the best of times, it was the worst of times, it was the age of wisdom, it was the age of foolishness, it was the epoch of belief, it was the epoch of incredulity, it was the season of Light, it was the season of Darkness, it was the spring of hope, it was the winter of despair, we had everything before us, we had nothing before us".[1]

Bizarrely, almost mystically, the Hebrew edition of this book came out about a week before the outbreak of the coronavirus crisis. While the publisher's PR department was distributing copies to the media, most Israeli citizens were placed under home quarantine and bookstores, like nearly all other establishments, remained deserted. The book could, of course, be delivered or purchased in digital versions, but by this stage no one was thinking of buying anything other than food, medicine or toilet paper.

But what was initially perceived as a bad case of the author's curse quickly turned into a blessing in disguise, or more accurately, a reinforcement of the book's thesis on academia. It promptly became apparent that the forced quarantine, which kept millions in their homes and forced them to increase their use of digital media, was about to become a particle accelerator for the accessibility and flexibility which is revolutionizing how we are provided service, how we work, and how we study. In fact, everything we had predicted for the future of science and higher education now seems on the brink of fulfillment, and at a much faster pace than we expected.

The fact that institutions of higher education were forced to turn around and immediately make the switch to online studies turned the spotlight on our book. It was covered extensively by Israeli media and, despite the impaired market, quickly became a bestseller.

In mid-May, we were invited by the Council of Higher Education in Israel to give an online lecture on the book to the directors of all organizations devoted to the advancement of teaching in Israeli institutions. A short while later, the Universities of Tel Aviv and Haifa held an online panel on the book and the changes expected in academia following the coronavirus crisis. The Haifa panel included a Nobel Prize winner in Chemistry, the president of a technological college, and one of the most prominent authors in Israel, who is also a professor in the humanities. While we were writing a book on the fall of academia, never in our wildest dreams would we have expected that the book would be received by way of webinars attended by hundreds—gatherings at which no one would need any convincing that we are entering a new era for science and education.

Academia—named after the Athenian hero Academus—was born in ancient Greece as a meeting point for lectures (historians unanimously agree that this is where Plato spoke with his students), but only in the 17th century did the ancient term turn into a common phrase among European scholars. With time, it became a generalizing synonym for the mechanisms of science and higher education in the modern age.

The development of academia from ancient times until today is a fascinating evolutionary story, encompassing continents, nations and cultures. It is a relay race of the human spirit which has launched humanity towards immense achievements. But success is not invulnerable, and that which has worked in the past will not necessarily work in the future—especially when a substitute is found.

Few in our day are able to imagine a world without institutions of higher education, but remember that in the not-so-distant past, no one could imagine soldiers without swords, farmers without horses, or mail without paper.

People are able to comprehend and digest small changes in their lives, but find it difficult to accept the idea that even those basic and established arrangements which they have always taken for granted will one day disappear. Universities are somewhat taken for granted by many of us.

We live in a time that has seen a rapid rise in the percentage of academics among the general population, a consistent improvement in quality of life and lifespan, and an explosion of innovations and inventions. It seems that science is more successful than ever, and that higher education is blossoming. But this picture is misleading. Global academia is in the throes of its broadest crisis yet. It is an economic, intellectual, organizational, moral, and educational crisis, and it is not a malfunction or some kind of temporary failure. The traditional university model, with roots in the Middle Ages, is in advanced stages of erosion and is sending off distress signals because it, like other traditional models in our times, is being subjected to structural changes. We are in the midst of a period of immense change, in which the old is no longer suitable and a substitute, born of dynamics of friction, is in its infancy.

Although the crisis in higher education is the focus of conversation in the academic community, and has engendered an endless array of papers, reports and books on the issue, its true dimensions and its dramatic consequences are hidden from most of the public, and in truth, from most of the world's scientists and professors as well. Academia is still deep in denial, misleading itself and the public, and is therefore finding it difficult to understand the true nature of things, and to reach educated and resolute decisions.

The purpose of this book is to put the puzzle pieces together to form a panoramic overview of the state of higher education worldwide. However, this is not only a critical essay, meant to open eyes to the dawning of a new era, but also an optimistic projection, and in some ways, a recommendation for a rejuvenating model of research and education suitable for the 21st century.

The human race is fast approaching a historical turning point in which the academic bubble will be burst wide open, institutions of higher education will lose their monopoly, and a scientific career will look much different than it does now.

Before we get into the thick of things, we must emphasize a few points for our readers:

- This book deals with the most common and prominent phenomena in academia around the world, especially in leading scientific countries, and not with the nuances which uniquely characterize each nation and institution.
- The many footnotes and endnotes woven throughout the book include not only references for the data and insights contained in the text, but also professional literature meant to expand the reader's view. In this sense, the

book also serves as a collection of important sources for any discussion of the current and future state of academia.

- Our book is fairly expansive compared to standard nonfiction (and we apologize to our readers for that), but it's not that, to paraphrase the great Mark Twain, we would write you a shorter book but we didn't have the time. In fact, it is just the opposite. After a research and writing process which took up three years, we tried to summarize as much as we could for our readers the complex landscape of a complex system in a complex time. Each chapter deals with a different aspect of the academic ecosystem, and an omission of any one of these would have caused us to stray further from the goal. Furthermore, because there is a sort of grave "indictment" here, we felt compelled to anchor it in as wide a range as possible of evidence, and to present arguments from different angles.

  But there is another reason for the expansiveness of the text. Most of the public—including a large proportion of scientists—is not familiar, or only partially familiar, with the meandering mechanism of global academia. The creaks in the old system cannot be comprehended, nor can the necessity of changing the system, without first understanding its basic principles. Therefore, we devoted more than a few pages in each chapter for an overview of this kind. This book is thus also an ethnographic document for those interested in the behind-the-scenes workings of academia.
- The comprehensive overview we have put together is based on thousands of sources: papers, books, surveys, reports, informational websites, discussion platforms, and blogs. In order to get a sense of the field and hone our insights, we have interviewed 212 academics of various levels of seniority and from a number of countries: Israel, the United States, England, Scotland, Australia, Germany, Italy, France, Spain, the Netherlands, Greece, Japan and Taiwan. Most of those interviewed requested that they remain anonymous, and we therefore decided not to use any names. Here we must note: the fear held by many faculty members, including senior academics, of exposing themselves is a symptom of the grim state of academia. We hope that a time will come in which scientists and lecturers will feel safe to freely express themselves regarding any and all problems and difficulties in their workplace.

  During our visits to campuses around the world, we also spoke with many students, who added insights from the point of view of those doing the studying. We compounded these observations with those collected a few years earlier during our research on Generation Y in Israel. This study of the

> younger generation, published in 2016, made waves and stirred a wide-ranging debate among the general public, as well as in academia (the English version of the book was published in 2019).[2]

For us, this book was a grueling and complicated journey. We made an effort to base our diagnosis and prognosis on as wide an infrastructure as possible of data (which was not always available or complete), but nothing is over yet. Naturally, some errors, inaccuracies, and omissions were committed. We would be grateful for any comments and additions by readers, and we will do our best to include these in the next edition. Either way, we see the book as fertile ground for a debate on an issue whose significance to society, and to all of humanity, is hard to underestimate.

A personal note in conclusion: we feel very lucky that we have gotten the opportunity to be citizens in a democratic country which encourages critical debate, and to work at a scientific institution which allows free research. But by the same token, we are heartbroken that in the current state of global academia, it is highly doubtful that younger researchers, without a tenured position and under pressure to publish as fast as they can, would dare take such a project upon themselves. We hope our book contributes to changing this reality.

2

Survival at All Costs

The Economic Crisis

The Tectonic Rift of 2008

At the beginning of the first decade of the third millennium, the American market experienced rapid growth. The U.S. safely led the world into the global era. Real estate prices skyrocketed due to the soaring demand for apartments, interest rates were low, and loans and mortgages were generously offered to everyone, up for grabs. Digital technology kept evolving at an uncontrollable rate, leveraging growth in the market like an economic hormone. Millions of people broke through social barriers and continued to climb up the socioeconomic ladder. There was no sign of what was going to happen at the end of the decade: the most severe financial crisis in the history of the United States since 1929.

The first symptoms appeared in July 2007, when many borrowers, accustomed to consuming above their economic capability, found it hard to meet their commitments and pay their debts, mainly mortgage repayments. Households were declared insolvent, and when the banks tried to collect and realize debts by selling the mortgaged homes, it became clear that the mortgages exceeded the value of the mortgaged assets and the sales did not cover the debts. The real estate market plummeted, banks faced liquidity difficulties, and the inevitable catastrophe culminated in 2008: The American real estate bubble exploded in a massive thunder, dragging the stock exchanges down with it. A sharp fall in bond rates was followed by the collapse of stocks. Highly reputable financial institutions had to declare huge losses, and an economic avalanche quickly rolled from the U.S. to other countries.

A legion of economists, most of whom failed to predict the 2008 crisis, now had to explain the course of events in retrospect. Multiple explanations were offered: the volatility of the new global economy; the rising rate of unemployment; the concentration of wealth in the hands of a small group; the growing gap between the GDP and the expenses and debts of the population; and the blindness and the intoxication of power displayed by the major credit companies and banks, especially the mortgage banks.

But there was another structural factor that led to this crisis, which has been ignored by economic experts: the transformations and turmoil which always characterize a revolutionary era. The 2008 crisis was probably not a transient economic crisis, one of many in the sequence of history, but rather part of a tectonic movement signaling the approaching end of an era—and the beginning of a new one. This crisis joined the many other global disasters that have recently befallen us and the many yet to come in the sensitive period ahead of us—not only in the area of finance but also in healthcare, security, politics, demography, communication, education, and more. We live in a time when most of the veteran social institutions that have served humanity faithfully over tens and hundreds of years will either disappear or change beyond recognition. One of them is academia.

The economic crisis in 2008 dealt a fatal blow to institutions of higher education.[3] On the one hand, it nibbled away at their financial investments (capital market and yielding assets), and on the other hand, it slowed down donations. A survey conducted in 2009 among 435 institutions of higher education in the United States revealed that a year earlier, institutions had lost an average of 23% of their donations. 65% of the institutions reported that they had to use donation reserves to fund their ongoing activities. Even prominent and wealthy institutions did not escape the crisis.[4]

Nonetheless, the consequences were not only manifested in financial damage. The 2008 crisis disclosed and worsened the ongoing existential crisis of academic institutions. Most of all, it illustrated the fact that the traditional economic model on which academia was built in most countries is faltering.

End of the Age of Abundance

Funding scarcity has been a constant problem in the academic system since its formation in the Middle Ages. But in the 1980s and 1990s, when higher education and science began to pump huge sums and created a too-heavy burden on governments' budgets, the problem became critical. In this new economic reality, there was no escape from painful cuts.[5] For example, in 1995, the scope of government funding for higher education institutions in Canada was $13 billion lower than in 1983. [Throughout the book, the term "dollar" refers to U.S. dollars]. From 1994 to 2005, the Canadian government's student subsidy fell by nearly 50%.[6]

Budget cuts in most countries were not just due to objective funding difficulties but also stemmed from ideological reasons. In those years, the ultra-capitalist orientation (known as "neoliberalism") became more influential in the west. The main manifestations of the new ideological trend were the diminution of government intervention and control, the weakening of the power of the trade unions, and the strengthening of the private market and the big corporations.[7]

But these cuts were merely a taste of what would take place in the economics of academia following the great financial crisis of 2008. The global crisis forced governments to make deeper cuts in funding for science and education.[8] Although the budgets for academic institutions have increased nominally in most countries (for example, between 2008 and 2014, expenditure on higher education increased in the OECD countries by nearly 20% on average), in practice, the budgets have actually decreased (proportionally), at times on a dramatic scale of over 30% on average. The reason for this is the increase in the number of subsidized students and research costs.[9]

Cuts to public funding and the increasing demand for frugality and efficiency have flung institutions of higher education into a new era of struggle for survival. They have been forced to pool their resources and come up with creative ideas to generate revenue from every possible source—for example, renting out halls, sports facilities, and swimming pools, and charging fees for guided campus tours, lectures, and events for the general public. Many institutions have hired corporate consultants and economic experts in order to introduce management methods practiced in the business sector. This new concept has also introduced a new lexicon into academic culture: Each department is a "profit unit," the student is a "customer" to be lured and maintained, the faculty member is an "entrepreneur" and the entire institution is oriented towards and dedicated to increasing profits.[10]

It is important to emphasize that, only two decades ago, the combination of the terms "marketing" and "university"/ "college" mainly characterized the competitive American educational market. Very few institutions worldwide invested significant strategic thinking and financial resources in advertising and self-marketing. The prevailing perception was that education and science were public assets and therefore subsidized services, disconnected from the forces of supply and demand. But the new economic reality, particularly the intensifying war over every student, has forced many institutions to shift direction. As a result, the worldwide academic market today is characterized by aggressive competition, just as in the cellular or hotel market. Many institutions employ spokespeople and PR units armed with expensive image and branding tools, operate attractive websites, and pay massive amounts of money for commissioned image-enhancing articles in the popular media, giant alluring billboards, and appealing commercials.

Jason Brennan and Philip Magness, in their book "Cracks in the Ivory Tower," devote an extensive, critical, and cynical chapter to the embarrassing degree-marketing culture that has evolved in recent years in American colleges and universities (in fact, as mentioned above, it characterizes most of the world's institutions). They provide numerous examples of the empty promises, exaggeration, and clichés that characterize these marketing messages, most of them reminiscent of advertisements for diet supplements and longevity potions, and some of them already located in the gray and even black zones of unethical behavior. Brennan and Magness argue that if educational products were strictly supervised, as is the standard with medical products, quite a few educational institutions would have been sued for customer fraud.[11]

In fact, the first lawsuits targeting what has been hilariously nicknamed "Mickey Mouse Degrees" (a term coined by British Education Minister Margaret Hodge at a hearing about the devaluation of degrees) have already begun to emerge. A particularly well-known case reviewed in the press was that of a young lady named Pok Wong from the University of "England Raskin." After obtaining her degree in International Business Strategy, she sued her institution for misleading advertisements. She claimed that the university's commitment to "high-quality teaching" did not stand the test of reality. The suit concluded in a settlement agreement under which the university compensated Wong to the tune of £61,000.[12]

It is worth noting that even beyond the deception of the public, the new marketing patterns of academic degrees have another problematic moral aspect: The huge budgets that are spent on these campaigns are usually public money. This happens when higher education institutions are forced to cut budgets that were initially targeted to improve teaching. In a survey conducted in the U.S., it was found that the average college spends about $472,000 a year on marketing advertisements![13]

"Open house days" have also become an integral part of the marketing campaigns adopted by many institutions around the world in recent years. Stalls, leaflets, consulting stands, image-promotion lectures, giveaways, and lavish refreshments—every possible tactic is employed to lure the young and their parents, who come for "degree shopping." Higher education has become a wild market, and the professors take on the role of merchants flaunting their wares. And when the end (to bring as many students as possible) justifies the means, no one is modest anymore. All institutions boast about rankings and titles with fancy names, in many cases absurd and ridiculous, not to mention curricula with supposedly cool headlines. Everyone, including the most marginal institutions, portrays a glamorous and prestigious image. Just come aboard and enroll.[14]

Yet enrolling customers is not enough to survive financially. Most institutions of higher education around the world have started to undertake painful, unprecedented procedures, both in terms of scope and depth: cutting internal budgets for departments, faculties, and libraries; merging departments and occasionally even shutting down unpopular departments; increasing the number of students per lecturer in courses; raising tuition; reducing financial support for needy students (scholarships, aid programs, etc.); cutting academic and administrative positions; and stopping or at least slowing down the recruitment of new faculty members, including a complete freeze of new tenure standards.[15]

Academic faculty members have also paid and continue to pay a painful price. A symbolic example is that of the cuts made at BSC (Birmingham-Southern College) in Alabama—one of the oldest and most prestigious liberal arts colleges in the U.S. In June 2015, shortly after a nationwide survey rated BSC as the most gratifying institution to work in, the college's management announced the cancellation of 63 administrative and academic jobs due to financial difficulties. Those who were saved from the layoff sword were informed of a 10-percent cut in their wages.[16]

The impact is felt not only in faculty paychecks, but also in a variety of traditional benefits such as pensions, sabbaticals, funding for conference participation, and the like. Money and benefits that were once distributed generously and under loose supervision are nowadays allocated sparingly in many institutions or not allocated at all—for example, funding for computer equipment or teaching assistants. Many institutions have split their offices, and some have even moved professors from private offices to open spaces—just as in high-tech—in an attempt to cut costs.

Meanwhile, faculty members are expected to bring more money into their institutions, chiefly by publishing in reputable platforms and obtaining research funds. The questions of "how much money did you bring in" or "how much money do you intend to bring in" have become primary considerations in recruiting new faculty members, and in offering tenure and promotions for each position.

If all this is not enough, one of the tragic and tangible consequences of the economic crisis is budget cuts for the regular maintenance of buildings and facilities on campus. This even includes old and stately universities that take pride in their monumental buildings. Therefore, the economic crisis has received visual confirmation for the first time, and anyone stepping onto campus can sense immediately that academia is in critical condition.[17]

Limiting the Privileges of the Aristocracy

The economic crisis has opened a new page in the relationship between governments and institutions of higher education. On the one side of the barricade stand the treasury officials, who demand streamlining and cuts, and on the opposite side, the heads of institutions, protesting their economic strangulation. Yet the implications of the growing tension between the government and academia are far more than economic. They basically undermine the academic tradition.

One of the fundamental principles of democracy is the separation between three authorities (branches of government): the legislative, executive, and judiciary branches. In practice, the formula has always included a kind of a fourth separate authority—the scientific authority. Its independence is evident in four aspects: A) A mandate to research, study, and teach any subject that comes to the minds of scientists, with no outside dictates or tight supervision—in short, "academic freedom." B) Tenure for faculty members, which means job stability and immunity from dismissal on political grounds. C) Ownership by many institutions of physical and intellectual property. D) Extensive freedom of action and license in managing the organization—including the freedom to recruit personnel, make appointments, and handle contract signing.

In all countries, there are laws that anchor the independence of academic institutions, and regulate their functioning and the ties between them and the governmental authorities. But this is not just about laws and regulations: Government officials have usually avoided interfering in the matters of universities and colleges, including management of professional and financial affairs, mostly because of the popular perception of universities as temples of knowledge and wisdom, along with the traditional sentiment of awe for scholars and inventors. This explains why institutions of higher education have usually managed to remain under the public scrutiny radar of the media, state comptrollers, and parliaments and governments. In fact, for many years, academia has essentially been a sealed-off universe, subject to less accountability than other public institutions. It has been perceived as serving an elite—an order of exalted professors.

Because of the aforementioned deference towards and awe of scientists ("our former professors,") because science is the most important economic engine for the development of economies, and because the model of academia has never had a real substitute or competition—politicians and treasury officials have avoided bargaining with college and university heads over every cent in the budget. In most countries, academia has proceeded quite placidly, because the assumption has been that academics know what they are doing, and therefore manage their institutions in a sensible and responsible manner.

Following the 2008 crisis, some question marks popped up for the first time as to the efficiency level of institutions of higher education. In various countries, institutions were obligated for the first time to undergo examination by independent, external experts. Supervision and control have been increased, along with a demand to provide ongoing and detailed reporting on expenses, outputs, student enrollment, recruitment of faculty members, and so on.[18] There were countries (Japan is a particularly noteworthy example) where, while demanding transparency, the government granted public academic institutions broader autonomy in budget management and manpower—this in order to increase competition in the domestic education market.[19]

Unlike the boards of commercial companies, the Board of Governors of academic institutions is a broad body (usually comprised of 20 to 50 members) and very diverse in composition. Its duties are quite abstract and, in any case, tend to have more of a symbolic than a practical nature: assisting in obtaining budgets, coordinating academic institutions and friends' associations around the world, approving changes to the institution's constitution (which rarely happens), ratifying (usually automatically) the appointments of senior officials (whom they did not nominate), and bestowing honorary titles (ditto).

The members of the Board of Governors differ from institution to institution and from country to country in terms of number, mix of individuals (demographic background, professional background), powers, status within the institution, and the manner in which they are appointed or designated (by the governing council, the government, alumni of the institution, or academic faculty members).[20] The representation of university faculty members in the Board of Governors usually includes executive management, senior administrative staff, senior and junior faculty representatives (in the United States, it is not customary to include junior faculty), alumni and retired professors, representatives of the public (usually successful businessmen), and representatives of the government (urban, provincial, or national authorities). Sometimes students are also included in the Board of Governors (in some universities they constitute a small minority or are included as observers only, without voting rights). The Board of Governors is headed by a chairman, whose role is also mainly representative.

This diversity of representatives is allegedly intended to ensure that the institution is truly subject to scrutiny and therefore properly managed, that it safeguards the broad public interest, and that it is independent (not bending to politicians and high-ranking government officials). In practice, and in most cases, this is a forum whose primary role is to portray a reputable image of the institution and create an appearance of proper, external supervision. In actual fact, many of the members of the

Boards of Governors of academic institutions are mainly used as a rubber stamp for the active management—or, in slightly less subtle language, as a butt-covering strategy.

This happens not only because it is an overly large and eclectic body, but also due to the professional background of many of its members. Many of the board members are retirees who have never experienced scientific research or academic teaching (in a survey conducted in Florida, for example, it was found that only three of the 121 board members in the state's 12 universities had any experience in higher education).[21] Most of them lack the tools, ability, time, and information to really influence the management of the institution they are supposedly entrusted with. Various surveys conducted in the United States found that most lacked even financial training. Many of them admitted that they do not actually supervise the institution's budget, and that their main job is to "back" the institution's managers and help raise funds.[22]

The annual meeting of the Board of Governors is usually a social gathering. It brings to mind, in its character and purposes, a meeting of the royal court, in which the officials of the palace and its servants prepare and adorn themselves to entertain the dignitaries and praise the valor of the organization. The highlights of the festivities include mingling, dining, tours, lectures, and honors ceremonies (awarding honorary titles and the like). By the time the hollow discussions, the exchange of compliments, and the self-glorification are over, all bid their goodbyes and go their separate ways amicably until next year's futile and idle reunion.

In some institutions of higher education, there is another statutory body alongside the Board of Governors: The Executive Committee (in some institututions they are called Board of Directors, Board of Curators, or Board of Regents). This is a smaller forum (usually comprised of 10-20 members, most of them from the Board of Governors' broader forum), designed to help with the ongoing management and supervision of the institution's activities. The Executive Committee usually includes high-level executives and senior executives with extensive experience in a variety of fields (economics, law, academic, etc.), as well as representatives of the institution's management (administrative and academic), faculty members, graduates, and in some cases the students. The chairman of the Executive Committee is usually a reputed public figure with a managerial background who is meant to assist the president of the institution. Members of the Executive Committee do not usually receive a salary, or receive only a symbolic salary, and their work is performed out of a sense of mission and solidarity. In many institutions, the Executive Committee is also the body that selects the president, while the Board of Governors is summoned only to ratify the election.

Although the Executive Committee maintains a tighter relationship with the university's management than the Board of Governors, its influence on the institution is in many cases similar—that is, faint to nil. It is clear from the too-generic wording and often-vague descriptions of the roles of such forums on the websites of various institutions around the world ("monitor management," "outline policies," "determine strategy," "supervise the manner in which the president operates," "discuss financial statements" and the like) that in most cases this is yet another ineffectual, decorative committee.

It is important to note that there are differences between patterns of supervision at public academic institutions and patterns of supervision at private ones, where management operates with a more economic orientation. These patterns are partly reflected, among other things, in the composition of the committees. In general, in Europe, South America and Asia, members of the academic staff and representatives of the state have more power in the supervision of institutions. In the United States the orientation is more "managerial," which also dictates the professional profile of the Board of Governors and the Executive Committee.

For many years, there was a consensus in most countries with regards to the public commitment to support the existence of institutions of higher education, and, as a corollary, their management model. The economic crisis undermined the unfaltering trust in the old system, and for the first time extensive public criticism resounded concerning the role and functioning of the Board of Governors and the Executive Committee. The main claims were that they dealt with issues which were not within their authority, such as ideological and political issues, and that they served as rubber stamps for presidents of the institutions, did not take responsibility for their decisions, and were not held accountable to the public, even in the face of the institutions' failed performance.[23] One of the phenomena widely criticized in this context was the inflation of the number and percentage of administrative staff in institutions of higher education, disproportionate to the increase in the number of students and faculty members.[24] A study showed that from 1990 to 2012, the average number of administrative faculty members (in a full-time capacity) in U.S. public and community colleges increased by 150%, while the average number of academic faculty members increased by about only 30% during the same period.[25]

In all fairness, it is important to note that the growth in the number and rate of academic administrators was partially inevitable. Sources of growth included, for example, the desire to improve service on campus, the need to establish a broader mechanism for fundraising, the increase in the volume of computer equipment requiring ongoing maintenance, and the increase in government regulations that required institutions to add officials to the workforce (mainly for the preparation of ongoing reports). However, most economists are unanimous in saying that the inflated bureaucratic mechanism in educational institutions was also due to excessive management spending and a lack of proper public supervision.[26]

In 2011, Professor Lucy Marcus, who served on the Wesley College Board of Directors in Massachusetts, published harsh criticism of Boards of Governors and Executive Committees in the United States. Marcus described them as, among other things, too large, too heterogeneous, and quite impotent.[27] The National Commission on College and University Board Governance in the United States issued in 2014 a severe report on the conduct of these bodies, and it can be assumed that the picture depicted in the report also holds true in other countries. Former Governor of Tennessee Philip Bredesen, who is very familiar with the management system of academic administration, said in an interview: "Many meetings of the Board of Governors and the Executive Committee are conducted according to the same pattern: the president gives his presentation about the wonderful things being done in the institution, then they have lunch, and then it's time to go home." Bredesen added that, in today's world, this pattern cannot continue. According to him, academia's management bodies must shift from a country-club mindset to the mindset and mode of operation of a real management entity.[28]

You'll Approve Mine and I'll Approve Yours

If you assumed that two forums (the Board of Governors and the Executive Committee) would be sufficient to outline a policy (or not) and supervise (or not) institutions of higher education, and especially to decorate them—you assumed wrong. They are only the tip of the cumbersome bureaucratic iceberg.

The Senate is the top academic body of higher education institutions, and is officially the body responsible for outlining academic development programs and ongoing academic activities. The composition of the Senate includes the senior officials in the institution (president, rector, deans, heads of schools, etc.), along with representatives of the academic staff (and sometimes also student representatives), who are elected by tenured faculty members according to a representative index of ranks and fields. They call it democracy, but in reality this is mostly bureaucracy, impotence, and the aforementioned butt-covering. Prof. Esther Cohen, who served in the Senate of the Hebrew University for two decades, admitted: "The Senate is a farce of academic democracy. Nothing has changed the basic fact that we have always voted without knowing what we voted for."[29]

Indeed, the Senate in many institutions is a cumbersome and inefficient body, managed with an appalling lack of transparency. This may be the reason why it has simply been abolished in some European institutions. Members of the Senate meet regularly every few weeks for tedious, ceremonial discussions, in many cases without a practical intent, which end with almost automatic approval of the motions put before them. In fact, many Senate members do not really know what they are voting on, because they do not have the time and energy to read the abundance of materials presented to them at each session, such as approving new curricula or appointments. It is mainly an internal political body, which operates in a fraternal, self-serving fashion. That is, "approve my programs and I will approve yours." Its members' tendency is to unquestionably say "amen" to just about anything or at most to abstain, because the votes are usually out in the open. In general, academic faculty members do not tend to oppose or vote against a motion in the numerous meetings and committees in which they participate in their institution, because it would require them to formulate an opinion and could jeopardize their promotion. You never know who checked your status or may be involved in your professional affairs (approval of a research budget, promotion, checking your student's thesis, etc.). The truth is that they often do not really have to decide, because every senate, faculty, or department has committees and subcommittees to which they transfer a large chunk of the decisions.

Theoretically, one could take comfort in the fact that despite the tangles of bureaucracy and the decentralization of power, in the end everything is concluded within the family. Well, not exactly—because there is also a government, and despite "academic freedom" it also has its say, today more than ever. The degree of government supervision and control over institutions of higher education is uneven, and is linked to the political structure and tradition of education in every country. However, even in the freest states, institutions are subject to the supervision of some government body, which usually operates under the auspices of the Ministry of Education or the Ministry of Science. In Israel and in several African countries, this body is referred to as the "Council for Higher Education" (CHE); in Germany it is called "the Scientific Council." Its role is to determine the policy of higher education in the country, to supervise institutions, to approve the opening of institutions (and the use of such titles as "university," "college," "institute" and "faculty,") to empower an institution to confer academic degrees, to allocate special budgets to particular institutions or disciplines in accordance with the country's changing needs and priorities, and sometimes also to approve curricula. In some countries, regulators are government officials, and in other countries it is a public council whose composition differs from place to place.

The need to monitor institutions of higher education, both at a budgetary and at an academic level, stems from a series of reasons: A) Academia trains some of its professionals in fields related to saving lives and/or fields requiring a license (medicine, engineering, psychotherapy, law, teaching, and so on). Such a license is subject, inter alia, to an examination that will verify that the graduate has acquired the necessary knowledge and skills. B) The question of what should be taught, especially in the humanities and social sciences, is a question of values and ethics that requires political sensitivity and broad consensus. C) The education system is partly financed by public funds, and since it is based on the principles of scientific objectivity, it is necessary to ensure that academic institutions function accordingly.

All would be well and good if the regulatory bodies would leave institutions significant leeway, and would focus on protecting the interests of students and preventing outside political interference (just as the Supreme Court protects civil rights and prevents illegal actions by government agencies). In practice, these bodies are manufacturers of red tape, who encumber the management of institutions and in many cases operate from narrow-minded considerations (including interests of and power struggles between the various representatives).

It is not uncommon that government officials and top academic councils are not thoroughly familiar with the concrete problems of each and each institution, including the region and population it serves. In fact, they cannot be familiar with these problems, due to scarce time and lack of ancillary staff. As a result, they are forced to decide on high academic and administrative issues in the abstract on the basis of too-general and often non-professional considerations. Moreover, these are often old timers who impede or hinder the necessary processes of change and updating (a relevant example is the hesitant, slow, and limited decisions with regards to online learning, on which we will elaborate later).

This institutional supervision is especially burdensome in times of crisis, when quick and courageous decisions are needed. Just as an aircraft carrier has more difficulty changing direction than a small ship, thus a public council with such a wide span of control has more difficulty changing direction in the economic market than more compact, private organizations.

Incidentally, the academic council with the most extensive powers in the world operates in Israel. It is headed by the Minister of Education, and most of its members are academics representing the various institutions across the country. But rather than being beneficial to higher education and science, it is detrimental to them, in part because it is an arena of power and ego struggles, and in part because, due to the multitude of representatives and conflicting interests, it constitutes a toothless body. It is not uncommon for delegates to neutralize each other and therefore find it difficult to reach applicable decisions.[30]

In 2012, upon the completion of his term as a member of the Council of Higher Education in Israel, Prof. Baruch Nevo of the University of Haifa published a public letter to the new members of the Council. He reviewed the failures of the council, its impotence, and its blind-eye approach in the face of serious incidents of "laundering" inadequate curricula, and concluded with the following words: "Planning for higher education in Israel is the responsibility of the Council for Higher Education (CHE). So we thought, when we were appointed to the CHE five years ago [...]. Have we been involved in the planning of higher education? In the vision of higher education? Five years in office, fifty CHE meetings, hundreds of hours of subcommittees meetings and plenary sessions, and how many hours did we devote to planning? Ten hours? Twenty? Surely not more than that. The CHE should have developed control mechanisms for the quality of the graduates in all curricula in all institutions. Not at the individual student level but at the programmatic level, by means of sampling, the CHE did not develop such mechanisms. Therefore, we must admit the truth: We have no clue as to the CHE and the PBC [the Planning and Budgeting Committee operating within the framework of the Council for Higher Education in Israel, and responsible for distributing the state budget dedicated to higher education]. What is the true quality of our graduates? Who bears the ultimate responsibility for all this? All of us, members of the 11th Council for Higher Education. Best of luck to the 12th Council for Higher Education."[31]

And as if to further complicate the academic bureaucracy, in many countries there are additional forums of institution heads and senior scientists whose role is to advise governments: committees of presidents or rectors, national councils of science or councils of science and technology, and more. This is usually another framework for privileged lords who mainly engage in stirring the pot and in the mutual bestowing of honors. An astonishing illustration (and probably not an exception in the global academic scene) can be found in a document of notes sent by Dr. Leah Tzivoni to the State Comptroller, following a report she published in 2005 on the Israeli National Academy of Sciences. Tzivoni, who served as the Academic Secretary of the National Academy from 1988 to 2004, as the Divisional Coordinator for Humanities, and as a member of other committees within this body, describes an organization that operates as a private latifundium: it abuses the powers conferred upon it by the law, conducts meetings in a charlatan manner, appoints relatives and acquaintances, manages budgets and finances in a reckless and manipulative way, prevents external criticism of its members, and pads its members with countless perks (including inflated salaries).[32]

Two Are Fewer Than One

The academic establishment is similar to the ecclesiastical establishment not only in the traditional titles of the senior positions—Chancellor, Rector, Provost, Dean—but also in its basic management model, which originated in the Middle Ages and since then has not changed much. It is referred to in the language of the experts as "double-headed management" or "shared governance," which means separation of administrative management and academic management. The model is based on the commendable aspiration to protect the academic freedom of the people of contents and the desire to free them from ongoing management concerns,[33] but the result is an "organized chaos" that is almost unmatched in the modern management world.

The academic institution is habitually headed by a president, who is also the head of the administrative division. In institutions where the president's role is merely representative, politicians, military figures, scholars of the law, and former holders of these positions are appointed. In a limited number of institutions, especially in Australia and New Zealand, there is a symbolic role above the president: visitor, a role originally reserved for the representative of the Church. When the university has several campuses, the chancellor is usually the general manager of the complex, with each campus having its own, separate president. In countries such as France, Germany, and Poland, the senior representative of the government is the representative president of several institutions from the same district, and does not manage them in practice. In all versions where the president is a representative figure, the rector is the head of the institution in practice.

A comprehensive survey of the characteristics of the presidents of American colleges and universities, which was conducted in 2017 by the American Council on Education, has identified three interesting characteristics: A) The average age of presidents was 62—ten years more than the average age 30 years ago. This may be due to the wider increase in life expectancy, but it is more likely to be related to the general aging of academic staff and the fact that fewer young people aspire to an administrative career in academia. B) The rate of women among presidents was about 30%. C) The rate of presidents from minority backgrounds was 17%.[34]

In most institutions, when the president is not just a representative figure, he is in charge of fundraising, budget management, strategic planning, and administrative appointments. He is appointed for a predetermined period and, as mentioned above, is considered the superior figure in the institution, although academic management is not in his hands.[35] The president has deputies who are his subordinates and who are in charge of specific administrative areas, such as finance, manpower, marketing and public relations, and who comprise the university's executive management.

The institution's academic division is headed by a rector—a term taken from the Latin word "regere" and borrowed from the Catholic Church. In Spain he or she is called "Magnific Rector," in Scotland "Lord Rector," in the U.S. and Canada "Provost," in England and Ireland "Vice Chancellor," and in Australia "Deputy Vice Chancellor." At liberal arts colleges, the rector is sometimes called the "Dean of College" or "Dean of Faculty."

Unlike the president, who is elected by the Executive Committee (usually a search committee for worthy candidates), the rector is elected by all faculty members (e.g. in Germany) or by their representatives (most often members of the Senate), and sometimes, for example in Italy, by a designated body representing the faculty and the students. There are countries (like the Czech Republic) in which the election of the rector is subject to the approval of the authorities.

In almost every institution, the rector is responsible for the professional side of academic work—research and teaching alike, including appointments and promotions. The rector's powers vary from institution to institution, as does his or her status within the organization, but usually his or her subordinates are the faculty deans, heads of vocational schools, and sometimes heads of colleges within the universities (when it comes to a large institution with affiliates), as well as the dean of students, dean of research, and library directors. The rector also heads the Senate, heads the Institutional Appointments Committee, and is a member of all of the university's executive bodies. In a plurality of the institutions, the rector is actually number two in the organization and is referred to as "Senior Vice President for Academic Affairs."

An organizational structure in which there is a separation of powers between administration and content is not uncommon and even works well in many places—for example, theaters that have an artistic director and a CEO, or schools that have a pedagogical director and an administrative director. However, a clear hierarchy is maintained in which there is a head to the system, with full powers of decision. In higher education institutions, however, the management model is not hierarchical. Although the president is formally the head of the institution, in practice his powers are very limited in the core areas of the organization, namely research and teaching (including curricula, academic appointments, and promotions). In fact, the rector and the president work in tandem with each other, and their cooperation is largely based on goodwill and human chemistry.

This dual leadership makes synergistic management difficult and in many cases paralyzes the system. When the management of one institution is split between two heads, who are also appointed separately, it is a breeding ground for conflicts of interest and interpersonal tensions. This split also makes it difficult to build the organization's vision and effectively implement policy.

The thing that is most strange and absurd about the split model is that it was originally intended to allow institutions of higher education to be managed in a differential-complementary manner (expert academics here, expert administrators there), but in practice, most presidents of higher education in the world also come to the role from within academia. A comprehensive survey conducted in the USA in 2001 found that 62% of college and university presidents came from the academic world rather than than the administrative and/or business worlds. In private institutions it was "only" 56%, while the rate in the public institutions was even higher—77%.[36] In other words, it's not about directors with proven administrative and business successes, but rather, and in most cases, about professors who are well-connected and who have paved their way to the top of the pyramid through political lobbying, personal connections, and elbowing.

Professional Mishmash

Every academic institution is a sort of scientific conglomerate that holds a variable mosaic of disciplinary units known as "faculties" (in some institutions it is customary to use the term "school"): social sciences, humanities, exact sciences, natural sciences, engineering sciences, health sciences, education sciences, and law. Each faculty is headed by a senior faculty member known as the dean. Each of these faculties consolidates a number of departments which are also headed by elected faculty members (less senior faculty members may also be appointed to this position). Additionally, smaller, more focused academic frameworks, such as laboratories, and research institutes, operate in institutions of higher education.

In principle, there is nothing improper—and may even be benefits—in decentralization of management, delegation of powers, and dispersing of power, but the over-splitting of the ancillary units gravely impairs the functioning of academic institutions for a number of reasons:

First, the discrepancies between the departments are often so large (the nature of the department's research and studies, the extent of budgets, the demand for degrees, and more) that it is difficult to apply uniform procedures, a comprehensive policy, and a common vision to them all. In fact, there is no parallel organization that simultaneously manages so many domains from so many different worlds of content. For example, departments such as English literature and nuclear engineering, whose common denominator is slight, can reside in the same institution and receive the same directives and instructions in the fields of teaching, budgeting, appointments, and so on.

Secondly, although all units are subject to the same management and university committees, many faculties and departments are granted broad managerial autonomy in many areas—for instance, managing the budget, recruiting personnel, and developing curricula. The result is a lack of coordination or loose coordination between the units in determining goals, powers, and budgets, as well as redundancies and waste of resources.

Thirdly, the university conglomerate is so fragmented and non-hierarchical that even simple managerial decisions require countless approvals and ratifications of approvals involving countless officials and faculty members (departmental council, faculty council, professional committees, ad hoc committees, and so on and so forth).

Another problem is the professional level of department heads and deans. Institutions of higher education deal with huge budgets, employ an army of workers, and hold income-yielding properties (buildings, halls, swimming pools, land, stocks, bonds, and more) that require regular maintenance, complex financial management, and informed investment. All this goes on while a large percentage of department heads and deans are devoid of all knowledge and experience in management and finance, nor have they undergone any prior professional training.[37] It is important to note that excellence in research and teaching is not a guarantee of management ability. In fact, these are usually contrasting skills that are hard to find in one person. It is not uncommon that a complete bumbler who is barely capable of managing his personal finances will be elected head of the department or dean. The result is, in many cases, an amateurish management, and often a careless one, which come at a heavy price. This may explain the fact that many institutions—which count leading economics and business researchers among their faculty—have nevertheless run into huge deficits.

Moreover, it is not uncommon that faculty members are elected to managerial positions (by vote within the department, faculty, or senate) on the basis of immaterial considerations, and mainly on the basis of political considerations by their members. In many cases, it is a default choice, meaning: the person who agrees to take on the job or "submit to the order of the movement" and who is "one of us." It is not uncommon for the appointment to be pulled together in the upper echelons through alliances and barter deals, even as most faculty members are not at all familiar with the job requirements, the candidate's managerial skills, and not least his or her suitability for the position. The members receive an instruction as to the choice of the clique, and they simply obey. In any case, everyone knows that very little (if anything) will change following the new appointment. Certainly, there are faculty members who succeed in their managerial role, but due to this method it is a random success.

Another problem with the academic management model lies in the fact that the senior director returns to the role of a regular faculty member after three to five years of tenure. Of course, one can argue that there is something beautiful and democratic in managerial rotation, but professionally this rotation is a disaster, reminiscent of the management problems that the Israeli kibbutz had when it was still fully communal. First, by the time the new manager learns the intricacies of the job, he's already about to complete his term and leave the job. Secondly, the model by which "you manage me today and I'll manage you tomorrow" devalues the managerial role and leads to avoidance of difficult and painful decisions (especially in matters of promotion, cutbacks, and worsening working conditions).

Only a handful survive in management positions over time, and usually not for the right reasons. In actuality, in almost every academic institution there is a limited group of wheeler-dealers who covet positions of control and power and engage in musical chairs among themselves. Many of them are mediocre scientists whose political-managerial career in academia compensates for their lack of intellectual brilliance or limited scientific success. The genuine geniuses of science are usually not drawn to management roles and internal politics from the outset, and they are immersed in the intellectual worlds where they find their calling. Thus, a 2017 study in the United States found that only at the top research universities in the country did presidents hold an impressive academic record. At the majority of the other institutions examined in the study, the figures at the top were not prominent academics, and many of them had difficulty climbing the academic ladder before being appointed to their high administrative position.[38]

It is not uncommon that battles for senior positions between wheeler-dealers pump in bad blood—not only because of ego and honors, but also because elected officials generally represent interest groups and coalitions within the institution.[39] It is important to each group to ensure maximum control over positions of power and influence in order to help its members with promotions, allocation of resources, staffing standards, and the like.

It is difficult to assess when the current academic management model will pass away and depart from this world, but indications of change are already out there. The financial crisis unveiled issues of irresponsible management, non-irregularities, and enormous spending in many institutions, along with poor auditing and supervision. The image of academic institutions as bodies that conduct their affairs in a prudent, well-informed, and honest manner, as befits scholars of science, arts, and humanities, is undermined year by year. The "academic freedom" umbrella[40] is already less protective of the institutions, and in a number of countries there have been some recorded precedents in which courts intervened when the university refused to allow government officials to examine their fiscal conduct. The previously large financial and managerial credit granted to them has been reduced more and more, and the funding bodies—governments, foundations, and donors—demand greater involvement and transparency, including the hiring of external consultants. Recently, organizations and associations acting for the quality of government have become a party to the demand, as has the media.

Furthermore, in many countries, evaluation committees have been established to examine the curricula, faculty composition, and performance of their members, with the aim of streamlining processes and setting proper priorities in financing research and teaching.[41] A number of reports have also been published that provided data, interpretations, and recommendations on the management and funding of academic institutions.[42] It is true that, in general, the reports have been conservative and the recommendations hesitant, satisfied with implementing minor amendments, but one can assume that the claims from outside for change will become more and more aggressive and frequent over time. It is worth noting here that control over the system of higher education has also been tightened at the international level. For example, when Bosnia-Herzegovina sought to join the EU, it was required to reform its education system and conform it to the Western European standard.[43]

Presumably, in the not-too-distant future, we will see more and more institutions merging the duties of the rector and the president and appointing a more professional and active Board of Governors that will demand a closer review of the accounting books and strategic plans. The demand for accountability is also expected to intensify.[44] Many institutions may shift to the conventional management model practiced in the business world, which means professional managers under a professional board of directors.

However, it is doubtful that all these actions will suffice to put the institutions of higher education on their feet again. In the current situation, it is doubtful whether talented executives, however talented they may be, would be willing to get into a sickbed with slim chances of recovery. What awaits them is mainly a huge deficit, along with faculty and staff who guard their cheese and fight for their livelihoods, treasury officials breathing down their necks, an anachronistic structure that is not suited to the new era, and an unsympathetic media for dessert. It is no coincidence that in recent years, the proportion of managers in higher education who left office—i.e. who were dismissed, who resigned, left at the end of one term, or whose term has not been extended—has increased.[45] By way of illustration, from 2011 to 2014, 16 of the 34 presidents of leading public research universities in the United States resigned or were dismissed.[46]

Donors Close Their Wallets

Most academic institutions in the world have diverse sources of income (tuition, rental yields, investment funds, sale of inventions and developments, and more). However, they do not function as a standard economic entity and are defined as non-profit institutions. They strive to maximize their equity, obviously, but do not distribute dividends and do not pass along revenues to any owners. There are some universities in the world that operate under the auspices of commercial companies, but they are very few and marginal.

The ongoing management and development of science and education entails high costs, which include, among other things, salaries and pensions, maintenance of buildings, ornamental areas and equipment, acquisition of materials and equipment, tuition fees, tuition subsidies, scholarships, and more. Institutions' own sources of income cannot cover their heavy expenses, so external sources are always required. In private institutions, these sources are primarily donors—and in public institutions, they primarily come from the government. Private institutions also generally benefit from government aid, such as subsidies, tax rebates, loans, and public research foundations.

The government budget varies from place to place and from time to time. It has to do with the state's economic situation, its priorities, and its economic and cultural tradition. In Europe, for example, 85% of the budget of higher education comes from the public treasury, as opposed to 45% in the United States.[47] Poor countries have difficulty funding their institutions of higher education via public sources, and are dependent on the support of wealthy countries, international science organizations, and charities.

The manner of financing also varies from country to country. In Norway, for example, budgets are determined in the House of Representatives, as part of the annual state's budget. In neighboring Finland, however, the funding is derived from a formula based on a strategic program called the "Academy of Finland," which is under the auspices of the Finnish Ministry of Education. In the United Kingdom, the government determines the policy of higher education, and the Council for Budgeting (HEFCE) only implements this policy (the Council has been split in 2018 into two sub-councils: one for teaching services and the other for funding scientific research and technological development). In Israel, the financing powers are vested in the Planning and Budgeting Committee, which acts as a subcommittee of the Council for Higher Education. In Japan, the national universities receive their ongoing operation grant directly from the Ministry of Education, while private institutions benefit from subsidization of ongoing expenditures through the Society for Advancement and Mutual Assistance of Private Schools in Japan.[48]

The element that is common to all countries worldwide is that higher education constitutes a significant percentage of the state budget in general and the education budget in particular.[49] In 2013, for example, the average global expenditure on higher education represented 21.8% of the total expenditure on education.[50] In OECD countries, the average government expenditure per college or university student in 2014 amounted to more than $16,000 on average—about 80% more than the expenditure per student in elementary school. Some countries, such as Canada, France, the Netherlands, Sweden, Hungary, Turkey, and the United States, spend two and a half times more on college or university students than elementary school students. In Mexico and Brazil the gap is threefold.[51]

Although the state contributes enormous sums to the ongoing funding of institutions of higher education, the money is insufficient in most cases, especially when it comes to research universities. Additional sources of income are needed, and one of the main sources is donations.

There is a large gap in the rate of donations between countries and institutions around the world, due to historical, economic, and cultural differences. In Europe, for example, the donation component is less central than in the United States or Australia, partly because the state provides higher rates of funding for colleges and universities. In the United States, the culture of donation is highly developed due to friendly tax laws (Patrick Rooney, dean of the Indiana University Lilly Family School of Philanthropy, argued that "the number of donors in the United States is greater than the number of voters in the election") and also due to the norm of externalizing wealth (in the United States, a person's wealth is measured more by the extent of his expenses than by the extent of his income).[52]

People donate their own money to academia mainly out of altruistic and patriotic motives. Many also feel gratitude for what they received from the institution where they studied, and translate it into checks. However, behind the motivation to contribute to public institutions—often very large sums—there are also considerations of benefit, first and foremost glorification and self-perpetuation. Countless buildings and halls are named after donors and their relatives, as are faculties, schools, academic departments, foundations, and scholarships. The donation is often worthwhile, too, because it is recognized as a tax expense and creates a positive image for the donor's business. This is all the more so when the donation increases the chances of the donor's offspring to be admitted to a prestigious institution—which is actually a kind of bribe (a study conducted by two researchers at Stanford and Princeton presents compelling evidence of this phenomenon, which is widespread in prestigious institutions in the U.S.).[53] In addition to all this, a donation serves as an instrument to strengthen the ties between private companies and institutions of higher education, and sometimes to strengthen relations between countries.[54]

In Israel, donations from private individuals constitute an important component of the budget of institutions of higher education. For example, 7% of the Hebrew University of Jerusalem's current budget comes from donations. A similar proportion of income comes from competitive foundations, and more than half of the university's income comes from tuition fees (as of 2010).[55] Israel's uniqueness is in that most donations come from Jews abroad, who are connected with all their heart and soul to the Jewish people and the State of Israel. For them, donating to institutions of higher education in Israel is a way to be partners in the Zionist enterprise, and often these are huge donations of tens and even hundreds of millions of dollars.[56]

It is important to emphasize, in this context, that even in countries where there is a well-developed tradition of contributions to institutions of higher education, most of the beneficiaries are the rich and prestigious institutions. In the United States, for example, there are some 4,000 colleges and universities, but only a few are successful in raising significant funds. In 2012, the average donation to private research universities in the United States was $128,000—twice the average contribution to public research universities and 100 times the average contribution to community colleges.[57] A prestigious club of 76 elite universities benefits from more than $1 billion in donations a year each (in 2017, Harvard raised $36 billion; Yale raised $27 billion; Stanford $25 billion; Princeton $24 billion; Duke, Washington, and Chicago $8 billion each; Ohio and New York $4 billion each).[58] In greater Europe, only the British Oxford and Cambridge ("Oxbridge") belong to the Billions Club.

The donations given to prestigious institutions have another important characteristic: most of them come from wealthy graduates. At Harvard, for example, one-fifth of the annual budget comes from donations from the institution's graduates. These huge donations allow "well-padded" universities to maintain and even increase their scientific advantage over other institutions, because they help fund advanced research labs, attract outstanding researchers and students, and maintain their own journals and publications. The donations also enhance the prestige of the wealthy institutions, allowing them to better survive periods of economic depression.[59]

But there is also the flip side of the coin: the blessing of donations comes with a catch. When charity becomes a central budget source, it creates an unhealthy dependence on unsteady cash flow, as it is difficult to build a balanced budget over time when relying on the goodness of benefactors. This growing dependence is also unhealthy because many donors in recent years tend to dictate the institution where to spend their money, thus restricting its independence (a comprehensive survey conducted in the United States in 2001 found that 63% of donations bear a restriction for use in accordance to the donor's requirements).[60] The result is that in many cases this financial addition is directed towards purposes that do not constitute a top priority for the institution, and it obviously does not help to repay debts. Sometimes the outcome is even more serious, because the donated buildings or equipment require annual maintenance that draws funds from the budget originally allocated to more important purposes.

Since the drastic drop in donations to institutions of higher education (and in donations in general) which manifested as secondary waves of the 2008 economic earthquake, there has been already a worldwide recovery, especially in the United States. From time to time, the media reports a huge donation that has broken another record, and the apparent impression is that the global economic growth has restored the trust of donors in academia. In reality, the picture is much less rosy—and to some extent even the opposite. First, when comparing the data to previous periods, it is not difficult to see that the decade of 2008-2017 was weaker than the previous yearly average. Also, the gap between the institutions that receive hefty donations and those who are barely thrown a bone, or those which donors do not even consider, is widening. As in other domains, the rich academic institutions become richer and the poor become poorer.

But the more interesting and sinister finding is that the nominal growth of donations lies mainly in the scope of mega-donations—that is, in individual philanthropists who donated one-time enormous sums, rather than the modest donations of many philanthropists.[61] This is not surprising considering that the economic growth of recent years has leveraged mainly the wealthy—not the middle deciles and certainly not the lower deciles. The mega-donations therefore compensated for the decline in the number of donors, a significant and alarming trend in terms of institutions of higher education. This means that donations today are more random and less predictable. And when there is volatility in a key financial source of an institution, its economic stability is undermined. Furthermore, in addition to the decline in the number of donors, a creeping reduction in the volume of donations is already emerging on the horizon. It stems from a number of reasons:[62]

- Donors have become more suspicious about the use of their money. The multitude of cases where mismanagement and even sometimes corruption is revealed in institutions of higher education (e.g., exorbitant salary conditions for senior executives) is likely to further weaken their trust in these institutions. The blessed increase in transparency in recent years has repeatedly exposed a manipulative use of donations—for example, an institution that clips coupons from donations that are designed to help students. Cases like these outrage and put off donors.
- The gap between the expenditures of the institutions and their income will continue to widen and debts will continue to pile up. This trend is expected to weaken the motivation to donate, because people are reluctant to pour money into a bottomless barrel.
- The fact that wealthy people contribute mainly to powerful institutions, and not to those which struggle for their existence, infuriates people with altruistic

sensitivities and a social agenda. The more that criticism of neoliberalism intensifies (and it is steadily intensifying), the more people will prefer to donate to organizations that reduce inequality in the world and not to those that augment it. Academia is perceived by many as creating gaps due to the difficulties experienced by segregated and socially excluded groups in being admitted to studies in general and into prestigious institutions and departments in particular.

- The competition in the donation market is growing fiercer. Alongside the religious, medical, educational, and scientific institutions which previously benefited from the lion's share of donations, thousands of organizations and institutions today engage in "charity hunting": for disadvantaged populations, children in distress, the disabled, animals, promoting political goals, saving the world, etc. The significance is that the charity is dispersed among many more fields, institutions and causes.
- Campuses in many Western countries have become a propaganda hub for dogmatic, delusional, and aggressive leftists (including manifestations of anti-Semitism). This belligerent agenda brings with it scientific and moral distortions and very often verbal and physical violence that deters many, including donors. Furthermore, in general, donors are looking for consensus and organizational stability, and are reluctant to contribute to institutions where conflict and chaos prevail.
- Many donors come from the world of industry and business, and they are beginning to internalize that institutions of higher education "do not deliver the goods." That is, they do not equip their graduates with updated tools for success in the employment market (we will elaborate on this later). Academia is also gradually losing its status as a leader in scientific research—especially when it comes to applied research—and people who contribute to science tend to contribute mainly to the groundbreakers.
- As mentioned above, the desperation for funding has led some institutions of higher education to adopt overly aggressive self-marketing techniques, such as those popular in the business world. This is annoying to many, who are already subject to endless harassment from fundraisers. Furthermore, due to the difficult economic situation, faculty members and even students are sent to collect donations. These patterns create antagonism in potential donors, because no one likes to be badgered and pestered or manipulated with pleas.

The expected decline in donations also lies in intergenerational differences:

- The millennials (and probably the generations that follow it) have entered the work world at a later age than its predecessors, and therefore it is also achieving economic stability later. With the exception of the narrow segment of high-tech workers and a few others, it is a poorer generation compared to its parents, and therefore can and wants to donate less money.[63]

- Young people today prefer to donate directly to entities and people in real and immediate distress—most often those associated with a moving story—rather than to public institutions (especially institutions with huge budgets). This phenomenon is called "effective altruism" or "donation with meaning," and it is expanding across all social strata.
- Many of the younger generation prefer a donation that is "dependent on reciprocity," meaning that the donation that they have made will also benefit them, either directly or indirectly. The most striking example of this is the popular model of crowdfunding, in which academia is, for the time being, out of the game (except for a few pioneer attempts).
- The millennials tend to attend social gatherings less in the institution in which they studied, because they maintain a continuous connection with their classmates through digital media, and have no need for physical gatherings, which are often exploited for fundraising.
- Many of the young people are disillusioned with academic studies and disgruntled by the burden of heavy debts incurred during the period of their studies. These feelings weaken their motivation to donate to the institution where they studied and to institutions of higher education in general.[64]

The Dubious Honor of Honorary Degrees

The desperate yearning for an addition to the budget brings many institutions to woo every potential donor. One of the means is the distribution of honorary titles. This is a long-standing tradition in which the academic institution grants a dignitary the symbolic title of "honorary doctor" (and rarely "honorary professor") as a tribute to outstanding accomplishments and contribution to science, art, economics, education, security, or society in general. The title is granted every year at a prestigious event as part of the awarding of doctoral degrees to the institution's graduates or at the Board of Governors assembly.

The first to confer this symbolic title was Oxford University, in 1478. It was granted to the Dean of the University of Exeter, who was "coincidentally" also the brother-in-law of King Edward IV and later Bishop of Salisbury. In the United States, the title was first awarded in 1962 by Harvard, and with time the idea became widespread throughout the academic world.

The concept of an honorary doctorate has always reflected the tradition and self-image of academia: an institution whose roots are ancient, with high prestige and civic commitment. It's as if it appropriates for itself the right and pretense to mark who are the outstanding figures in society, and awards them an entrance ticket to the exclusive club of dignitaries—that is, itself. Indirectly, the ceremony also aims to ratify the status of a higher academic title as a prestigious status symbol.

The history of honorary titles has known some bizarre nominations, including nominees whose hands are stained with blood. For example, North Korean tyrant Kim Jong-Un received an honorary Doctorate of Economics from the Malaysian University HELP (Higher Education Learning Philosophy University). However, in most institutions (especially in democratic countries), efforts are usually made to select individuals whose accomplishments are indeed worthy of merit. The problem is that the cardinals of academia disagree on just about everything, all the more so when it comes to titles, honors and ceremonies. Therefore, every now and then, major controversy around the selection of candidates erupts about a personality that has changed history. It may be easy to agree with the selection of Nelson Mandela, who was awarded five honorary titles in his lifetime, or the Dalai Lama, who has been awarded no fewer than 43 honorary titles—but candidates like Margaret Thatcher and Barack Obama have stirred heated arguments. Academia may indeed have invented political correctness, but Michael Crow, president of the University of Arizona, refused to award an honorary doctorate to the first African-American president, due to "the lack of sufficient accomplishments to date." At the University of Notre Dame, Indiana, Obama's candidacy also sparked unrest and protest, since his liberal views on abortion and embryonic stem cells research were inconsistent with the University's conservative Catholic views (incidentally, Obama did receive the title in Arizona—but didn't get it from Indiana. "Michelle agrees with you," he laughed when he received the title in Tucson. "She has a long list of things I still haven't managed to do yet and which I should do when I get home."[65] On the other hand, there have also been awardees who were requested to cede and return the honorary titles they received, post-factum, following the exposure of a shady past—in an act that was more disgraceful for those who selected them than to the nominees themselves.

The changes in the identity of the awardees of honorary doctorates reflect the processes of democratization and decentralization that are taking place in Western society. In the past, the title was mostly awarded to great scientists and artists, while today quite a few businessmen, politicians, and popular cultural stars (musicians, athletes, media personalities, etc.) receive it. The decentralization of honor would be positive and important, were it not for irrelevant considerations here as well. The honorary degree has already become yet another instrument for fundraising, and as a result, there is an increasing number of cases where the the selected persona is not a credit to the institution, but rather tarnishes and even makes a mockery of it.[66] For example, in 2016, York University in Toronto awarded Canadian billionaire Victor Dahdaleh an honorary title in a venue packed with newly-graduated students and their families. None of the university leaders mentioned in this ceremonial event the "trivial" detail which the media had revealed a month earlier: Dahdaleh had been allegedly mentioned in the "Panama Papers" as having been involved in a number of bribery cases. In his address, Dahdaleh recommended to his young audience: "Do your best to be good citizens," definitely a worthy recommendation. As far as York University was concerned, Dahdaleh did do at least one civil good deed in his life: A few months before he was awarded the honorary title, he donated $20 million to the institution. The donation was intended for the establishment of a building for the Global Health Institute—named, of course, after him.

Dahdaleh's case may be unusual in its severity and certainly in its exposure, but it is likely that whoever runs a thorough examination will discover that quite a few awardees of the honorary doctorate title have earned it mainly due to their financial contributions to the institution and less because of their extraordinary contributions to society.[67] But the clock of truth is ticking. The anachronism of it all, and especially the bad smell that often emanates from this ancient and rather ridiculous ritual, are likely to increase public criticism of what is happening behind the scenes. When it becomes clear that the idea of honoring eminent personalities has been replaced by honoring donors and privileged contributors, more and more institutions will abandon it altogether (this is already happening), and more candidates will give up this dubious honor. Moreover, the doctoral title, once considered highly prestigious and therefore also coveted, has begun to lose its status in recent years anyway; this is also likely to gradually diminish the value of the honorary doctorate. Thus, another indirect and non-kosher source of income will be lost.

The Deceptive Demand for Higher Education

Higher Education for All

In the twenty years between 1990 and 2009, the enrollment for bachelor's degree studies in the world increased by an average of 5% per year. During that time, the number of young people in the 18-22 age range, who constitute the major share of the student population, grew by only 1% on average. If in 2000 the number of students in the world was approximately 100 million, by 2014 it had already more than doubled, reaching 207 million. The rate of enrollment in academic studies sprang from 19% to 34% within the relevant age groups.[68] One of the most prominent examples of this global phenomenon is Israel. Since the establishment of the State of Israel, the number of students of all degrees, has increased by 130 times—almost tenfold the growth in the population. The number of students of all degrees, has nearly tripled— from 76,000 in 1990 to 209,000 in 2006.[69]

The increase in student numbers and their percentage in the population tells a dramatic story—the story of the higher education revolution, which is generating more opportunities for more people, and gradually aligning the class stratification pyramid.[70] However, this should not be overly celebrated: higher education is still not accessible to all in all countries. A study conducted by UNESCO in 62 countries found that one in five within the age range of 25 to 29 in the affluent strata acquired a college degree. In the underprivileged strata the ratio was about one in a hundred in the same age range.[71] As long as there is poverty in the world, there will also be young people for whom even high school studies would be a distant dream. Nevertheless, we should keep in mind the starting point and the trend.

A significant contribution to the increase in global demand for education can be attributed to the major countries. Just four countries—China, India, the United States and Russia—contributed no less than 45% to the increase in the years from 1990-2009. But, as mentioned above, the growth in demand occurs across all continents, and in some countries it has reached no less remarkable rates—sometimes higher than the demand for private cars.[72] In Pakistan, for example, the rate of those seeking higher education has increased by 179% in less than a decade (2002-2009). In Vietnam it has increased by 127%, in Bangladesh by 84%, in Turkey by 74%, in Saudi Arabia by 70%, and in Brazil and Nigeria by 68%.[73]

Higher education growth has reflected and contributed, concurrently, to the rapid economic growth of many countries—and especially to the strengthening of the "growing economies" in Asia, Eastern Europe and Latin America. Today, countries such as Japan, South Korea, Slovenia, the Czech Republic, Poland, Lithuania, Estonia, Hungary, Brazil, Chile, and Israel (Israel ranks first among OECD countries in the rate of graduates, just before Canada)[74] can be found at the top of the chart of enrollment in higher education. This rapid growth in the educated population is due to demographic, economic, and political reasons, including:

- The rise in the number of high school graduates.
- The burgeoning industry of preparation courses for college and university admission exams.

- The increase of scholarships, foundations, and student loans.
- The rise in standard of living (which enabled young people to study with the financial backing of their parents).
- The increase in life expectancy, which opens up the possibility of learning even at an advanced age (while working and even after retirement).
- The later entry (compared to the past) into the workforce, due to the lengthening of the interim period between adolescence and adulthood.
- The increase in the number of women joining the work and management circles.
- The transition to a services and information society along with rapid developments in the fields of organization, manufacturing, management, and technology, which have required world economies to train employees with broad knowledge and high cognitive skills, which at this stage can be acquired primarily in the academic world.
- More flexibility in workplaces, which enables students to study while working.
- The development of knowledge and innovations in the ultra-technological world that have led to the academization of professions which did not previously require academic training.
- The increase in the demand for an academic degree is also related to the change in the values scale that took place in the 1980s, with the rise in awareness of civil rights, including the basic right to education. Furthermore, the desire to "succeed in life" has become a motto for many youngsters, and has been typically translated into measurable tools of financial success. Since education is perceived as a key to financial well-being, it has become an important goal—both for young people and, perhaps even more, for their parents.

In addition to all these, the rapid growth in demand for higher education and its realization is both a cause and effect of the globalization trend. India is perhaps the most distinct example of this trend, not only because of its size and economic rise, but also because it is a democratic state and because some of its population, even the less educated, is fluent in English. And in percentage terms: in the more than three decades between 1983 and 2014, the rate of students in India increased from 6% to 18% in the age range of 18-21 years old. By 2020, their rate is expected to grow to 30%.[75]

The global growth in the number of students was accompanied by a parallel increase in the number of institutions of higher education. At the beginning of the 1980s, many new colleges emerged in most countries, riding the waves of the increasing demand. In the United Kingdom, for example, the number of colleges and universities increased by over five times—from 31 in 1962 to 164 in 2015.[76] In the

1989-90 academic year, 21 institutions in Israel awarded academic degrees. 22 years later, in 2011, there were already 71 such institutions in the country.[77] In Taiwan, in 1950, there were only 7 institutions of higher education. In 1986 they amounted to 105, and by 2012 they had already reached 163.[78]

As of 2018, there are approximately 28,000 institutions of higher education in the world, most of them public and some private.[79] Approximately 16,000 institutions in more than 180 countries have been ratified by local government bodies (naturally, there are differences in the criteria for defining a scientific institution).[80]

India is the leader in the number of institutions with 3,944, followed by the United States with 3,257 institutions, then China—2208, Indonesia—2110, Brazil—1394, Russia—1172, Japan—980, and Mexico—916. The second tier on the global scale (countries with several hundred institutions) includes the United Kingdom, Australia, Canada, Germany, France, Italy, Spain, Poland, Iran, Malaysia, Colombia, Pakistan, Ukraine, Nigeria, and the Philippines. Most countries are in the third tier with dozens of institutions, among them the Netherlands, Sweden, Singapore, Taiwan, Ireland, Hungary, Thailand, Slovenia, Greece, and Israel. Another fairly large group includes countries with ten institutions of higher education at most—most of which are located in the African continent and in Latin America.[81]

The tremendous growth in the number of institutions has been facilitated by public pressure on governments to reform the emerging education market and allow the entry of new players into the arena—small colleges established primarily in peripheral regions and old, vocational colleges that have been ratified to upgrade to academic institutions. In order to compete with the veteran institutions, they have offered a variety of inducements: studies close to home, more favorable admission conditions, employment-oriented study professions, and more.

Tuition Fees Increase More and More

From the Middle Ages until the first half of the 20th century, most universities in the world did not charge tuition fees because they operated under the auspices of the church or the central government, and were designed to train a serving elite of clergy and senior officials. In the second half of the 20th century, coinciding with the rapid growth of the education system in the Western world, the model of academic education for a fee began to spread and became instituted. This model took a quantum leap in the 1980s—especially in the United States and the United Kingdom—inspired by the ultra-capitalist socioeconomic approach led by President Ronald Reagan and Prime Minister Margaret Thatcher. Since then, there has been a worldwide increase in the number of private institutions of higher education—and at the same time, a consistent increase in tuition has started to take place, both in private and public institutions.[82]

In most countries, tuition is not subject to the supply and demand forces of the market. In many cases, governments set a maximum fee for public institutions, and only private institutions are allowed to charge tuition as they see fit. Only in a small number of countries, most notably the United States, is there only minimal supervision, if any, and universities (even public universities, which benefit from government funding) are permitted to set the amount of the tuition themselves.

The gap between the tuition fees charged by prestigious and coveted institutions and those that are charged by the "ordinary" ones is enormous: $40,000 a year or even more in prestigious private institutions, compared to $4,000 and even less in peripheral community colleges.

The extent of tuition is not only affected by the prestige of the institution, but also by the field of study. For example, tuition fees in dentistry programs in Canada are almost three times higher than tuition fees in the field of education. The cost of advanced degrees (master's and doctoral degrees) is usually higher than the bachelor's degree, but in practice a large proportion of these students pay less because the employer who sends them to study is funding it—at least partially—or because they receive scholarships and sometimes discounts for their work as research and/or teaching assistants.[83]

Since higher education is considered in many countries a "basic commodity" or a vested civil right, most students in the world do not pay real tuition fees for what they receive, and their studies are subsidized. The extent of the aid and its nature differs from country to country, and is related to the academic tradition and the cultural and economic characteristics.[84]

More than 40 countries provide their citizens with higher education in public institutions free of charge or for a symbolic fee—for example, Argentina, Kenya, Morocco, Egypt, Uruguay, Scotland, Turkey, and Greece. In some countries (Germany, France, Sweden, Norway, etc.), the government enables free studies or symbolic costs for foreign students as well. In Denmark, not only is higher education free, but students with Danish citizenship also receive monthly financial support of $900 for living expenses.[85]

However, more and more countries have recently reduced their subsidies for higher education, and the result is a steady increase in tuition fees. In most countries, this increase is much higher than the increase in the average wage and the cost of living.[86] The average expenditure on tuition relative to families' average incomes have consequently reached alarming rates in some countries—much more than in previous generations.[87] Here are several examples: In 2014, the average annual tuition fee for a bachelor's degree in Japan was $24,000 (18% of average household income), in Singapore $35,000 (36%), in the United Kingdom $40,000 (42%), in Lithuania and Ukraine $23,000 (50%), in the United States $92,000 (53%), in Malaysia $18,000 (55%), in Chile $24,000 (73%), and in Hungary, the average tuition of institutions of higher education reached the frightening rate of 92% of the income of an average household, when the average tuition there was $34,000.[88]

The raising of tuition fees is supposedly meant to compensate for the ongoing cuts in government subsidies to the institutions, but there are also other reasons, including the institutions' desire to improve the learning experience and be more attractive in the turbulent academic market (higher education's customers today have higher standards of living compared to those in the past). More comfortable chairs and tables, pools, gyms and sports halls, designed learning spaces, air conditioners, lawns, comfortable dormitories, and computer equipment—all these and many other upgrades cost money and demand a steady increase in the budget (in recent decades, most of the service branches in developed countries have become more expensive, as part of the general improvement in standard of living).[89] Some believe that the ease with which student loans, discounts, and scholarships are provided in many countries is another factor responsible for raising tuition so aggressively. In competitive education markets, such as the United States, discounts and scholarships provided by institutions are intended, among other things, to lure students to enroll (many of them from families with financial difficulties).[90]

Alongside all of this, sad to say, one of the reasons for the large increase in tuition is the greed and insensitivity of the heads of colleges and universities. For many institution administrators, this is the easiest and most convenient way to repay debts and, in many cases, raise senior executives' wages to outrageous volumes.[91]

For example, in the mid-1980s, the typical salary of a U.S. research university president was on average 70% higher than the typical salary of a tenured faculty member with the rank of professor. In 2015, the gap increased to 350% in public universities and to 400% in private universities. In 2015, nearly 40 presidents of private institutions in the United States earned more than $1 million a year, as did 8 presidents of public institutions.[92]

In 2014, a protest of students and faculty members broke out at the Western Ontario University in Canada as a result of a disclosure that, in parallel to cutbacks in faculty members' salaries and increases in tuition, the institution's president doubled his salary (some professors earned less than one percent of the president's salary).[93] This was a fairly rare case of protest over the salaries of senior academics, for the simple reason that most senior salaries are not exposed to the public eye, and most professors fear for their status and are careful not to open their mouths.

Unfortunately, institutions of higher education have allowed themselves to increase their tuition more and more not only because the education market is not really free, but also because of their clients' indifference and blind trust in academia. Many of the students and their families regard the tuition fees as they regard work and exams, namely: if this is the requirement—then it's an indication that it is justified, and, anyway, there is no alternative.

The Growing Burden of Subsidization

The steady increase in tuition fees has not stopped the increasing demand for higher education. In fact, anyone observing the dry data of demand may get the impression that the state of the institutions is better than ever. So believe, or want to believe, many of the heads of universities and colleges, as well as senior government officials in the relevant offices in dozens of capitals.[94] In reality, for the first time after two decades of rapid growth, there has been a recent slowdown in demand growth.[95] In some countries, including Israel, this is not a slowdown but a real decline (2.5% in the years 2014-2018), which perhaps heralds the beginning of a trend reversal.[96]

The heads of higher education institutions ascribe this slowdown to the fact that the class of high school graduates is small. In Japan, for example, the 18-year-old population shrank by 40% in 18 years—from 2 million in 1992 to 1.2 million in 2009. If this trend does not stop, universities could lose tuition as a major source of funding—a problem already defined by experts as a ticking time bomb.[97]

In our estimation, the slowdown in demand for higher education is expected to continue not only for demographic reasons, but also because the gap between tuition and the socioeconomic value of the degree is increasing (we will expand on this in the eventh chapter on education).

But since, in the meantime, the state is required to subsidize more and more students, the budgetary burden on governments continues to grow and become heavier. In the years 2008-2014, the higher education subsidy budget in the OECD countries, for example, increased by an average of 18%. Brazil and Turkey almost doubled their spending in this budgetary section during these years.[98]

It is important to remember that governments subsidize academic tuition not only by transferring funds directly to institutions, but also through scholarships, discounts, merit awards, and student loans. In the United States, 75% of students receive scholarships or subsidized loans. In Mexico, its neighbor to the south, 12% of students receive aid in the form of stipends or subsidized loans (this may be a small percentage compared to the United States, but a large one in relation to the state's budget). In wealthy Germany, the government provides students, among other things, with an aid fund, which includes grants and 20-year loan terms. The Dutch government grants students who do not live in their parents' home a basic allowance of 300 Euros per month. To cover the tuition fee, which amounts to 1,900 Euros a year, the Dutch student can get a subsidized loan from the government, at a meager rate of 0.8%, and begin to repay it only two years after completing his studies, in an up to 15-year loan terms. In Australia, the government's loan repayment terms depend on earning ability after receiving the degree, and it is standardized according to professions.

In some countries, the government also provides guarantees on tuition loans from private entities. In South Korea, for example, no fewer than 750,000 students take out sizable loans from banks each year to finance their tuition, and the government guarantees these loans for a period of seven years. In France there is a plentiful system of scholarships, based on academic excellence or economic and personal status, and the government grants a 10-year guarantee on 70% of the loans granted to students.[99]

It is doubtful whether governments will be able to withstand this budgetary burden in the future and continue to subsidize students—both directly and indirectly. Indications for reducing and even stopping the subsidy are already apparent on the ground. For example, in a number of federations in Germany whose economic situation has deteriorated, it has been decided for the first time to collect tuition fees from students. The Japanese government has gradually increased tuition fees at national universities—from a nominal sum of 360 dollars in 1975 to more than $5,000 in 2008, which has greatly reduced the gap between the tuition fees in public institutions and tuition fees in private institutions.[100] In the United States, the government's funding for students has decreased by 27% in five years (2012-2007).[101]

In fact, the old model of the "public university," which is based on a substantial subsidy of tuition fees by the state, is eroding.[102] Even institutions where refraining from charging tuition fees was ideological and constituted a longstanding tradition have succumbed to the economic burden over the past decade. One of the symbolic examples is the well-known Cooper Union College in New York, which announced in 2011 that it had no choice but to change its policy.

We are nearing a point where both governments that subsidize tuition fees and citizens who pay increasing tuition fees will realize that it is difficult, if not impossible, to maintain higher education in the current format, and that it is preferable to invest in alternative formats such as professional education in the private market and online teaching (we will elaborate on that later). In an era where most websites are accessible to any user free of charge, paying for studies, especially at high rates, becomes absurd.

The Heavy Shadow of the Mountain of Debt

The growing demand for higher education, accompanied by a sharp rise in tuition fees, along with a general trend of bulimic consumerism and an irresponsible policy of loans up-for-grabs, has made the issue of mounting student debt one of the most pressing economic problems that plague Western economies—most markedly the United Kingdom, Australia, Canada, and the United States. Student debt in the United Kingdom reached beyond the staggering amount of 100 billion pounds in the beginning of 2017 when the average student debt amounted to 50,000. According to the Institute for Fiscal Studies, the British government will be forced to write off some of its debts in the future, as 77% of graduates will not earn enough to repay their debt even 30 years after being awarded a degree.[103] In Australia, the average graduate debt amounted to $22,000 in 2012, and in Canada $20,000.[104] Experts have calculated that it would take a Canadian graduate an average of 14 years to be freed from the burden of debt.[105]

In the United States, the majority of loans are granted by the state goverments and about 30% come from private lenders—at exorbitant interest rates. Once the borrower stops paying, the collection agencies enter the picture and harass the borrower mafia-style. From 1999 to 2012, the total student debt in the United States increased by 551% and exceeded the trillion-dollar standard—second in its amount to housing mortgages. Of all household debt in the United States, the debt for higher education loans is the fastest-growing.

In 2012, more than 44 million Americans still paid for student loans and 9% of borrowers dodged this debt repayment—an all-time record. In fact, the real data is even more serious than the official statistics, because many universities are finding creative ways to improve and roll on the debts. In one of the reportages that reviewed the problem of student loans, one of the experts speculated that one of three students is evading repayment.[106] Not for nothing did the Occupy Student Debt Campaign movement emerge that year—a syndicate of desperate students collapsing under the heavy burden—that ran a campaign for a total write-off of their debts. They managed to raise more than 30,000 signatures (in 2015 another protest was organized for the same purpose, on more than 100 campuses across the country)[107]—but that didn't help them. By 2016, American student debt had already reached $1.4 trillion (7.5% of the GDP)—a nearly threefold increase in 10 years (in 2006, student debts amounted to $480 billion, "just" 3.5% of the GDP). By 2018, debts had been overblown up to $1.5 trillion, and American academic graduates emerged with an average debt of $30,000.

Many predict that student debt will be the next bubble that will burst in the American economy, just like the real estate bubble and the sub-prime crisis.[108] It is important to note that there are economists who believe that the media has taken the issue of debt out of proportion. They claim that not a small proportion of young people around the world are graduating without debts at all. According to them, the heavy debts pushing the average upward mainly belong to graduates who studied in private institutions and paid particularly high tuition fees, as well as doctoral students forced to live on starvation wages at the very stage at which they start a family (about 55% of US doctoral graduates complete their studies with a debt of more than $120,000!). Another claim is that the loan of higher education is like a housing mortgage. The young students take upon themselves a financial debt, knowing that their investment will pay off in the long run and that the repayment will be gradual.

But these claims are demagogic. First, the data show that the average debt grows over time.[109] Second, as we will see later on, the reward for investing in an academic degree is diminishing. And third, medium-scale debts also have a devastating effect on young people: they make it difficult for the students to study with a mind at peace and force them to work long hours while studying. These debts also push many young people into the labor market with a huge overdraft, which overshadows the joy of independence and makes it difficult to buy an apartment and start a family.[110]

By the way, in Israel the problem is slightly less severe, as only 0.8% of Israelis take out a loan to finance their studies, compared to the United States, where 13% of the population does so. Tuition fees in Israel for most academic institutions is supervised and subsidized and amounts to approximately NIS 10,000 per academic year (or approximately NIS 13,000 per year for a master's degree), while in the United States they are tens of thousands of dollars a year. In addition, the state grants soldiers a scholarship grant.[111] However, even in countries where higher education is free of charge or at a nominal fee, many students still complete their studies with debts due to the cost of living. In 2013, the *Atlantic* reported that 85% of Sweden's students graduate with an average debt of $20,000,[112] and that's just one example. Overall, there are millions of young people around the world who will spend most of their lives repaying heavy loans they took on as students.

The consequences of the student debt problem are, of course, not just the concern of the students and their families. They are not just economic either. This crisis is harming the clean image of institutions of higher education as non-profit institutions. The image is also stained as students cry out under the burden, higher education leaders continue to pad themselves with fat salaries and excessive benefits, and senior bank executives greedily celebrate at the expense of the overdraft epidemic. All of this is expected to intensify public anger at academic institutions, reduce the demand for higher education, and lead to a dwindling financial source of tuition fees.

It is important to remember that the increase in the demand for education has stemmed in part from the growing parenting ethos. The mothers and fathers of this generation felt obligated to fund their children's higher education as part of the parental excellence package. In order to tell themselves that they were exemplary parents, they were willing to invest huge sums and take on large debts. It is doubtful whether Generation Y and Generation Z will feel the same commitment towards their descendants (the Alpha Generation). While these are generations that are equally and perhaps even more committed to the parenting ethos, they are, by the same token, more critical and flexible consumers and often share information with others about the true value of the products they purchase. In the future, more and more parents will relay to each other that it is better to send the children to acquire education and a vocation in other ways.[113]

A Temporary Lifeline from China

If, in the past, the main demand for a higher education degree has come from the upper deciles, in recent decades the trend has reversed. In many countries, the majority of the demand actually comes from the middle strata and, more recently, from those lower on the socioeconomic scale. In community colleges in the United States, for example, the rate of Hispanic students who are the first generation in their families in higher education has doubled from 13% to 26% in the 15 years from 2001 to 2016.[114] This change probably reflects a welcome trend of eliminating the social monopoly of the old elites on the academic degree, as well as the creation of a more egalitarian and open socioeconomic structure. However, over time this trend may prove to be a double-edged sword, as it erodes the elite image of higher education. It is a known paradoxical process which has also taken place in other domains, such as law, security, and education: the more popular a status symbol becomes, the more it loses its value in society.

New demographic strata are entering the gates of higher education not only because of economic mobility processes and changes in values (including awareness of the need to correct social wrongs), but also because, in troubled times, institutions of higher education are increasingly lowering admission standards (we will expand on this later). But it turns out that the addition of students from new strata also fails to rescue the institutions from the economic crisis. Fortunately for them, there is demand from abroad. The main winners (at this stage) are of course the rich countries.

"Internationalization" is a relatively new component, but already very significant in the strategy of higher education institutions.[115] Many universities promote international collaborations in diverse and varied formats, such as the establishment of international academic extensions, mainly of large and well-established universities; faculty and student exchanges, including allocation of funds for tuition scholarships as well as grants for visiting professors; scientific collaborations between researchers, research entities, and funding bodies, and between higher education institutions and international companies; global standardization of degrees, and mutual recognition of institutions from different countries in academic accreditation, including recognition of a bachelor's degree in order to pursue postgraduate studies in another country; English curricula (more and more universities are conducting graduate studies at least partially in English); translation of courses into foreign languages, mostly through online platforms; and facilitation from immigration authorities in obtaining student visas and residence permits.

The most prominent phenomenon of internationalization of higher education is the rapid growth in the number and rate of young people studying outside their homeland.[116] Sometimes these are not studies for a full degree, but enrichment, internships, or gaining experience abroad—as part of the mandatory curriculum or just as an option for those interested.

Student exchange programs for all degrees were formulated internationally as early as the 1980s,[117] but the trend has expanded greatly in recent years. The fact that nowadays employers consider partial or full-time studies an advantage when seeking employees has also contributed to the phenomenon. In Germany, for example, a government program was launched regarding this issue. Its goal is that by 2020, half of the country's students will experience at least partial study abroad. As of 2015, the rate had already reached one-third of German students. In the United States, a five-year program called Generation Study Abroad was formulated, and it is expected to double the number of students who will engage in some experience abroad during their academic studies.[118]

Alongside the expansion of the trend of a partial study experience abroad, the trend of full academic degree studies in another country is expanding. Moreover, if in the past the majority of students who have chosen to study abroad have done so for advanced degrees, in recent years the trend is also expanding for bachelor's degrees.

The internationalization trend is led by the EU, which has built diverse programs to encourage collaboration and student mobility. The most known and important ones are: the ERASMUS Program (European Region Action Scheme for the Mobility of University Students); the Bologna Agreement (formally known as the Bologna Process) to standardize the accumulation of credit points for degrees, mutual recognition of courses, and homogenization of the degrees structure; and TEMPUS (Trans-European Mobility Program for University Studies] for the sharing of knowledge and experience with neighboring countries.[119]

The figures speak for themselves: In 1990, the number of university students studying for a degree outside their homeland was 1.3 million, by 2000 it had risen to 2 million, and by 2016 it had already soared to more than double—to 4.8 million international students. In 2015, international students accounted for 6% of all students in OECD countries. In some countries, the rates of foreign students are particularly high. For example, in the UK and Australia, they constitute more than one-fifth of all students in the country. In Canada, the growth rate of students from abroad is 10% per year, in Germany 8%, and in France 4%. In the United States, approximately one million international students studied in institutions of higher education in 2017, representing approximately 7% of students.[120]

Furthermore, not so many years ago, most of the students who studied abroad were channelled towards a limited number of prestigious destination institutions in the United States, the United Kingdom, France, Germany, and Australia. But similarly to what has happened with the world's tourist destinations, worldwide destinations for study also vary. Malaysia, South Korea, Singapore, and New Zealand are already on the list. And above all is China, which is closing gaps with the West in this area as well.[121] Brazil, too, is soon expected to join the leading countries in absorbing students from abroad—which illustrates the general transformation taking place in the global balance of power.[122]

The majority of international students come from Asian and African countries (from European countries, only Germany and France "export" many students).[123] Anyone who visits the metropolitan centers in Europe and Australia today can see thousands of Chinese young people gathering in the food, entertainment, and shopping centers. A similar picture can be seen in the university cafeterias and libraries.[124] The Chinese language has become so prevalent on campuses that the head of the master's program at Duke University in North Carolina was reprimanded and transferred to another position after sending bulk emails asking Chinese students to speak only English on campus.[125]

The increase in the number of international students can be attributed to several factors:

- Technological and economic changes have spawned a new era in the history of mankind, where it is easier to move from one place to another, to understand one another, to collaborate, to study, to work, and to travel abroad, to experience new and enriching cultural experiences—and also to emigrate. The statistics of higher education spectacularly narrate the story of the development of the global village. For example, as the economic disparities between neighboring countries reduce, the turnover of students increases between them. In Latin America, the tendency to study in a neighboring country increased from 11% in 1999 to 23% in 2007. In East Asia, the trend was similar—from 26% to 42% in that same period. In Japan, approximately 90% of international students come from other Asian countries.[126]

- Naturally, student mobility is influenced by political, economic, and social trends. An example of this is the toughening of the British visa policy for students from India, which led to a deliberate decline in their numbers.[127] Such examples, however, are the exception that proves the rule. Many countries embrace international students, who are considered young people with high personal potential, with the purpose of compensating for their internal population shrinkage and raising their ranking in the international indices. This is probably the reason why quite a few foreign students receive scholarships and other benefits from the host government. In addition, foreign students bring funds into cities and host countries through their living expenses. In the United Kingdom, for example, international students brought in more than £10 billion pounds into the kingdom's treasury as of March 2012.[128]
- Governments in countries from which many young people depart to study around the world are encouraging this phenomenon, because some of these students (especially students of advanced degrees) are studying in prestigious institutions and in advanced scientific environments, and when they return home they improve and enhance the level of science in their homeland. Some countries, among them Italy and France, even grant encouragement scholarships to local young people who study in other countries.[129]
- The intelligence services of various countries encourage the migration of students and professors abroad, using them to gather information.[130]
- A wide gap has been formed between supply (the amount of institutions and their capacity) and demand for education in countries belonging to the second and third wealth circles. Many young people are forced to seek their fortune abroad—because they were not admitted to studies in their own country. In Nigeria, for example, in the decade between 2005 and 2015, the demand for study abroad soared by 164%.[131] One of the most outstanding examples in this context is medical studies. Many young people (including in Israel) who were not admitted to medical studies in their homeland apply to institutions in Eastern Europe (mainly Romania and Hungary) and Italy. The phenomenon has expanded in part because many families in the peripheral countries have become wealthy in recent years and can finance their children's studies in prestigious institutions.

  Furthermore, some parents prefer funding their children's studies in a foreign country in the hope (which is also often realized) that it will build and sustain a greater commitment to graduate.
- Many students choose to study abroad because the field of study that interests them is not taught in their homeland or because the level of studies abroad is higher.

- Some countries have an inherent advantage in specific fields of study. Studying the history or art of ancient times in Greece or Italy, for example, is particularly alluring, because the most important monuments and historic landmarks are there. Many would prefer to study design, architecture, or winemaking in countries such as France, Italy, or Spain—where these fields of study have been developed over many generations. In subjects where a foreign language is required (e.g. Asian or European studies), students prefer to acquire it in its natural environment.
- As we have already mentioned, many are turning to study and acquire an advanced academic degree abroad because it is advantageous in many workplaces (and also in academic careers).
- In a world with a growing rate of single men and women, sometimes studying elsewhere opens up more opportunities for meeting and dating new people.
- Apart from the prestige, studying in the company of people from different cultures, in a foreign environment, offers an enriching and empowering experience.

But more than everything, foreign students are welcomed with a warm embrace by many institutions of higher education because they can be charged higher tuition fees (as in the interest of hospitals in "medical tourism") and thus supplement the institution's income. In Israel, for instance, a local student in a regular study program for a bachelor's or master's degree pays a subsidized tuition fee of about $4,000 a year to the public institutions. A student from overseas pays about $12,000 a year for a similar program. In programs like medicine and engineering, a foreign student's tuition can even reach the amount of $30,000.[132]

The funding channel through overseas students has become so important to universities in the West that many institutions have established offices for the development and marketing of international study programs and the absorption of foreign students.[133] Many universities in non-English-speaking countries offer English courses to foreign students, and quite a few departments and faculties have shifted to teaching all or most of the courses in English. Concurrently, the growing demand has engendered commercial companies and private consultants that help young people—for a fee, of course—to select an educational institution abroad, pass the entrance exams, and carry out the registration and admission procedures.

However, what appears to be a promising cash source for the higher education market will not necessarily remain as such for long. It seems that the time of this oxygen pipeline is also limited for three main reasons:

- Growing economies, particularly China and India, are quickly closing their gaps as compared to the West. As the gap becomes narrower, the more young people's motivation to study outside their country decreases—precisely for the reasons that drive them out today.
- The vast economic reforms of the last two decades have created a massive middle class stratum of more than 200 million people in China. These hundreds of millions are generating a huge demand for higher education at a high level. To illustrate: Between 2007 and 2015, the number of Chinese students in the United States grew by 166%. One-third of the United States' international students at the end of the second decade of the 21st century are Chinese, and even Xi Mingze, daughter of the president of China, is a Harvard graduate (she graduated in 2015). Furthermore, if in the past the majority of Chinese students studied for master's and doctoral degrees (in 2016 they constituted one-tenth of all doctorate recipients in the United States), most of them now study for a bachelor's degree.[134]

  Universities have long identified that Chinese parents are willing to make a great sacrifice in order for their children to study abroad, and research has already found that the average tuition that Chinese parents are willing to pay to a U.S. university is equivalent to the ten-year average annual disposable income of an urban household in China.[135] Middle-class parents enroll their children in English-learning programs as early as kindergarten, and American companies are conducting preparatory courses for admission exams to universities in Western countries in thousands of study centers throughout China.[136]

  But the trend is already beginning to change direction. The Chinese are not gullible dupes and excel in intelligent consumerism. They have begun to realize that higher education institutions in the Western countries regard them primarily as a cash cow, and the result is a growing resentment that is expected to yield, in the future, reductions in the tuition fees they are charged. Moreover, the Chinese power has long since become not only a prominent student exporter but also a significant importer, and is considered one of the world's most sought-after higher education destinations,[137] Mainly, for now, it attracts students from Asia and Africa, but it is also gradually drawing young people from Western countries. If in the past, the interest in China was mainly historical and cultural, today, as China is one of the world's leading economic and technological leaders, it is expanding into other domains.

  It is therefore likely that at some point the balance between exports and imports of students will be reversed. When this happens, more Chinese students will prefer to pursue a higher education in their homeland.

- But above all, online teaching will eliminate the need to physically move to another country in the not-distant future. As most academic courses will be accessed online, a sharp drop in the number of international students will be recorded, and with it a drop in the cash flow that comes with them.

The Exploited Workforce of Academia

Most higher education institutions employ two types of professors, with many common denominators between them—but also a deep chasm. The first one, the coveted position, is a professor who holds a position position, most often full-time tenure. These professors belong to the permanent faculty of the institution, are also engaged in research, and are on the path of an academic career with advancement in rank and salary. The second type is temporary professors or lecturers, whose employment is renewed and terminated every year or every semester.

The temporary professor category consists of two sub-groups. The first consists of experts from outside of academia (judges, physicians, architects, artists, journalists, businessmen, etc.) who are invited to teach one or two courses to enrich the department's curriculum. They tend to accept the invitation for one or more of the following reasons: a liking for teaching and contact with youngsters avid for knowledge, social status (in many countries "academic professor" is still considered a prestigious label), supplementary income, recruiting outstanding students for jobs, expanding relationships with peers, and sometimes even social aims.

The second group—the larger one—consists of non-tenured faculty members whose main or entire job is academic teaching and for whom it is their main or only source of livelihood.[138] These professors usually work part-time, and are paid on the basis of teaching hours or the number of courses they teach (in the United States, a temporary professor is paid $3,000 to $5,000 per semester course). Their salaries do not include all the benefits of a tenured faculty member (such as vacations, sabbaticals, personal office, research budgets, etc.) and they do not have representation in the institution's executive bodies (a right granted to students in most places).[139] To earn a living, many of them have to assemble a puzzle of teaching in several institutions. In the United States, for example, according to a 2014 report, 89% of external teachers worked in more than one institution. 13% worked in four or more institutions.[140]

Most part-time and temporary professors teach only within the framework of the bachelor's degree, and this is actually an academic proletariat—"grunt workers" whose nicknames in the various countries tell the story of their exploitation and organizational inferiority: "adjunct professor," "adjunct faculty," "sessional lecturer," "non-tenure track faculty" and more commonly "contingent faculty", "conditional professor" or "adjunct" (in Spain the nickname is "Professor Adjunto").

In contrast to his truncated rights, the duties of the adjunct professor in the field of teaching are the same as those of the tenured professors—from preparing a syllabus, to preparing for lectures, teaching in classes, holding office hours, checking papers and exams, and grading.

The growing trend in the number and proportion of adjunct professors began more than 50 years ago, but has accelerated in the last two decades, and today a large part, and in some countries even the majority of professors, in institutions of higher education are employed on temporary and partial contracts (i.e. without a permanent position).[141]

If in the United States, for example, only about 20% of professors were employed as temporary employees in 1969, in 2007 their proportion grew to 70%, and in 2015 to 76% (most of them also part-time). In the UK, the proportion of temporary professors that year was 60%.[142] Linkedin Network has recently reported that "adjunct teacher" is one of the fastest-growing jobs in the American employment market. It is for a good reason that the United States has earned the unflattering nickname "Adjunct Nation"—"the nation of the appendages."[143]

It is important to note: The adjunct professor position was not born in sin. This employment pattern was originally created with good intentions: to give young professors an opportunity to acquire experience in teaching and to seize a stand-by position in case a permanent position became vacant; to offer research students a chance to experience teaching; to add instructors in courses with many participants, mainly introductory courses; and to meet the demand for more and more courses in light of the rapid increase in the number of students.

But then the heads of colleges and universities saw that it was a favorable thing, and the temporariness and the exception became permanent. At this stage, the main consideration has become economic: it saves the institution many expenses and allows for maximum flexibility. Since the demand for a part-time position continued to rise, everyone seemed happy with the deal. Up to a few years ago, there was not enough awareness in the world about abusive employment, and this also made it easier for institutions to make a wrongdoing acceptable.

The new colleges, which sprung up like mushrooms in the 1990s, have further contributed to the institutionalization of the phenomenon from another direction, because they focus on teaching and vocational training and less on research, and unlike universities, they have no sources of income other than tuition. For them, temporary employment is almost the only option.

However, the economic motive was not the only motive for expanding and motivating the "'equals' and more 'equals'" phenomenon in academia. Economists have examined and found that even during periods where economic strain decreased, this employment pattern continued to expand—including in the wealthy institutions. To illustrate: Harvard University increased the number of adjunct professors in recent decades even as its revenues soared to $35.7 billion (more than the GDP of most countries in the world). The reason for this phenomenon is simple and painful: greed and cynicism—two human traits that drive the expansion and institutionalization of the phenomenon of independent contractor employees in other areas of employment as well. Economist Thomas Sowell blamed the veteran professors for organized exploitation. He claimed that they encouraged the employment of temporary teachers so as to make time for research for themselves and to better their working conditions (for example, exemption from the mass introductory courses). He seems to have been right.[144]

But there was another reason for the phenomenon to take root: the priorities of higher education institutions. Teaching in most academic institutions has always been considered inferior to research, and in a time of economic crisis, it has been pushed even further into the corner.[145] Moreover, in contrast to investments in buildings, laboratories, or advanced equipment, whose yield can be seen in a relatively short timeframe, the investment in teaching bears fruit only after years. It is also difficult to quantify it, and, as is well-known, what is difficult to measure and publicize is less nurtured.

The phenomenon of adjunct professors has been a dark and muted secret for many years. In fact, most students do not now distinguish even today between a tenured faculty member and a temporary and part-time staff member, because most professors do not usually tell the class about themselves and their work (many of them are ashamed of their status). Since the victims of the system kept silent about it, and since the media did not closely scrutinize the academic world, the scope and implications of the phenomenon were not revealed.

Recently, a change has begun to take place. The distortion and injustice have been exposed in a series of essays, articles, and books, which depicted a shocking reality in which poverty and distress nowadays is not only the fate of the less educated, but also of the most educated strata—those previously regarded as the elite. A survey conducted in 2015 in the United States found that one-third of adjunct professors were struggling to pay rent or meet their mortgage payments, and sometimes even current household bills. 17% had difficulty even buying food.[146] Another survey conducted that same year found that 25% of part-time professors and their families were registered for at least one public assistance program, such as medical aid or food coupons.[147] Many of them earn less than the minimum wage and find it difficult to make ends meet. A growing proportion of them live on the verge of poverty or are already there. They work long hours (above the average in the employment market), are unemployed for long periods (for at least several months between one school year to another), and move from institution to institution and from department to department to garner teaching hours, without any minimal financial collaterals, exhausted and discouraged. No wonder someone has already bestowed upon them the awful nickname "the fast-food workers of the academic world." This is really the way things are: academia uses them and throws them out.[148]

At the extreme end of the distress scale, there are already those who have had to resort to public works projects for the unemployed in order to supplement their income. Some have become homeless and even deteriorated into prostitution. It is true that, in the meantime, these are extreme cases which mainly characterize the brutal American economy, but they illustrate the moral degradation to which academia worldwide has deteriorated following the economic depression.[149]

One might expect that faculty members would feel uneasy in view of the deep class gaps in their institutions. In practice, this does not happen. Even inequality and discrimination scholars who preach against the wrongs of the world are indifferent to the injustice when it comes to their private comfort zone. And not only did most of veterans in the profession not lift a finger to alleviate the deprivation phenomenon within their domain, but the gaps continue to grow and the exploitation is becoming increasingly disgraceful. In the United Kingdom, for example, a cunning contract called "zero-hour contracts" was devised, which does not specify the number of hours the professor is supposed to teach. Instead, he commits to be available and to be called up for duty at any time (usually at the last minute).[150]

As the climb on the ladder of academic ranks goes upwards, the moral standards become only more desensitized. Thus, as tenured teaching staff in the institutions is diminishing and the group of the "hanging by a thread" expanding—the senior management staff is growing, and many of those holding senior positions further raise their inflated salaries and award themselves fat bonuses.[151] One article in the *Chronicle of Higher Education* reported on three New York universities—Columbia University, New York University, and the New School—where adjunct teachers constituted the majority of faculty members (60%, 79%, and 90% respectively as of 2013), while at the same time, the presidents of these institutions earned more than $1 million each.[152] Professor Lee Hall of the Institute of Legal Education at the Widener University of Pennsylvania, said in an article published by the *Guardian* that while she earned $15,000 a year (in 2013), James Harris, the president of the university in which she worked, earned $997,000.[153] A report published in 2014 showed that this repulsive phenomenon was common in many North American academic institutions,[154] but it is likely to be no less common and in fact even more common in Europe, Asia, and Latin America, because the academic world there is a more closed and less transparent territory.

There are those who try to defend this employment model using the favorite argument of exploiters: this is a free market. The terms of employment are known in advance to all parties, including those who have the least chance to advance to a permanent position. Others will retort that this is a demagogic argument in the style of "everyone has a right to live under a bridge." Even when the exploited party signs a contract in which they accept and take upon themselves the terms, what is unethical remains unethical—just as in the exploitation of women throughout the ages.

Another argument defending the model claims that most adjunct professors prefer a part-time job over a demanding career. But this argument does not stand the test of facts. A 2015 survey found that 73% of part-time professors in the United States covet a full-time position.[155] Their motivation is not related only to salary levels, but also stems from the desire to achieve employment stability and peace of mind. Studies have also found that feelings of alienation, anxiety, stress, and depression are common among adjunct professors and are characteristic of those who work in part-time jobs, not by choice.[156]

Another argument in favor of the model explains that the salary gaps between tenured professors and adjunct professors are inevitable in light of the burden weighing on the shoulders of tenured professors (temporary professors are released from the obligation to conduct research and publish articles with everything that this entails, including various administrative duties). If that argument were true, academia would have created two separate career paths from the outset, and rewarded each accordingly. In reality, adjunct professors do not work fewer hours and sometimes actually work even more than tenured professors. The mere comparison of pay slips is untenable because it does not take into account many salary benefits and bonuses that are withheld from the temporary staff. It also ignores the fact that temporary professors usually do not receive the aid of teaching assistants, and therefore the burden placed on their shoulders is heavier.

But the most baseless argument is the one claiming that the distinction between the two employment patterns reflects the desire to improve the quality of teaching. The logic here is that when a professor is exempt from research, he can devote himself solely to teaching. In practice, not only does this model not improve the quality of teaching, but rather impairs it for a number of reasons:[157]

- Since the sword of layoffs is constantly hanging over the heads of adjunct professors, and since their work is temporary by definition, they feel quite apprehensive of teaching subject matter that may not be liked by the senior faculty. In this way, academic freedom is attenuated, including the teaching freedom of a large number of professors. At the same time, the students' right to hear less common and conventional things is compromised.

- Adjunct professors must ensure that the courses they teach will be in current demand, so efforts are made to satisfy student wishes. The inevitable result is inflation of grades and deflation of requirements and constructive criticism. In an age where the student is a coveted customer, an adjunct professor's refusal to grant academic accommodations may cost him or her a loss of livelihood.
- The level of teaching is also compromised because adjunct personnel change frequently, even before they get sufficient time to be familiarized with the system and improve. The rapid turnover also makes it difficult for outstanding students to receive letters of recommendation. In many cases, when students need a recommendation upon the completion of their studies, they discover to their surprise that the first-year professor is no longer teaching at the institution.
- Adjunct professors usually teach far more hours than tenured professors—and in more than one institution. The heavy teaching load makes it difficult to develop new courses, or to update and refresh the subject matter. Furthermore, since they are subject to the changing needs of the institutions, they are often alerted and hired at the last minute (sometimes a month or even less before the semester begins), which does not allow thorough preparation for the course.
- The small quantity of teaching hours in each institution makes it difficult for professors to hold personal meetings with students in order to provide counseling or support outside of classroom hours.

  Even a proper office for such meetings is not available to many, and they are forced to meet with their students in the cafeteria or on a bench in the campus yard.
- In a large percentage of the institutions, adjunct lecturers are excluded from the regular meetings of the department and faculty. Not only does this increase their sense of alienation, it also makes it more difficult for "contingent professors" to update their students and advise them in a broader context.
- The need to juggle between departments and institutions, the lack of sabbatical, and the constant pressure of livelihood and work insecurity increase the potential for burnout as well as the level of frustration and bitterness of

> adjunct professors. As amazing as it sounds, this means that a large part of today's academic teaching staff is made up of desperate people, who feel exploited and hopeless.

The feudal employment of adjunct professors harms academia not only in its moral and pedagogical aspects. It also weakens the distinct identity of the institution, since it is less associated with its professors, who come and go. Furthermore, fewer professors feel like household members of the institution in which they work, and therefore participate less in campus activities and in its processes of improvement. And above all, the scientific profession is less perceived as a respectable profession worthy of investment. How symbolic, sad, and perhaps even amusing, that in 2017 the American Sociological Association removed the professional field "faculty member in academia" from the category of stable careers for the middle class.[158]

And the question still remains: why does the victim cooperate with the exploitative system, and in fact preserve it by his silence? Moreover, although one might expect that the problems associated with the phenomenon of adjunct professors would deter young doctorates from applying to these jobs—the demand is only growing. Many young people continue today to knock on the gates of academia and gather job crumbs. Several explanations can be offered for this paradox:

- In 2000, the *Quarterly Journal of Economics* published an article entitled "Why do drug dealers still live with their moms?" The authors, economist Steven Levitt and sociologist Sudhir Venkatesh, presented an interesting thesis, which was later expanded into a bestselling book called "Freakonomics: A Rogue Economist Explores the Hidden Side of Everything" (written by Levitt along with journalist Stephen Joseph Dubner). The authors juxtaposed the employment method of adjunct professors with the common one in the world of crime: Mafia heads sit back in their fancy villas and get rich thanks to the dirty work done by "contractor workers" who live a life of poverty and also bear the consequences: addiction to drug and alcohol and serving time in jail, in the hope that the day will come that they will become senior mafia leaders. Likewise, the adjunct professors serve years of hard labor[159] because of the dream—or rather the illusion—of attaining a permanent job someday, while repressing the grave and real significance of a temporary-forever job.
- In many of the scientific professions, there are virtually no employment alternatives outside the academic world. So those who have already reached this far in the profession (Ph.D and postdoc) are not in a hurry to walk out. In general, it is difficult for anyone who has completed an advanced degree

to engage in professional retraining (especially in the humanities and social sciences).

- Despite the low financial reward, many young people are attracted to teaching in academia because it provides an intellectual challenge and is ego-gratifying. Many also assume (mistakenly, of course) that teaching will enhance their résumé and help them gain a better job in the future.
- Many employers are reluctant to employ people with advanced degrees and resort to the flattering but frustrating "over-qualified" excuse. They prefer to train "hungry" young people who have just completed their bachelor's or master's degrees.
- The Millenials, who have recently begun manning adjunct positions, are seeking less long-term linear careers, and tends to hop from job to job (a standard time of stay of this generation in a workplace ranges from one to three years). Many of those born in the 1980s and 1990s also perceive their work in academia as an interim job. For a given time this job suits them, until the next job, the next trip, or the long vacation courtesy of their parents.

Unfortunately, the format of part-time and temporary jobs in academia also continues to exist because they are mainly staffed by women (61% of American adjunct professors are women).[160] They agree to work under the exploitative conditions we described above for a number of reasons:[161]

- This model allows them flexible working hours. This is especially convenient when there are babies and toddlers at home.
- In many families, the woman's salary is still considered a "second salary" while that of the man—the "primeval hunter"—is the primary source of livelihood, which means women more easily allow themselves to earn less. In this vein, studies have shown that not a small proportion of female adjunct professors are married to tenured professors, and they "sit on the fence"—by choice or lack thereof—for the sake of their spouses' careers. This phenomenon has already been named "the Housewives of Higher Education."
- The fact that adjunct professors are exempt from research, and therefore also from the burdens of publishing articles, the struggle for raising research funds, and tough competition, is also a consideration for many women, who seek to invest primarily in motherhood.

In addition, the proportion of minorities among adjunct professors is also high; needless to say, the bargaining power of minorities is weaker, and therefore easier to exploit.

However, it is doubtful whether the part-time-temporary employment model can continue to exist over time. It is likely to explode in the face of academia eventually, due to one or more of the following reasons:[162]

- The pattern of adjunct professors is, as aforestated, harming teaching, and in the long run will keep students away from campuses.
- An organization cannot survive over time and thrive when its economic model is based on exploited and disgruntled employees.
- When the work environment in institutions of higher education is contaminated, the public image of the academic world is also stained. The pretense of scientists is not only to discover the wonders of the world, but also to constitute an example of ethicality, incorruptibility, honesty, integrity, and sensitivity to injustice and oppression. In light of this exploitative employment model, this very pretense claimed by the scientists seems increasingly ridiculous.
- The phenomenon of castes—"masters and servants" or the dukes of science versus the academic proletariat—has been fully exposed in all its ugliness in recent years, and criticism in the media, research literature, social networks, and pressure groups—civil rights associations and trade unions—is mounting. In the meantime, the criticism has engendered a weak, temporary, and local protest, due to adjunct professors' fear of losing what little they have, and it has generated only cosmetic improvements in the terms of employment (for example, obtaining unemployment benefits between contracts). But the nature of protest against injustice is that it gains momentum. An example of this is the American Federation of Teachers's Just Ask! campaign, in which college and university applicants and their parents were encouraged to ask questions about the employment method of temporary professors while on campus tours for the purpose of choosing a school.[163]

But it seems that even before the oppressed form a class status consciousness and mount the barricades, the academic Bastille will fall on its own—because, ultimately, the problem of the professors is simply an indication of a deeper problem: the incompatibility of the traditional academic model with the new era. Therefore, even sincere willingness by the institutions to change the employment model will not salvage them. First, even if the institutions had intentions to improve the terms of employment of adjunct professors and to grant them fair wages, in the current economic reality this is impossible, since huge sums of money are in question.

Secondly, when most of the courses shift to digital media, most adjunct professors will lose their jobs anyway, and the next in line will be the tenured ones. In the future, when the teaching monopoly emerges from the grasp of academic institutions and the higher education market opens, it will be subject to common rules of supply and demand. Under such conditions, the finest and most sought-after professors will survive, regardless of their academic status. That is, the moral problem will not be solved by equalization of employment conditions, but by eliminating traditional academic teaching.

A Bottomless Barrel of Pension Debts

Higher education institutions have always ensured beneficial retirement arrangements for their employees. The main method has largely been employment-based pensions, where the employee is not required to allocate a provision of a part of his salary for his retirement annuity. The employer finances the annuity that the employee will receive for the rest of his life, using funds that he or she (the employer) reserves for this purpose. Many academic institutions have kept this arrangement tooth and nail, and governments have not pressed for change, in order to provide scientists with financial security and to attract talented people to science.[164]

The transition to a competitive market economy, which emphasizes freedom of choice and personal responsibility, alongside the weakening of the "married to the organization" model, i.e. sticking to one workplace for life, has led to the continuing abandonment of the employment-based pensions model in all professions,[165] and introduced alternative tools: accumulated pensions and integrated life insurance savings (what is branded in Israel as "senior employees insurance," although it is also offered to ordinary employees). In the new tools, both the employer and the employee allocate monthly agreed amounts to pension savings in the employee's name; from this source, the employee will be paid a monthly allowance after his retirement, according to the amount he has accumulated.

A pension fund of any kind is supposed to suffice for the long-term welfare of its insured, and the joint fund constitutes a guarantee. The employing institutions (in the case of employment-based pensions) and the pension funds (in the case of accumulated pensions and senior employees' insurance) are therefore required to maintain an actuarial balance. However, in the past few decades, actuarial deficits have been mounting in almost every pension fund in the world, due to a series of factors:

- The increase in life expectancy, without a corresponding change in retirement age, burdens further annuity payments on the joint foundation, since the pension period—from retirement to death—is lengthened.

- The decline in the number of active employees in most countries, which detracts from the ratio of those who fill the funds to those who empty them (potential support ratio). In the OECD countries, in 1950, this ratio was 7.2 between the age range from 20 to 64 years old and anyone over the age of 65. By 1975, the number—which is actually the employment rate—had plummeted to 5.1, and by 2015 it reached 3.5. Experts predict that by 2050 there will be only 1.8 20 to 64-year-olds for anyone over the age of 65. Over time, it will therefore be very difficult, even impossible, to financially support all pensioners.[166]
- The increase in the number of unemployed has reduced the number of pension savers, and therefore also the amount of money flowing into various types of funds.

But beyond the external causes which are related to macro-processes, there is another reason for the actuarial deficits accrued by higher education institutions: mismanagement and extravagance.[167] Not only did institutions not always ensure that the allocated funds to pension payments arrived at their destination, but there were many who used the existing pension reserves (contrary to the law, ethics, and logic) to finance current needs and failed investments. The cessation of retirement pension provisions and the improper use of funds which have already been reserved has become more common in the wake of the 2008 economic crisis.

Many argue that the global pension problem is equivalent in its destructive potential to global warming because it lays an impossible future burden on young people. The dimensions are truly inconceivable: according to World Economic Forum analysts, eight of the leading economies (the United States, Canada, the United Kingdom, the Netherlands, Japan, Australia, China, and India) have accumulated an actuarial deficit of 70 trillion dollars in 2015.[168]

This problem is indeed not unique to institutions of higher education, but in many countries academia is one of the largest public sector employers, where employment-based pensions were more widespread.[169] Even in a nation such as the United States, with a high proportion of private institutions, the majority of employees of public colleges and universities, and more than a third of tenured academic faculty members, were part of an employment-based pensions scheme in 2012. In countries such as the United Kingdom, the United States, or Israel, the pension debts of educational institutions are considered a problem on a national scale.[170] In Israel, the actuarial debt of the seven veteran research universities was estimated by the state comptroller at NIS 15 billion in 2008. In 2017, it inflated to 31 billion, which means a surge of more than double within ten years.[171]

Already by the end of the 20th century, many institutions in the world have undertaken a series of financial emergency measures in an attempt to cover the actuarial deficit (usually following a government demand). In many countries the old model has been completely abolished, and the new faculty members have switched to a model of accrued personal pension. The deficit has also forced many institutions to worsen the pension conditions of their employees. They were required, among other things, to allocate an amount out of their salary to a foundation that would help the institution finance the employment-based pensions in due time, to increase the provision if it already existed, and/or increase the retirement age. Furthermore: In order to avoid future pension payments, the tendency is to employ temporary professors, devoid of permanent position, of whose deprivation and exploitation we have already told and will further tell.

But this is all too little and too late.[172] Everyone involved recognizes that the crisis is jeopardizing the future of the higher education system, and there is no solution in sight. In the meantime, the crisis is managed as if it were a chronic disease, while it could become terminal.

Those who are already retired feel fortunate and protected (according to the law practiced in several states, the conditions of those who are already retired cannot be harmed),[173] while faculty members who are far from retirement generally adopt the familiar human tendency to repress the fact that we are all aging. In any case, academics do not have the power to do much about it, as their professional maneuvering options are limited, and most cannot engage in professional retraining or even transfer to another institution.

The common denominator of all those who are party to the open secret is a denial in the style of the poor fellow who falls from the 40th floor and says to himself on the 20th floor: “so far, everything is fine.” Their premise is that the pension problem is a national and global problem and will eventually be resolved through financial “haircuts” and government aid.

It won’t be simple. The pension problem is difficult to solve not only because of the difficulty of covering such a large debt, but also because it is a politically sensitive and volatile issue. This can be illustrated by the University and College Professors’ Union strike that broke out in February 2018 in the United Kingdom.

The strike was declared after the university administration’s umbrella organization unilaterally decided to impair professors’ pension arrangements. It was the longest and biggest strike in the history of British academia. More than 60 institutions shut their doors for four weeks, with professors receiving sweeping support from students and the general public. It turned out that when the problems affect the pockets of the faculty members, they are prepared and willing to break the bond of silence. Upon the outbreak of the strike, the registration for professors' union membership soared by hundreds of percentage points. Active participation in protest operations has also soared, and thousands of professors who, until then, had been sitting on the fence joined the picket line. Even in the pouring rain and freezing cold, many congregated at workers' meetings, demonstrated a loud presence at the gates of the institutions, and prevented the entry of workers.[174]

It was the first time a strike of this kind had succeeded in Britain, and the heads of the universities agreed to engage in an arbitration process. Some believed that the success was also related to the new union members' profile (and by implication, that of faculty members too): If in the past, leaders of universities were veteran, conservative professors who avoided confrontations with the establishment, the next generation holds a more cooperative and conscious attitude towards its rights, and therefore is less prone to warped justification.

The success of the British protest does not, of course, herald a solution to the pension problem in the academic world. Maybe even the other way around. Despite the awareness of the worsening problem, most governments do not take action to solve it from the ground up. The result is that the actuarial deficits of academic institutions continue to inflate, and are expected to contribute further, from another direction, to the worsening economic crisis which they are facing. This, for a number of reasons:

- The dependence of academic institutions on treasury officials will increase, because without government aid, they have no capability to comply with pension obligations to their employees.
- Even the streamlining of institutions cannot eliminate the actuarial deficit that is usually added to the other deficits and debts, which are cumulatively increasing. It's like a person who gives up buying coffee because he or she has a million-shekel debt.
- The danger that hovers over future pensions of veteran faculty members, alongside the worsening conditions of employment and pensions for young people, make academic careers less attractive. The cost is a loss of quality professors who turn to more rewarding jobs outside academia.[175]
- Deficits will lead to creeping damage to previously promised benefits and are expected to increase tension within the academic system.[176] The great 2018 strike in the UK was basically just a "promo" for the restlessness awaiting to happen in the future.
- The actuarial crisis increases the pressure to raise tuition fees,[177] which will probably contribute to a decline in the number of students and to increasing deficits.

Many members of the faculty believe that no government will allow itself to throw thousands of retired scientists to the dogs. Maybe they're right, maybe not. Either way, it can be assumed that, when the time comes, the actuarial deficit will constitute another heavy argument of governments on the way to abolishing the traditional employment model in academia (in fact, the impairment of conditions has already begun, as we will expand in the chapter on academic careers), closing institutions, and offering early retirement packages to many professors with terms that will entail fierce struggles.

How Much Is Eureka Worth—And to Whom

The term "intellectual property" or "intellectual capital" refers to the rights to human works such as technological inventions (patents), computer software, databases, research findings, literary works, music, and art, which are protected by property laws in most countries. These laws prohibit the use of these properties, even if they are non-material, without obtaining the owner's permission and sometimes also paying the holder of the rights. However, unlike intangible assets, ownership of intellectual property is limited in time. For a defined period of time, the owners of the rights are authorized to trade in the intellectual property that they generate and profit from, but at the end of the period, it becomes general property (in Israel, for example, a drug discovered during medical research is protected for 20 years). In many countries, patent law stipulates that only a "beneficial" invention which has "inventive progress," can be registered as a patent (a word that sometimes replaces the term "intellectual property") and be granted protection under the law.[178]

In ancient times, ideas and inventions were considered the common property of the educated elite, and manuscripts were distributed by the manual copying of monks (most often in Greek and Latin), without any legal protections. Modern academia began publishing the findings of its research in organized journals and books, and was careful to mention the names of the researchers and authors. But the rewards for the works were mainly honor and reputation.[179] The prevailing conception at the time was that universities were out of the commercial game, and scientists did not work to sell the fruits of their intellectual labor but rather to search for the truth and enrich human knowledge.

But noble goals and social generosity were detrimental to getting potential huge sums of money for academia. Hundreds and thousands of economic entities and industrial establishments have become rich at the expense of scientists' genius, and incubators in which inventions have grown have received no remuneration. An unwritten distribution of roles has actually been created: we (the academics) will research, and you (industry) will implement and develop the results and products of our research. We will invest our abilities and you will reap the profits. And so even in exceptional cases where inventions have yielded royalties to higher education institutions, the main purpose has not been to reward employees but to maintain the institution and the research.

The first glimmers indicating the creation of legal protections (through the establishment of standards) on the commercial products of campus research emerged in the first half of the 20th century. At the same time, the first attempts of academic institutions (especially in the United States) were also made to generate profit from the commercial potential of scientific inventions and the establishment of economic companies on campus. But these were random and unsystematic attempts that did not change the rules of the game. At the beginning of the new millennium, there was a change of direction in institutions of higher education in the world regarding access to intellectual property. There were a number of factors underlying this change in direction:[180]

- In a turbo-consumer culture, the obsessive pursuit of wealth shoves aside and impulse towards contribution to society.
- The desperate need of institutions to raise funds has led their leaders to look for additional ways to generate profits.
- The development of the entrepreneurship and idea industry—that is, companies whose primary of profit is invention and patents rather than their practical application, and who are not engaged in manufacturing and marketing—has been well-suited to scientific institutions. If a young entrepreneur can make a number of millions exit with an original idea and a laptop, there is no reason for academia's scientists not to join in the celebration.
- The development of the global network has promoted and strengthened legal practice and awareness of knowledge rights.

The new profit approach that has developed thanks to all these factors has taken on a practical character on campuses through three notable moves:

- Tightening of the legal protection of intellectual property and copyrights held by academic institutions. Guidelines papers and partnership agreements, carefully formulated by skilled lawyers, try to seal off every loophole.
- Increase of indirect and direct support for profit-generating research, and investing in setting up incubators for start-up companies, most often in collaboration with industrial establishments invited to enter the campuses.[181] These are primarily initiatives in the fields of electronics, software, medicine, biotechnology and biomedicine, chemistry, physics, nanotechnology, and engineering.

Indeed, investments increase year by year—and so do profits.[182] The leading countries generating profit from intellectual property in academia are the United States, Canada, the United Kingdom, Australia, and Israel (already flatteringly dubbed "start-up Nation"). In 2007, Israel was ranked third, after Switzerland and Sweden, in international patent (PCT) registration in relation to population size, and the four leading academic institutions in Israel (Hebrew University, Tel Aviv University, the Technion [Israel Institute of Technology] and Weizmann Institute) were ranked among the 100 academic institutions that registered the most patents.

- Increased use of knowledge commercialization companies, which specialize in identifying commercial potential and directing faculty members to profit-generating research, as well as in registering patents and turning them into commercial products. Israel has played an important historical role in this regard: indeed, the world's first knowledge commercialization company was established at the University of Wisconsin in the United States, but the second one was the Weizmann Institute's "Yeda [Hebrew for 'knowledge'] Research and Development," and the third "Yissum [Hebrew for 'application'] Research Development Company" of the Hebrew University.[183] Using legal tools, these companies also help define new reciprocal relationships and interaction between institutions, scientists, and commercial companies.

It should be noted that the wars over gains or scientific inventions are not restricted to campus boundaries. Governments also want to benefit from the gains of higher education institutions—not only through taxation on profits, but also through laws designed to increase the transfer of knowledge transfer to the public benefit.[184]

The commercialization of knowledge seemingly includes important benefits for academia: substantial revenues for researchers and institutions, incentives for accomplishment and excellence, increased funding for research, a boost for development of technological applications and scientific inventions, and a flow of knowledge from industry to academia and from academia to industry. But can profits from intellectual properties prevent the economic collapse of higher education institutions? The answer seems to be negative. In upside-down logic, these gains may even accelerate the economic collapse because:

- In fact, very few higher education institutions in the world (for example, Columbia, Northwestern, New York, California, and Princeton Universities in the United States) earn substantial sums amounting to $100 million or more on patent registration and licensing (most commonly drugs).[185] The majority of other universities do not even cover the expenses involved in the development and legal registration of the inventions. Moreover, unfortunately, most institutions have no significant potential for selling intellectual properties due to their areas of expertise.[186]

- Since intellectual property copyrights are relatively new and extremely complex legal issues, they are embroiled in a fierce moral and legal controversy—which in many countries impede legislation and make ruling difficult. When academia entered the games of profit, it often found itself in a clash of interests between management and faculty. The core of the controversy was the question: to whom do the royalties belong—to the institution that employs scientists and provides them with working conditions, wages, and time, or to the scientist who conceived the idea, toiled day and night, and usually also obtained the funding to put it into effect? Any attempt to weigh the contribution of the scientist's skills relative to the contribution of the institution is doomed to failure.
- In recent years, many academic institutions have been trying to expand the boundaries of the sector, and demand to make a buck off of other intellectual properties of their faculty members which were not previously considered in financial terms—for example, online academic courses and even books. This has stirred up a great deal of anger among professors, not only because it robs the poor man of his lamb, but because it is another manifestation of the vulgar commercialization of academia and the cynical enslavement of faculty members to the economic production line.[187] The appetite and greed of institutions of higher education may in the future lead them to demand not only a share of the research funds that scientists raise and bring for their research (through the collection of "overhead"), but also a share of monetary prizes such as Nobel Prizes and Field Medals. In the meantime (we say, cynically), as financial scarcity grows worse, even the absurd becomes reality. Meanwhile, by virtue of current patent law, which grants the employer ownership of the inventions of his employees, the universities are allegedly the owners of the intellectual property of the inventions of their faculty members. And still, reality is vague and therefore also explosive. Many legal experts believe that, in effect, the rights belong to the scientists and not to the institution that employs them, and the dispute is far from over.[188] For good reason, there has been a rise in copyright infringement lawsuits filed by faculty members against the institution in which they are employed, as well as lawsuits filed by institutions against faculty members, and even reciprocal legal claims between

scientists. Incidentally, to date, the institutions of higher education have been the ones to increase claims for rights to the works of their scientists. It is quite likely that the trend will be reversed, and scientists will sue for a cut of the profits from their employers for their direct and indirect contribution to institutional revenue—for example, for a media interview, which constitutes an indirect advertisement of their university with a monetary value.

- If all this is not enough, the issue of rights becomes even more complex and complicated due to the fact that, in parallel with the academic institution, many scientists also work in an economic/industrial organization or in a private enterprise—not to mention working in a host institution (for example, during a sabbatical) or international collaborations. Therefore, in many cases, it is impossible to determine—and often also impossible to know—where and when the invention was conceived.[189] A particularly familiar and symbolic example is the Israeli company "Mobileye." Eighteen years after its inception—and after having already turned its two founders into billionaires—the company was sold to Intel for $15 billion, the largest exit in Israeli high-tech history to date. The fact that some of Mobileye's technology was conceived and developed in the Hebrew University's School of Engineering and Computer Science labs has sparked a dispute between the university and Prof. Amnon Shashua, who owned 7.5% of the company on the eve of its sale, around the question of who owns the company's intellectual property. Mobileye categorically rejected the University's and its Economic Society's claim that they were entitled to some of the royalties received in the sale transaction, and Professor Shashua, in an act of protest, threatened to resign from the University. Eventually, the Executive Committee of the Hebrew University decided, by a majority of votes, to withdraw the demands, contrary to the opinion of the Chairman of the Board of Governors and the Chairman of "Yissum," the technology transfer company of the Hebrew University.

  The judicialization pervasive in the higher education system is one of the causes of the formation of an organization climate saturated with suspicions, shady business plots, and grievances. The growing tension between scientists and universities on the matter of ownership of inventions and discoveries turns the academic arena into a more tense, less friendly, and less community-based entity. Many faculty members feel like exploited miners in the scientific mine, and the result is alienation.

- The new economic orientation of the institutions provides an advantage to applied science fields, which are potentially profitable. This may deepen the class gap within the institutions between the humanities and social sciences and the rest of the sciences. Already today, the attitude towards "unprofitable" scientists—those who do not bring in enough budgets and do not generate inventions—is much more dismissive than ever, to the point of treating them as parasites and freeloaders. This is how an ecology of "only the (economically) strong scientists survive" is coming into being.

- The sale of intellectual properties increases the economic gap between institutions around the world. It is expected to escalate the competition between them, and to create negative and destructive phenomena such as concealing information, deprivation of rights, bias in research results, etc.
- The pursuit of economic profit changes the identity and tarnishes the clean image of academia. Many, both inside and outside of academia, oppose this change—for ideological, professional, and personal reasons (fear of losing their job). It is therefore to be expected that the increase in the istitutions' profits from patents will increase the public polemic and debate around academia's identity and the direction in which it is heading. Furthermore, turning academia into a commercial organization would force it to cope on its own with the capitalistic jungle. It is doubtful whether most institutions have the ability to do so, especially in view of the power of private competitors. Institutions that fail to produce marketable intellectual property will find it even more difficult to survive under the new market conditions and will be forced to opt out.

Some argue that all of these difficulties are only labor pains, which will subside by means of legal regulation and leverage the higher education system into a new era. This is probably true, but it can only become a reality when academic institutions change their faces and become independent research institutions. If and when this happens, and we will further expand on the issue, the entrepreneurial campus incubators will become commercial companies for all intents and purposes, and scientists will become paid employees, with or without shares and options, as in any company. The question of intellectual property will then be resolved by itself.

Clinging to the Foundation

Sources of Funding for Scientific Research

Organized public funding of empirical research began to become established in the Western world in the 17th century as part of the scientific revolution and the formation of the nation-state. One by one, national science councils and institutes for the advancement of science were established that raised and distributed research budgets. The most prominent among them were the Royal British Society, the Royal French Academia of Sciences, St. Petersburg Academy in Russia, the National Academy of Science in the United States, and the Kaiser Wilhelm Institute for the Advancement of Science in Germany (later the Max Planck Institute).

Both world wars led to the increase of the scope of government funding for scientific research, as part of countries' national efforts to defeat their enemies. The inter-power arms race in the 1950s, 1960s, and 1970s also had an impact. At the time, research was primarily aimed at achieving military and economic superiority, but in practice it led to countless inventions and developments within academia as well as within public and private research institutes. The rapid economic boom of Western countries, along with the progress of research and development culture and the assimilation of the democratic-humanist conception, has generated a growing number of diverse funding sources, which are currently funding research in all domains. But it is a mixed blessing: As science has evolved, the academic institutions' dependence on external research budgets has increased, due to the rising number of faculty members and higher research costs, and due to increasing competition between institutions and scientists.

Academic research is funded today by two main sources—the current budgets of higher education institutions, and research foundations of various kinds. It is important to note that government funding is partly direct (budgeting research on a competitive basis) and partly indirect—that is, participation in the current expenditure of the institution and its researchers.

As the scope and costs of research expand, the cash flow of research foundations become the primary oxygen of science. There are thousands of research foundations in the world operating for a variety of purposes. They are commonly divided into four categories according to funding objectives: basic research, applied research, meta-research (development of research), and the purchase of facilities and scientific equipment. Recently, a new category was added: mediation research (or translational research)—namely, research designed to connect basic science to practical applications.

Most research budgets that go to academia are directed to research in the "hard" areas—science, technology, engineering and math, known by the acronym STEM. In recent years, there has been an increase in the volume and variety of foundations for the "soft" sciences—humanities, social sciences, education, arts, law—but they are marginal in terms of their number and volume of budgets. The "hard sciences" obtain the majority of budgets in general, and the large budgets in particular, because most of the research in these domains deals with existential issues; because it yields more immediate, measurable, and practical results; and because its basic cost is high. In practice, most studies in the hard sciences are difficult to conduct without external funding.

One type of research foundation for financing research belongs to government offices. These foundations occasionally publish a "call for proposals" for those interested in funding research on issues relating to their fields of activity. In most countries, there are also general national research foundations. They channel budgets according to government outlines and policies, which are determined with the assistance of the National Councils for Scientific Research.[190] These are generally the wealthiest and most prestigious foundations.

Another type is international foundations (the largest ones are the EU [European Union], the UN [United Nations] and the IMF [International Monetary Foundation]). As we have noted, globalization has significantly increased the scope of international collaborations, and it is also reflected in the field of research and funding. If, in 1996, about a quarter of scientific scholarly articles were written by authors from two or more countries, in 2012, this rate had increased to more than one-third.[191] Furthermore, many international research foundations grant budgets on the condition that there is collaboration between researchers from different countries.

The third type is independent foundations, which are managed by public and private bodies. Most of them are perpetual foundations (the money comes from the foundation's current investment profits) established by philanthropists, nonprofit organizations, or charities. They act for noble causes that are close to the hearts of the donors, such as drug development, advancement of underprivileged populations, or reducing societal gaps.

Another tool for private funding of research for public benefit is public research institutes, which are established and operate (usually as nonprofit organizations) through donations from one or more philanthropists. Many of them act to promote social goals, such as supporting marginalized populations, increasing pluralism and tolerance, or protecting the environment. They employ their own researchers, either academic researchers (usually as a second job) or retired researchers.

Private companies are also a significant source of funding for scientific research, which in recent years has grown in importance and scope. Quite a few companies—generally international mega-companies—invest billions of dollars every year into research in order to gain economic advantage over competitors. Most of the research in this domain is carried out within the research and development departments of the companies themselves, sometimes in collaboration with academia. The manner of collaboration varies, from joint teams drawn from academia and industry, to foundations financing industry-oriented research in institutions of higher education.

The Race to the Research Budget

The first step in the process of obtaining a budget for research—of course, once the idea is formulated—is to find the right foundation and identify the proper timing for submitting a "research proposal." This is not a simple task; it is a time-consuming task that requires skill, access to information sources, and often connections. The huge variety of funders and foundations have produced dedicated databases and search engines, among them Funding Institutional, GrantSelect, ProQuest Pivot, Pivot, Grants.gov, and the Grantsmanship Center.

Submitting an application (a proposal) is the next, more tedious and frustrating task, and requires knowledge, experience, and a great deal of time and patience. It begins with a clear drafting of the proposal document, and consists mainly in filling dozens and sometimes hundreds of sections—including the researchers' professional background, research methodology, database, relevant bibliography, supplementary funding, required equipment, detailed budget and schedules, and the scientific and applicative potential of the research.

The screening methods and decision-making process for recipients of grants vary from foundation to foundation, but almost always depend on a few basic criteria: the degree of innovation and feasibility, the potential for usefulness and experience, and the reputation of the researchers. Of course, the scope of the foundation dictates the number of grants and the amount of funding allocated to each. Each foundation also has its own unique guidelines, which add another dimension in the selection consideration of proposals submitted. Naturally, the chances of obtaining a grant also depend on the number and quality of the competing submissions.

The method by which the winning research proposals are selected is basically similar to the method by which a scientific article is selected for journal publication (we will expand on this later): The initial screening is carried out by a senior official with a scientific background. The proposals that pass through his or her sieve are presented to a panel of judges, who are usually assisted by two to five external assessors with appropriate professional backgrounds (in large foundations, the scientific council of the foundation assumes the role of the panel of judges). In rare cases, the members of the panel go out on site in order to take a closer look at the conditions of the proposed research.

The convening of the panel of judges may take several days, and sometimes, as a preliminary stage for discussions, they are requested to write a review of a number of proposals in advance. The judges do not receive wages for their work, or they receive only a symbolic wage, as do the external assessors. Their willingness to participate in the procedure, which demands time and also resilience in the face of pressure, derives from the scientific ethos that requires the scientist to contribute to his community. But there are also less valuable and more mundane considerations: membership in a judging panel is a professional status symbol (if you are selected, it means that you have a reputation in the field). It adds a prestigious line on the résumé (which may contribute to promotion), and can also help less experienced scientists learn how to formulate good research proposals. It also helps to be updated on the latest innovations in the professional realm.

The transfer of funding to the academic institution for the purpose of conducting the research is done in legal format. That is, a contract is signed between the institution and the foundation, with sections that define the boundaries of budget usage, provision of interim reports, and meeting schedules.

It is important to note that when a researcher obtains a research fund, the institution he belongs to also gets a share of the bounty—through a certain percentage allocated to overhead (office and laboratory services, electricity, air conditioning and heating, maintenance, security, etc.). The larger the research budget, the bigger the coupon that the institution clips. This is also the reason why institutions of higher education pressure their faculty members to obtain as many research budgets as possible—and as large as possible (when applying for a position or a promotion, faculty members today are required to indicate in their résumé not just the type of grants they have received but also the amounts).

In addition, in many countries research grants are considered research output, which determine the government budget allocated to each institution. The more research grants are obtained, the higher the government's budget allocated to the institution.

When Money Talks – Academia suffers

The increase in the number of institutions and scientists in the world has naturally led to an increased demand for budgets. More scientists from more countries (including research students just starting out) are turning to research foundations today, and the result is a decrease in the chance of getting funding, and consequently, a more difficult and fierce competition than ever.[192] Thus, if 40%-50% of applicants to research foundations in the 1970s were able to obtain a budget, today, the rate of attainment in many foundations has dropped to 20% of applications or even less.[193]

In a survey conducted in 2015 by the Pew Research Institute among members of the American Association for the Advancement of Science (AAAS), 83% of respondents said that the difficulty of obtaining a government research fund was much greater as compared to five years ago. When the respondents were asked to point out the biggest obstacle to conducting high-quality research, 88% of them ranked the scarcity of funding at the top of the list.[194]

The competition for research budgets has become so fierce that even veteran and reputable scholars find it difficult to raise funds.[195] As a result, academic institutions are compelled to reinforce the bidding production line for foundations. This is done by establishing, expanding, and enhancing dedicated departments which employ an army of internal and external consultants, with the aim of helping researchers trace relevant foundations, find research partners, and draft proposals. These departments also provide legal, financial, and tax assistance. Many scientists actually become “science contractors,” and some would say “science pimps” (in the scientific jargon, they are called “grant dealers”).[196]

Moreover, in order to encourage scientists to submit more and more research proposals, an in-house propaganda mechanism has evolved in recent years, which aims not only to glorify and elevate those who “did it” but also to signal to others: “see and do.” At the same time, the incentives multiply. Various types of bonuses which have never been on the agenda in academic culture are distributed today as a reward for the acquisition of research budgets. These come in the form of a salary increase (in addition to the salary the researcher receives from the foundation), a supplement to the personal research budget, a reduction in teaching hours, and other perks.[197]

In many institutions, bonuses are distributed not only to actual recipients of funding, but also to those who have conquered a stage in the “Amazing Race”—and even to those who have entered the competition at all. The message is that even if you didn’t win the Holy Grail, you deserve a consolation prize for the mere effort. The goal is to encourage faculty members to continue submitting more and more research proposals, and in order to camouflage the commercialization, it is customary to mask such incentives with laundered terms such as “research encouragement” or “encouragement of excellence,” while strongly suggesting that obtaining research funding (more so than research results) is a key achievement measure in academia.

The phenomenon of bonuses distributed for obtaining research funding is particularly widespread in emerging economies that are striving to advance their status in the science arena, most notably China, Taiwan, Brazil, and India. The bonuses there reach very high amounts, which indirectly generate differential wages within the same institution and between different institutions.

The most alluring incentive is, of course, promotion. The updated message of the institutions to the members of the faculty is simple: If you have obtained fat budgets, you’ll get promoted quickly, and if not—your advancement will be stopped. It is no coincidence that to the sarcastic expression “publish or perish,” which we will discuss later in detail, has been added a more recent variation: “grant or perish”—get a grant or quit.[198]

To encourage fundraising, the heads of institutions grant perks not only to faculty members who bring budgets to the institution but also to the faculties, in accordance with the total fundraising obtained by their members during the year. The victory in this competition is important to faculty deans not only because it raises the prestige of the faculty they are heading, but also because in many cases it gives them an edge in the struggle to achieve personnel standards and budgets: if we put in more, we also deserve to spend more.

The need to raise funds has led more institutions around the world to favor turbo capitalistic "commissars" in senior positions (head of department, dean, rector, president).[199] These are usually faculty members with a distinct neoliberal view, whose talent is in compliance with the imperatives of the market economy and having a thick skin. These are often businesspeople outside the institution or outside of academia, with proven ability in the financial field. A symbolic example of this change was recorded at the University of Haifa, where we work. A president-philosopher, devoid of any business background and with a pleasant attitude, was first replaced by a determined president who came from the business world, without any academic background (and therefore with difficulty facing faculty pressures). When that failed, a professor was selected who had specialized in opening branches of a prestigious American university in the Persian Gulf countries and China. Probably not by coincidence, upon his election, he strengthened the PR orientation of the institution. At the same time, he tried to re-brand the university—much like a factory manager trying to market the same old product, the demand for which is declining, through a new pseudo-image.

And as the carrots multiplied, so did the sticks. Because faculty members have become a profit unit, those who find it difficult to deliver the goods (and they are many) are in constant anguish, and are often labeled as weak, lazy, and even exploitative researchers, and therefore unnecessary. In many institutions around the world, not only are low-generators of funds encouraged to take early retirement, but commissaries-deans receive bonuses when they succeed in luring such a professor to retire early.

At one of the universities we visited in Australia, we were told that the institution's management had conditioned the size of the office the faculty member got on the amount of funds he or she generated for the institution. Thus, it turned out that researchers who failed to fish fat fish in the turbulent oceans of funds were punished three times: not only were their studies harmed and their rooms shrunk, they were also humiliated in front of their peers. This may be an extreme example, but it illustrates the general trend throughout the world.

In the more competitive countries (mainly English-speaking), the more demanding sciences (mainly life sciences), and the most regarded (mostly private) institutions—the price of a scientist's economic failure could be even worse. There are institutions where part of the current salary is based on the grants that he or she manages to obtain.[200] One can only imagine the level of pressure under which these scientists are living (and working).

The diminishing chance of obtaining a research fund turn a failure to obtain a grant into a common experience in the world of academia. Many scientists feel that their professional success is not necessarily related to talent, knowledge, perseverance, and diligence, but to luck, personal connections, marketing, and image-making abilities.[201] True, life is not an on-demand plan, and failures and bitter disappointments are commonplace experiences in any competitive environment. But even in such an environment, there should be a reasonable and fair balance between the proportion of winners and the proportion of losers. Not only is the proportion of losers increasing from year to year, but the cost of the loss is increasing. In contrast to publishing an article, which allows the researcher to carry out a number of attempts, including corrections and improvements, until the scientific journal willing to publish it is found, it is difficult to convert and adapt a research proposal from one foundation to another. In many cases it is a one-time submission, and the rejection of the proposal is a death sentence for the topic of the research. The grueling work that was invested in writing the detailed proposal then goes down the drain, and with it the many funds that have already been invested in it.

It is important to emphasize that some see the industrialization and commercialization of academia, including intra-organizational competition and the differentiation of wages, as a legitimate and positive change. In contrast, there are those who ache and worry about the devastating effects of this process on scientific research, especially basic and theoretical (studies show that it is harder to obtain funding for basic research than for applied research).[202] Many also see this trend as a dangerous expression of a neoliberal culture, for all the evils it brings with it everywhere: worship of money and profit, greed and materialism, cultural vulgarization, contamination of interpersonal relationships, undermining of personal and economic security, unfair competition and preservation of the privileged hegemony, monitoring by Big Brother (rich executives and rich institutions), loss of personal freedom, disruption of work-life balance, and above all, workaholism.[203]

Many faculty members are outraged at the hypocritical and un-collegial attitude, at the obstacles to their personal promotion, at the fact that they are turned into workers on a scientific production line, a caliga rule, and at the ecology of threat and intimidation. They feel that academia is selling itself cheaply for the research-budgets scam. A pleasant and respectable work environment, previously considered an oasis, has been obliterated in an ultra-capitalist hurricane.[204]

In 2018, the scientific journal *Trends* published a study, pioneering in its scope and depth, that revealed (through a survey) the extents of the frustration that "academic capitalism" brings with it into the scientific community. While focusing on Israel, its findings reflect what comes from other publications in the world.[205] Most respondents (a sample of 4,853 scientists from six universities) reported being concerned about too much external interference in their research work and in the management of their university, the reducing of faculty influence on institutional policy, adverse changes in research, and the impairment of teaching. Many also raised serious claims regarding the invasion of statistical discourse and the preference for output considerations over creativity and true scientific quality.

Not surprisingly, the highest support for imposing market values on the higher education reserve was measured among faculty members from the areas of management, engineering, medicine, and exact sciences, while low support for these viewpoints was recorded among faculty members in the humanities, the arts, the social sciences, law, and agriculture. Gender differences have also come up (also not surprising): female faculty members were more concerned about academic capitalism than their male counterparts.[206]

Ultimately, the slavery for money and the contamination of the academic work environment are likely to increase tension between the disciplines, between the "profitable" scientists and the "losers," between the proponents of the business approach and the devotees of separation of matter and spirit, between men and women, between veterans and young people, and between rich and poor institutions.

Flaws in the Traditional Financing Model

For many years, the funding model for scientific research sailed its course on peaceful waters, and was one of the reasons for the phenomenal success of academia. Recently, like other components of the scientific mechanism, it has faltered and generated criticism with regard to its effectiveness and fairness. There is an existential crisis looming on the horizon that has already been defined in the research literature as the "funding crisis."

Beyond the budgetary difficulty, it seems that the old method is causing more major problems:

- **Waste of valuable time**. The funding factory forces most scientists to consume a lot of time preparing research proposals and/or examining proposals as judges. In the U.S. National Science Foundation (NSF) alone, in

2012, no fewer than 17,000 scientists were employed to judge and assess 53,556 proposals.[207] A survey conducted by the Australian National Council for Medical Research found that 34 working days were invested, on average, in preparing a research proposal. A total of 3,727 research proposals submitted in 2013 in Australia came at a total cost of $46 million. Only 21% of proposals were approved and received funding.[208]

Another large-scale study, conducted at prestigious American universities, found that faculty members spend about one-fifth of their time on average in preparing research proposals.[209] Medical school researchers would be pleased if this was the case within their discipline, because, as it turns out, they invest no less than half of their time in the preparations of proposals.[210] Investing so much time preparing research proposals and assessing peers' proposals is exhausting and takes valuable time away from the research itself.[211] One of the talented scientists we interviewed (from the natural sciences) wrote to us: "I sit and write a grant that I don't really want and need, instead of working on the book that burns inside me. After I finish this grant, I'll write another one, followed by another, and all this when I have little chance of obtaining it. I mean, chances are I'm wasting my time in vain."

- **Loss of good ideas**. Researchers who have examined the effectiveness of proposal evaluations have found that judges successfully weed out very bad proposals (those that do not exceed the minimum threshold) but find it difficult to distinguish between the rest of them and isolate particularly good proposals. The result is that many proposals worthy of funding go down the drain.[212]
- **A preference for "closed" research proposals**. Obviously, a public budget cannot be granted to scientists as an open credit. The company has a right and even a duty to know to whom and for what it distributes its money. Yet in science, as in art, it is important to leave some room for the unknown—that is, for the less defined and planned experience. Unfortunately, nowadays, as the material benefit approach dominates and everything is measured in terms of return-on-investment, this space becomes increasingly narrow.

The Hungarian-American biochemist and physician Albert Szent-Györgyi, the 1937 Nobel Laureate for Physiology and Medicine, is recognized not only for his success in isolating Vitamin C and his contribution to discovering the citric acid cycle, but also for being a freedom fighter and a prominent thinker. A letter he sent in 1972 to the editor of the journal *Science* was considered a classic because of his distinction between two types of scientists: the "systematic" and the "intuitive" (Wilhelm Ostwald called them "classic" and "romantic" and John R. Platt "Apollonian" and "Dionysian"). The "systematic" follow the leveled ground paths, with the aim of expanding and improving them further. The "intuitive," on the other hand, tend to "get lost" in alleyways outside the main path in order to find alternative paths. According to Szent-Györgyi, the future of science depends on both types of scientists at once, and therefore it is important to be careful about giving exclusive priority in budgeting the "systematic." "Being myself a 'Dionysian'", he wrote, "writing [research proposals] was always agonizing for me. I filled up pages with words and plans that I knew I could not follow [...] when I go home from my laboratory in the late afternoon, I often do not know what I am going to do the next day. I expect to think that up during the night. How could I tell [funders] then, what I would do a year hence?"[213]

- **Code of selfishness**. One of the noble ideas in science is that the competition between scientists is mainly about ideas and less about resources. This has helped along the development of human knowledge, created a culture of collaboration and fairness, and prevented unbridled competition between scientists. When academia replaces the gentlemanly code, the sportsmanship and community code, with a selfish and competitive code, it harms science.
- **Harming the integrity of scientific research**. One of the most destructive effects of the increasing pressure to obtain budgets is seen in the realm of integrity. The growing (conscious and unconscious) tendency of researchers to gratify funders makes it difficult to conduct clean research, which may naturally also end up with negative results.[214]

Moreover, when the sword of layoffs and the impediment of promotion hang over one's head, when despair and frustration build up—the rate of gaming the system inevitably increases.[215] In recent years, the tip of this phenomenon of iceberg dimensions has been exposed, the most popular methods being:[216]

- Using ghostwriters to prepare research proposals without the researcher, who signed the proposal, being involved in their preparation.
- Pre-arrangement and coordination between applicants and judges, through various types of clues or by informing the applicant that his proposal has been selected, with the assumption that he will in turn reward the favoring judge with the same currency.
- Forging alliances with other researchers from the same field (grantmanship), so that instead of submitting a joint proposal, they submit separate proposals, assuming that each of them will be asked to judge his or her friend by virtue of their professional expertise. In a survey conducted in

Australia, scientists from various institutions were asked whether they had formed alliances with other researchers to boost their chances of obtaining research foundations. One in five admitted that they indeed were at fault, and in reality the numbers were probably higher. A cancer researcher, who asked to remain anonymous, told the survey conductors that being a novice scientist, he received practical advice from his longtime colleagues: "befriend someone who works in your field and thinks like you, but never publish joint research with them, because it will disqualify them from judging your research proposals."[217] Even the academic institutions take part in the dirty game and plant people who will advance their interests on the judging committees.

- **An extravagant and wasteful mechanism**. The cost of preparing a research proposal amounts to thousands and tens of thousands of dollars, and its chances of success are almost never high. This means that huge amounts of public money are thrown in the garbage. In fact, the wasted amount is even greater if one takes into account that the time it takes scientists to "hunt funds" and judge peer proposals comes at the expense of research. Moreover, since foundations around the world work independently, and often without coordination with other foundations, it is not uncommon for studies to be duplicated in vain, which causes more financial waste.

  And what's worse: the pressure to get budgets forces faculty members to submit research proposals, in part to justify their employment. The result is countless worthless and futile studies and articles that should never have received funding in the first place.

  The traditional budgeting model is also astonishingly wasteful because of the way the money is distributed. The various research foundations operate different types of quality control at varying levels of strictness. Researchers are asked to always report the progress of the study and its final results, but the control is not thorough in most cases. Once the budgets have been distributed, the eyes are already fixed on the next round. Furthermore, most studies are not tested by their practical and useful outcomes, but only by the measures of the study's impact, deriving from the platform on which the study was published and the number of citations it gained. But as is well-known, publishing is not a single measure and sometimes not a key measure of the quality of the study. It is therefore difficult—and sometimes impossible—to assess whether a study justified the financial investment.

  And another fundamental issue arises here: Many foundations state in a "call for proposals" the amount of the grant As a result, many scientists stretch the study's requirements up to the top end of this financial frame, through a general, vague description of the proposal which enables the applicants to veil more and more expenses in the budget, including expenses that are not essential.

Most foundations also limit the amount of time in which the money will be available to researchers (usually up to three years). The budget should be utilized by this specific time, and the balance goes back to the foundation. This restriction brings on an "end-of-season" shopping celebration prior to the expiration time, using tricks and ruses such as "loans" for peers' research. In many cases, this manipulation is done with the deliberate awareness and even encouragement of the institution—informally, of course.

Since it is difficult for the foundation's people to keep a close eye on the study's expenses, many scientists have developed a utilitarian, perhaps cynical, approach which essentially amounts to: first obtain a budget and then decide what to do with it. As much as it sounds delusional, quite a few of the proposals' judges accept this tactic. In other words, they flip through the research proposal and tend to award the grant based on the researcher's identity, assuming that this is a type of ongoing funding. Some attach a justification and say to themselves: A good researcher already knows what to do with the money. It is possible that the idea of giving a gifted scientist a budget and allowing him to decide how to use it optimally is not a very bad one, but it cannot be done using a method of ruse and deception—especially given that each budget has a call for proposals that dictates research topics and a funding frame.

- **Inefficiency and unfairness in screening**. It is seemingly natural that the financiers should decide to whom they should give their money—in the case of research foundations, to scientists who have succeeded in convincing that their research has value. The problem is that the foundations' evaluation strategy, peer review, is far from efficient and objective. Studies have found that the correlation between the different judges' assessments and the same research proposals (which is known as "internal consistency between judges") is not high, and this means that the selection of the winning proposal involves a high coefficient of randomness.[218]

We will expand in a separate chapter on the objectivity issues in peer review. Here we will summarize a few common biases in judging research proposals:

A) A workload that encumbers an in-depth reading. One of the interviewees told us about his experiences as a member of a judging panel in these words: "The young judge read the entire proposal, the senior read only the abstract (the synopsis), the very senior read only the title of the proposal, and the head of the committee read only the name of the researcher". B) Political bias, mainly in the humanities and social sciences. C) Bias in favor of men, veterans, and those who have previously obtained funding.[219] D) It is not uncommon for foundations to grant research budgets to prestigious institutions—both because of the chance of receiving high matching funding there, and because they have the resources and connections to promote publicity afterwards. The common bias in favor of the rich is referred to as the "Matthew effect," inspired by the verse from Chapter 13 of the Gospel of Matthew, in the parable of the talents: "For to everyone who has will more be given, and he will have abundance; but from him who has not, even what he has will be taken away."—*Matthew 25:29, RSV.*

By the way, the assumption that institutions with a higher reputation will be more productive does not stand the test of reality. A study examining research grants given by the National Institutes of Health (NIH) in 2006-2015 found that it was precisely the less prestigious institutions that produced more articles and more citations per dollar invested in them.[220]

This inherent distortion is reminiscent of the reality of professional competitive sports in many countries, where the teams that repeatedly win championships and trophies are the wealthiest teams, sponsored by tycoons. Most of the teams and their players in the league are nothing more than extras or a backdrop for the solo performances of a few. But the situation in sports may be better than that of academia, because the wealthy teams acquire the most talented players with the help of an elaborate scouting system that explores and searches for potential stars all over the world. In academia, on the other hand, if you are a scholar without means who works with honors and dinstinction in the academic periphery, your chance of "being discovered," of obtaining a significant research grant and of advancing, is close to zero.

The question of whether the identity of the proposal's applicant in the screening process should be considered at all is a weighty question. In most of the foundations the identity of the applicants is visible, and, as mentioned, plays a central role in the judges' considerations (to return to the sports world, this is similar to the favored treatment granted by the judges to wealthy groups on the fields and arenas). Indeed, there are foundations that ask for anonymous proposals, where résumés are submitted in separate files, with the aim of producing objectivity and fairness in the selection process, but these are, as mentioned, the minority. A substantial part of foundation managers (for example, those of the National Institutes of Health) maintain that a researcher's rich success track record should count, as it increases the success potential of the new submission. Therefore, the common method for screening candidates who are applying for research budgets is to compare their output in terms of quantity of articles and quantity of citations. Opponents of the screening method based on the researcher's past argue that personal consideration gives an unfair advantage to a narrow elite with already abundant resources, and disadvantages young scientists and/or scientists with distant power centers.

The strongest argument of the opponents is that scientists' past performance does not necessarily predict their future,[221] and that studies prove that the productivity graph is not necessarily linear.[222]

- **Violation of the public's right to influence the scientific agenda**. The funds for financing science flow in a staggering volume, but despite the fact that these mostly come from tax money, citizens have almost no influence on how their money is used. It is true that the government and its officials, the so-called citizen's representatives, have some influence on the budgeting policy in science, but the decisions on where the money will be invested are primarily in the hands of scientists. Their considerations are not broad enough and do not necessarily coincide with the benefit of society. This is why every year quite a few studies on esoteric issues are funded, which interest very few people and contribute little, if any, to mankind.

  The Israeli economist Dr. Yaacov Bergman, who passionately preaches about extracting the hegemony on the scientific agenda from the scientists' hands, illustrates the distortion: "The public in Israel is forced to finance close to a million shekels for research on the Steppe peoples after the Mongol conquest—a study that may not be interesting to anyone but a group of those who engage in this esoteric field, not even the Mongols' descendants or the descendants of the Asian Steppe peoples."[223]

Allocating budgets through scientific foundations is consonant with a broader moral, philosophical, economic, and social issue that has been on the agenda in recent years in democratic countries, which are also the most economically and scientifically prosperous countries: how much should the general public be involved, and entitled to be involved, in setting priorities for the use of its money? This is a substantial question which has not yet reached science and education, but is expected to get there as well. It is true that the "common man," devoid of scientific background, has no professional tools to decide just how much money should be allocated to research in physics, linguistics, medicine or archaeology, but he or she certainly has the ability and even the right to speak up with regard to research priorities within the limited national budget. The more transparent the budgets are—and there are ways to improve transparency—and the more public representatives from a wider range of backgrounds participate in discussions on the allocations, the more objective, clean, democratic, and efficient the distribution of capital will be.

Out-of-the-Box Ideas

The aggravating funding crisis has intensified the voices calling for changing the old method—starting from simple, basic updates, such as granting longer-term budgets or regulating the pace of research proposal orders, and up to more far-reaching ideas.

One of the ideas calls for simplifying bureaucratic procedures, so that the preliminary research proposal would be a short, focused statement of intent, without having to fill dozens of pages and hundreds of sections. The full proposal, after the initial screening, would also be submitted in a shortened format, which would include the presentation of general directions of the research, without having to elaborate on it endlessly. Some have also suggested eliminating the panel of judges and settling for the external reviews, similar to the judicial process in the journals.[224]

Another idea talks about allocating budgets based on previous success alone. In any case, the foundations already attach great importance to this element, and here, this is the "laundering" of bias and its standardization. The advocates of this change are aware of the fact that it will deprive young researchers who are devoid of a scientific past, and therefore they suggest designating separate tools for the allocation of funds to inexperienced, novice researchers.[225]

But out-of-the-box ideas are also being heard that defy the rules of the game—for example, to replace the budgeting of individuals or groups of researchers collaborating ad hoc with collective funding of laboratories and research institutes. The rationale is that such a method would increase freedom of research, make it easier to take risks, and strengthen cross-fertilization. This approach is based in part on the notion that intelligence is not only a personal trait but also a group trait, and that "the whole is greater than the sum of its parts" (competition between groups is almost always more effective than individual competition). According to this approach, scientific research is becoming less personal and more collective and interdisciplinary anyway, so it is preferable to allocate money in advance to a conglomerate of researchers rather than to individual researchers. Furthermore, the allocation to the research institute, rather than directly to scientists, would release the scientists from the exhausting and frustrating bureaucratic activity of writing proposals and would direct and enable them to engage in pure research. In fact, even today, some of the research budgets are already directed straight to the institutions as a fixed annual budget, with the assumption that the institution's leaders will use their money wisely and prioritize properly.

Another idea in the spirit of the democratic approach proposes a combination between a uniform budget allocation that would be given to each scientist and used to fuel research (seed money) and supplements given by the scientist's peers. In other words, every scientist would be required to set aside a fixed percentage of the budget he or she has received in favor of peer funding, as per his or her understanding.[226] This method creates a kind of mass funding within the scientific community, assuming that scientists do not distribute the money using the "finance me and I'll finance you" practice.

But it seems that the most surprising and original idea came up in 2016 in the journal of the American Society for Microbiology, *mBio*. The originators of the idea recommend screening the proposals that come into the research foundations into just two categories: those that pass the high quality threshold and those that don't. All proposals that pass the initial screening would enter the lottery, and this would determine the winners.[227]

Conservatives may find it difficult to digest such a proposal, but a mathematical model published by two American scientists proves that given that the cost of preparing a research proposal is high and chances of winning are low, the lottery solution would save science huge sums of money—both for the applicants and the foundations. These funds would be best invested on research rather than on endless paperwork. Moreover, the lottery would release pressure (because not obtaining a grant would not be interpreted as a professional failure) and it would be fairer (because you would eliminate the distortion of nepotism, the "finance me and I'll finance you" practice, and the extreme priority given to recognized and/or well-connected scientists today).[228]

Two New Zealand research foundations have already adopted the lottery method, at least partially, in order to fund more adventurous research proposals which have difficulty obtaining funding through traditional pipelines.[229] It is worth noting that the lottery method has an additional important advantage: it would reduce the excess weight that is attached today to obtaining research grants as a condition for promotion.

Another revolutionary idea was presented by researchers in Canada, after discovering a startling finding that mocked and ridiculed the formidable, cumbersome, and anachronistic mechanism of judging research proposals. A calculation made by the researchers found that the cost of allocating grants by the Canadian Council for Life Sciences and Engineering is higher than the amount that would have been required had they split the total budget equally among all qualified researchers in the same field for preliminary research. They claim that there is no logic in the cumbersome procedure, and credit can be given to the professionalism, reliability, and integrity of most scientists. In any case, the results of the study undergo a strict scrutiny prior to publication in the scientific journals, and there is no point in wasting time, energy, and money on further judging. According to the researchers' assessment, not only would renouncing the judicial process save huge costs, but it would also shorten the time between the research initiative and its execution and allow more researchers to conduct preliminary studies. According to them, as barriers and selectors are removed, the potential for novelty in studies will increase.[230] Naturally, big and differential money will be distributed to those who passed the initial phase. Thus, the unsuccessful studies will be stopped after a relatively small resource investment.

"Crowdfunding" in the Service of Science

Further on in the book, we will see that science, which was supposed to be at the forefront, seems to be lagging behind changing realities in many areas. Unfortunately, this seems to be the way things are even in the realm of financing entrepreneurship and innovations.

The method of "crowdfunding" burst into our lives at the end of the first decade of the 21st century, spreading like wildfire in almost every area of life—starting from funding music albums and books, through political campaigns and setting up businesses and start-ups, to legal aid and an alternative lending market. Hundreds, often thousands, and sometimes hundreds of thousands of people, who do not necessarily know each other, individually invest relatively modest sums in a venture that needs funding, in place of one large investor. Each of these "small" investors becomes a partner, and receives reports on the progress of the venture.

This is, in fact, a multi-participant survey that uses the "wisdom of the masses" as well as the communal solidarity inherent in us, and expresses a collective, socialist, and democratic statement: not only "he who pays the piper calls the tune." Even those who are not wealthy and do not belong to the ruling forums are entitled, able, and want to both influence and benefit from successes. Experience shows us that it is not at all certain that their judgment is inferior to the judgment of the people who are behind the wheel. In fact, it usually surpasses them.

One of the advantages of mass financing is the possibility that young, groundbreaking, and pioneering entrepreneurs will obtain funds that that they would not have obtained in the institutionalized channels. Thus, the chances of discovering hidden talents and realizing "crazy" ideas increase. Another advantage lies in the fact that investing in this kind of funding does not pose a risk to a large amount of money, and allows for (small) risk spreading. Moreover, since such an investment entails a reward for the soul, the feeling is that even if you lost your money because the venture did not succeed, you have still followed your heart and helped the person or group of people who you thought deserved it.

Crowdfunding is already defined as a revolution. It is another avenue of realizing digital potential, and also serves as a balancing force against the epidemic of coercive capitalism, alienation, and the loss of solidarity in postmodern society.[231] It is apparently unsuitable for funding scientific research, as the prevailing consensus is that only experts can make informed and sound decisions in scientific matters. Research in academia is also not perceived as producing profits, so there is no apparent reason for "ordinary"/"amateur" people to invest in it.[232]

In the end, the sting is taken out of most of these claims in the new digital world. There are a series of significant benefits to point out, thanks to which mass funding is actually very suitable for science.[233] We have already mentioned two of them: First, scientific research in academia is in desperate need of money, and this is another, legitimate source of funding alongside traditional sources. Second, mass funding allows beginner researchers, or those who do not belong to the first circle of academic scholars, as well as researchers with unusual ideas to obtain funding. And there are other benefits:

- Crowdfunding is done in an expedited process, allowing projects to get quickly underway.
- The success of a mass-funded venture generates a sympathetic audience and may secure funding for further research by the same researcher or researchers in the same field.
- A venture that has been able to raise funding from the "masses" directs research resources to an area that is important to the public and close to its heart, and this is another manifestation of democracy and equal opportunity.
- The cost of obtaining mass funding is infinitely lower than the cost of the obtainment process from a research foundation. So almost all the budget is directed solely to the research itself, and not to the bureaucracy around it.
- The method is particularly effective in raising initial capital for pilot research, which is explorative and feels the pulse. In this way, studies can grow in a gradual way, in which success in the baseline stage constitutes a prerequisite for funding the entire study.[234]
- Crowdfunding creates a rich and heterogeneous donor-investor profile, and diversifies the motives of contributions. Ordinary people get a chance to enter the scientific world, which had been a locked garden for them.

- The new fundraising platforms offer investor-donors bonuses that do not exist in the traditional method, such as liaising with researchers and sometimes meeting with them.
- Mass fundraising requires researchers to market the research concept with wording that is commonly understood, and thus also to refine and simplify its objectives and importance.[235]
- The publication of the research proposal on a public platform strengthens the protections of the scientists' copyrights, and may prevent theft of scientific intellectual property.

Given the abundant benefits, it was only a matter of time before science skeptically adopted the method.[236] Indeed, awareness of the crowdfunding tool is expanding, and is reflected, among other things, in the increase in the number of seminars, workshops, and mentors that encourage research students and researchers to raise budgets this way.[237] The leading scientific journals also praise the method, and even provide effective fundraising tips and guidelines for effective fundraising within the framework of crowdfunding.[238]

In 2012, two young biologists launched a scientific crowdfunding site called Microryza, which two years later became a company called Experiment.com. In the first six years, more than 40,000 surfers invested within the framework of the site.[239] Since then, crowdfunding sites in the field of science are multiplying, and can be classified into three types:

- Designated niches of scientific funding within major portals intended for crowdfunding for diverse purposes (Rockethub, Indiegogo, Kickstarter, and more).
- Platforms of higher education institutions that raise crowdfunding for student scholarships, support for athletes, on-campus social initiatives and scientific projects. The first initiative came from students, for their living and research needs.[240] With time, the format has also been adopted by institutions, including prestigious institutions such as the universities of Columbia, Stanford, Duke, Washington, Cornell, Edinburgh, and Melbourne. By 2018, more than 50 American colleges and universities had their own crowdfunding websites.[241]
- Commercial corporate platforms designed for crowdfunding for scientific research. Each has a different emphasis in terms of research fields, fundraising volumes, interface, etc. The most popular are: Pubfund.Science, Crowd. Science, Petridish, iAMscientist, USEED, Patreon, SciFund, MedStartr, Consano, Give to Cure, Fundageek, and Futsci.

In 2019, the journal *PLOS One* published an article surveying some of the typical characteristics of crowdfunding in science, based on 700 campaigns launched on the oldest and largest platform—Experiment.[242] The findings reveal some enlightening and instructive data:

- The average requested budget was $6,460 (2012-2015).
- The success rates of young students and researchers in obtaining funding with this method are higher than those of senior and veteran researchers. It may be that these gaps stem from the better skills and mastery that young people have in the Internet medium. Young people are also more open to alternatives of any kind, and make a more varied use of collaborative tools, such as social networks, video software, and podcasting (it is important to note that in recent years there has been an enormous increase in online broadcasts that engage in science and engross a wide public).[243]
- Women succeed in crowdfunding at higher rates than men. This may be due to their better command and skills in the verbal domain (which provide them more effective persuasiveness), and may be because it is easier for women to garner sympathy from the general public.

In principle, gaps are not desirable, but in this case they have a positive value, because they attest to the fairness of crowdfunding as compared to the old funding methods that deprive women. This fairness is supported by another finding that came up in the report: Contrary to what is customary in research foundations, the researcher's scientific record and previous publications did not favor them nor give them an advantage here.[244]

It is important to emphasize that at this stage, the scope of scientific funding through crowd fundraising is still negligible compared to traditional funding from the research foundations. The difficulty of expanding this channel lies not only with the bosses of science but also with the scientists. A public funding application is still embarrassing to many scientists because it brings up associations of beggary, which could label them as failing scholars who have not been able to obtain funding through institutional channels and therefore were forced to appeal to the lay public. Furthermore, when research does not obtain funding through the public channel, the failure is also more visible and therefore more embarrassing.

However, the method continues to grow and evolve, gaining success and fans. It is conceivable that mental and bureaucratic barriers will be removed over time, the legitimacy of this refreshing tool will expand, and the amounts of the raised budgets will grow. This will happen because:

- The funding crisis in science is exacerbating and requires creative solutions.
- Crowdfunding is expected to reach a tipping point soon where the growing legitimacy of the new tool becomes a consensus, leading to faster development from then on.[245]
- Urgent problems require a quick solution, and just as millions of people immediately join forces to contribute to the rehabilitation of people affected by natural disasters, they will also join forces to fund research for finding a cure for an epidemic (Although this sentence was written before the outbreak of the coronavirus, the worldwide response to the pandemic has proven the point further).
- Governments are expected to increase incentives to invest in crowdfunding of scientific research through tax relief and other bonuses.
- Constitutional regulation will be put in place alongside technological tools to prevent ethical scams and frauds of "fake science."[246]
- The methods of mass financing are becoming more varied and sophisticated, and there is no reason why they should not permeate science. Recently, a new method known as Hackathon has been gaining popularity, which uses the wisdom of the masses to raise funds to test initial ideas and run pilots. This is a marathon event, where entrepreneurial thinking groups come together with the goal of meeting a pre-defined challenge. This conference is usually held in the form of a competition, with judges, winners, and prizes, including recruiting investors for the initiative, and sometimes also with the support and accompaniment of the development by a personal mentor. In the past, the marathon has been limited to 24 consecutive hours, intended for programmers and technology professionals only. Over time, the schedules have varied (between 5 to 72 hours), as have the objectives and deliverables (including setting social goals). It can be assumed that science will also adopt this model, because of its proven advantages: fast initial fundraising; financing burning needs; transparent competition, not limited to scientists in academic institutions; public branding of the common goal; teamwork and cross-fertilization; an atmosphere of creation and of mutual praise and encouragement; fostering an environment of *out-of-the-box thinking*, entrepreneurship, and love of science; and a combination of entertainment, work, and learning.

  It is likely that in time, more and more private and public organizations will set up entrepreneurial events for solving problems and raising funds. An example of such an organization is XPRIZE in California, which produces competitions to realize initiatives that seem fantastical. XPRIZE, for example, initiated the Tricorder competition, designed to prove that it is possible to develop a real version of the mythological "Tricorder" from the *Star Trek* television series. This is a device that can immediately diagnose a medical condition by means of indicative signs, without the need for a physician. Another project initiated by XPRIZE dealt with the future of forests. The goal was to understand how they can be saved without stopping the progress of human society and the economy. XPRIZE is also the organization that produced, with the funding of Google, the Google Lunar XPRIZE competition, thanks to which the Israeli aerospace company SpaceiL was established. While the company was unable to land a spacecraft safely on the moon in the first attempt, it catapulted the Israeli aerospace industry, along with a multitude of scientists, engineers, and employees, into a new era.

- The method of crowdfunding in scientific research fits into the general trend of increasing public involvement in decisions relating to its fate and the taxes that are being charged from it. In the future, more governance bodies will be assisted by platforms of this kind in order to consult with the public about the right priorities and, in some cases, even to allow all citizens, the "masses," to decide on controversial issues. In the political arena, first buds have already emerged to tighten the bond between legislators and their constituents through designated applications, and there is no reason why the public should not also be more involved in the government's investments—from transport to welfare to science.

Industry Takes the Crown

Research Collaborations

The symbiosis between academia and industry is not new, of course, and has been expressed for many years on many levels: A) Academia screens and trains employees and executives for industry. B) Industry applies theoretical knowledge that has been created and accumulated in academia, and translates inventions into revenue-generating products. C) Some academic researchers are employed in the industry as scientists or as consultants in a supplementary capacity, within a leave-of-absence framework or after retiring. D) Successful executives move from industry to academia, utilizing the knowledge and experience they have accumulated for research and teaching purposes. E) Figures in industry and economics contribute to the management of the universities as members of the Board of Governors, the Executive Committee, and more. F) The well-established industrialists donate from their private capital to institutions of higher education—especially those in which they themselves earned their degrees.

But the most significant symbiotic avenue today is the collaboration of foundations and research grants.[247] Private industrial companies have several motives for funding research in academia: A) Collaboration with scientists from academia contributes knowledge and experience to the company's R&D system. B) Such collaborations allow industrialists to be exposed to new research directions and discoveries that could evolve into a business benefit. C) Helping academia conveys a social engagement and contributes to the company's positive image. D) Transferring scientific research to academia saves enterprises heavy expenses and headaches: the recruitment of personnel, the employment of permanent workers who receive fixed wages, the regular payment of wages, the establishment and operation of expensive laboratories and offices, and more. E) Collaboration with academia generates acquaintances and enables the recruitment of high-quality players into industry. F) In some countries and in some research, the collaboration is granted a tax relief. G) Academic research helps market the industrial product because it conveys to potential buyers a message of conducting strict quality control. H) Collaboration with academia is a sales promoter for factories that produce materials and tools for scientific research.

On the other hand, academic researchers also benefit from a relationship with industry, thanks to: A) Additional sources of funding for research and publication. B) Access to new, state-of-the-art equipment which cannot always be purchased in academia, as well as access to closed databases. C) Increase of wages and financing of participation in conferences. D) Accumulation of practical experience and creating relationships that help in obtaining research budgets and in receiving job offers, whether in addition to the existing position in academia or in its place.

In the past, the collaboration between academia and industry mainly characterized the prestigious private universities, which are technologically and economically oriented. In the United States, where money talks, this collaboration has always been perceived as natural, and it has yielded impressive results. A particularly well-known example is the Massachusetts Institute of Technology (MIT), which since the beginning of the last century has joined hands with giant companies such as the Standard Oil company.[248] In recent years, collaborations have expanded in many institutions, including public ones. The relationships are reflected in the growing number of businessmen in the institutions' governing bodies, and especially in the increase in commercial companies' investments (mainly in the fields of natural sciences and biomedicine) in university research centers and research collaborations[249] (One of the most prominent examples of promoting cooperation between academia and industry is the Crowdhelix network, founded and operated by the European Union).

It is difficult to assess the non-public funding proportion for academic research, which is growing steadily both in absolute and relative terms, but data from diverse sources indicate the general trend: private financing proportions (especially of commercial companies) increase over time, while government funding rates fall.[250]

And that doesn't stop with money: the fact that industry is funding a huge percentage of academic research, and employs a battalion of academics, creates a fundamental change, an ethical one, the consequences of which are dramatic. The most important consequence is the creeping devaluation of the historical status of academia as a leader in academic scientific research—a phenomenon that will probably cause the academic model to change in the future.

Relationship Issues

The symbiotic relationship between academia and industry has always walked on thin ice, and the delicate balance has been based on a series of unwritten agreements: Industry works for profit while academia works for a purely intellectual purpose; industry deals almost exclusively with applied research and development, while academia often engages in pure basic and theoretical science, which is also the peak of its achievements; industry retains the professional knowledge it has developed (patents, professional secrets, etc.), and does not share it with others, while academia publishes its discoveries as a universal principle; academia zealously guards its independence of research, and refuses to become enslaved to tycoons.

But in the last decade it seems that more and more red lines are being crossed due to the growing dependence of academia on private funders. This dependence changes the sacred balance in several respects:[251]

- **Neoliberal propaganda**. The tightening relationship is problematic first of all because, in many cases, it promotes a dogmatic neoliberal agenda. This agenda enwraps almost all activities in the academic institutions like a toxic cloud, and has reached even the realm of teaching. An example of this is the curriculum in business administration: Since their inception, most business administration departments and faculties have maintained close relations with economists and industrialists. The relationship was reflected not only in student tours at factories and enterprises, in field-oriented seminar work and in inviting senior executives to run workshops and deliver lectures, but also in the voluntary adoption of the turbo-capitalist ideology, both in teaching and in research, and in instilling its problematic values. Many a time we hear the argument (and we tend to agree with it), that many of the researchers and professors in the fields of economics and business administration are propagandists of the extreme capitalist socioeconomic system. In other words, students in these departments are exposed—consciously or unconsciously, through articles and lectures—to ideological brainwashing. This brainwashing indirectly and directly reproduces controversial economic norms from the economic facet and certainly from the moral facet—for instance, exorbitant salaries paid to senior executives, and unlimited work and competition as the most important values, even when they are coercive and overriding.

In this context, it is worth noting that the rising popularity of MBA (Master of Business Administration) degrees has turned them into a money pump. Many business administration departments devise and close deals with companies and put together abbreviated curricula for these companies' employees, including concessions on academic requirements. This twisted deal is especially jarring in Executive MBA programs (MBAs for those with managerial experience), where extracurricular tuition grants privileged students an expedited degree with reduced requirements. The problematic mechanism behind this degree has been extensively revealed in the journalist and author Duff McDonald's book "The Golden Passport: Harvard Business School, The Limits of Capitalism and the Moral Failure of the MBA Elite,"[252] including the propagandist aspect that, according to McDonald, poisons American society. Small wonder Harvard decided to shun him and not collaborate with him on the work on the book. In a parenthetical note, we will mention that Harvard Business School (HBS) is considered to be the originator of this degree and the world's leading school for business administration. Approximately 10,000 candidates enroll in this prestigious school every year, and even though the tuition fees of this program reach the amount of 144,000 dollars, it probably pays off—that is, of course, if you assume that the curriculum and not the connections or the financial capital is the element that advances the students in the program: According to the *Financial Times*, 91% of graduates will find work within three months, and will earn $178,000 a year in the three years following their graduation.[253]

- **Robbing the poor man of his lamb**. Another problem stemming from the growing involvement of industry in academia is related to intellectual property. In government-funded studies, intellectual property is most often retained by researchers and institutions, while in studies funded by industry, sometimes the funders claim ownership of the findings. As a result, institutions and possibly researchers may be denied royalties for groundbreaking research which they initiated and conducted.

- **Damage to science's publicity**. Hiding research results is dangerous to science and society not only because it prevents the uncovering of the truth about the world, but also because it does not allow peer researchers to criticize and review the study and learn from it, and maybe prevent them from falling into the same traps.[254]

  In principle, the industrial research foundations and the scientists agree that studies must be published on the regular scientific platforms, which are open to the general public. But, contrary to the academic world, where all research findings are published for the benefit of science and humanity, in many studies funded by interested parties, the researchers are required, whether in open or covert contracts, to obtain prior approval to publish the research's results. Sometimes the funders postpone the publication of the findings so as not to lose market advantage.[255]

  It is important to note that American law requires the public publication of clinical trial results within 12 months. Similar laws exist in some European countries.[256] The "Declaration of Helsinki" clearly states that there is an ethical obligation to publish clinical trial results so that they are publicly available. In practice, a study that examined 30 leading European universities found that only 17% of clinical trial results were published in the EU trial registry as required by EU law, and this raises the suspicion that, here, there were commercial motives as well.[257]

- **Biasing the results in favor of the funder**. One can safely assume that most scientists in academia have a high ethical sensitivity, and are educated and trained to maintain integrity and the purity of science. However, when the pressure from the sponsoring companies is heavy and direct, the proportion of misdeeds increases.[258] It is not uncommon for commercial companies to apply direct or indirect pressure on the researchers from academia to achieve the results desired by the companies. This is done by imposing methodological limitations that distort the results of the study in advance, or by manipulating unfavorable findings.[259] This is not always done openly and directly. In fact, in most cases, the biasing of results is unconsciously done by scientists—due to the tendency to please those who funded their research and in who, in many cases, also pay their salaries.[260]

In recent years, the global media has exposed quite a few cases in which large companies in the food, beverage, pharmaceutical, energy, and other fields have funded university studies, and through these studies eliminated information about the health damage caused by their products—even when the findings demonstrated something completely different.[261]

In a study published in 2017, scientists were asked to express their opinion on future research about the potential risks associated with biological manipulation of food products. The respondents were given 15 possible combinations of collaborations between research teams from higher education institutions, government research institutes, public organizations, and large food companies. The results showed that when the research team included researchers from food enterprises (including enterprises with a positive reputation), the respondents estimated that the findings would have no scientific value.[262]

In a survey initiated by the journal *Nature* and funded by the National Institutes of Health, comprised of more than 3,000 scientists, 15.5% of respondents admitted that they changed the methodology and biased the results due to the pressure of the sponsors.[263] The true proportion is probably even greater. Furthermore, studies have also shown that a low proportion of scientists reveal a potential conflict of interest due to industry research funding to journal editors, although they are obligated to do so.[264]

- **Academia as an industrial extension**. As the university campus transforms from a sterile research area into a commercial science park, and as businessmen become household members on campus—the boundaries between industry and academia become even more blurred.[265]

It could be argued that the professional and moral noises in the field of scientific funding, given the connection between the private sector and academia, are the result of a temporary interim state, and that all the noises and disruptions listed above will be corrected over time. Already, attempts are being made to overcome the conflict of interest issue through new arrangements. For example, in the United States, a proposal was put forward to establish a common pool of funds designated by commercial companies for scientific research. This pool would serve as a research foundation, where the funds would not bear the colors of a particular company, and would free scientists from the pressure to achieve results that satisfy the sponsor's wishes.[266]

But it seems that salvation for the institutions of higher education will not come from here. Just as privatization in the kibbutzes prevented their economic collapse but did not prevent the change of their social model, and in fact changed them completely, so the privatization of academic research is currently rescuing some of the institutions of higher education, but paves the way for changing the entire traditional academic model.

The inevitable "exchange of crowns" process in scientific research is already evident on the ground, and can be identified by several signs:

- Already today, most (60%) of science and technology research and development is done in OECD countries by industries, and only 20% by universities (10% by government agencies and the rest by other bodies).[267] A large proportion of nutrition science is funded by the food industry,[268] and much of medical science is funded by pharmaceutical and medical devices companies. In fact, as early as 2000, nearly 75% of clinical trials in the United States were funded by private companies.[269]
- In March 2017, *Science* reported a historical turning point: for the first time in the post-World War II era, the US government no longer funded the majority of basic research in the United States (only 44%).[270]

  Contrary to the prevalent belief that commercial companies focus on research that only yields immediate profits, many companies actually invest in the long term. For example, huge companies like Apple, Google, Amazon, and Facebook are investing huge sums in basic science.[271]
- Upon examining the number and rate of scientific successes in the past two decades, including technological and medical breakthroughs, the accomplishments of research universities pale in comparison to those of the public and, especially, private industries. For example, in the last three decades the majority of developments in the fields of computerized technology and pharmaceuticals were born in the private market and not in university labs.[272]
- In the field of patent registration, the gap between academia and private companies is no less than amazing. Thus, in 2014, academic institutions in the United States registered 6,000 new patents, by all accounts a considerable amount. But that number constituted only 4% of the patent applications that year in Uncle Sam's kingdom. While many patents relied on or inspired by studies conducted in academia, these gaps still indicate the exchange of shifts.[273]
- More and more large companies are setting up their own research centers. They lure talented researchers with high salaries, sophisticated research tools, and access to large databases. If in the past academia attracted the best minds, many today prefer the economic-commercial world. The trend

began as early as the 1990s, with the meteoric rise of the high-tech and biotech industries, and has continued to strengthen ever since.

- More government budgets are being transferred today to research conducted within industry. One can assume that this is due in part to the influence of the tycoons on the politicians. At the same time, the growing confidence of governments in industry performance, in light of its phenomenal success in the present era, is also a cause for diverting budgets in this direction.
- Governments around the world encourage knowledge transfer from academia to industry and direct research into areas that bear economic potential—through funding programs and bonuses for researchers, and sometimes through legislation (Japan was the first harbinger. Already in 1998 a law was passed in Japan to encourage technology transfer from universities to industry).[274]
- The exchange of roles between academia and industry is evident even on the visual level. Although higher education institutions take pride in ancient, majestic buildings with a historical aura hovering over them, many of the buildings are crumbling due to maintenance costs, and appear neglected and rundown, while industrial parks are scattered with towering, glamorous, and modern buildings, equipped with all the latest technological innovations. In institutions of higher education, the offices of the faculty members are small and the working environment is outdated and scarce, while in industry many employees enjoy ultra-modern offices, with a young and fresh look and a luxurious, pampering work environment (impressive dining rooms offering a rich menu of fine catering, sophisticated meeting rooms, sitting areas, relaxation rooms, fitness and game rooms, advanced computing and more). It is no wonder that students expect educational institutions to tighten their ties with such companies already during their period of studies.

Tightening the relationships is beneficial to both parties for the time being, but it is likely that in the not-too-distant future, industry will reach the conclusion that it is not worthwhile to transfer research budgets to universities, and it would be better to acquire the best minds in academia and conduct independent research. Many researchers are already conducting their research outside of the institution that employs them, as it cannot provide them with the most state-of-the-art (and expensive) equipment and resources needed for advanced research. They make pilgrimages to prestigious universities, large laboratories, and commercial companies in the United States and Europe that are capable of providing the best possible working environment. One study found that over 75% of science stars in American academia

(5,400 scientists and engineers considered to be leaders in their field) had a professional relationship with at least one commercial firm during their careers.[275]

One Nobel laureate in Israel told us, smiling, that the institution to which he belongs boasts about his achievement, while most of the research that produced the prestigious award was funded and carried out in practice at a prestigious, sophisticatedly equipped institution in the United States, the likes of which there are only a very few in the world. A senior biotechnology researcher has told us that when she visits advanced factories dealing with the field of her expertise, she often finds herself ashamed and envious of the sophisticated means and rich budget that are at their disposal.

Paradoxically, today a growing proportion of the scientific procedures that academic scientists need are outsourced. The large databases have, for quite a while, no longer been the exclusive possession of the state and institutions of higher education. Commercial companies own and develop huge databases, access to which are limited. Much has been said about the fact that Facebook and Google produce and hold immeasurable information on billions of people. The information stored in their servers is tens of thousands times the information produced and provided by government agencies, and grows more detailed and updated every second. In other words, much advanced research in the social sciences is no longer in the possession of academia but in the hands of private, commercial entities, and the trend will only continue and become stronger.

3

An Avalanche of Papers

The Crisis of Scientific Publishing

A Scientist's Workday

A faculty member's daily work routine involves five complementary activities:

A. Classroom teaching, which also entails preparing lectures, checking assignments, and grading.
B. Supervision and mentoring of graduate students (MA, Ph.D. and postdoc).
C. Occasional or regular administrative jobs, such as taking part in professional and administrative committees and reviewing articles, dissertations, research proposals, and promotion files, often in addition to management positions in the department or faculty.
D. Activities outside the faculty member's home institution, whether for pay or on a volunteer basis, such as consulting, participation in governmental and public committees, collaborations with commercial and media entities, commissioned lectures for various audiences, and more.
E. Research activity, the most demanding of these tasks. Whether it involves lab experiments, numerical analysis, digging in archive files, or scientific observations of animals or humans, every faculty member must devote a tremendous amount of time and energy to research. This includes not just the research process itself, but also fundraising, designing a research plan

(including a review of the existing literature), analyzing results, and publishing conclusions. Research is pointless if the findings will not be published, so every scientist that carries out research eventually submits his/her findings and conclusions for publication to one or more of the countless scientific platforms on the scene—journals, books, or scientific conferences.

Scientific research is based on several fundamental principles, universal to all fields of knowledge:

- **Adherence to truth**. All scientists, in every field and every corner of the world, are committed to a strict code of scientific credibility which requires them to fully and accurately report their research (data, methods, findings, and so on), without concealing any information. This is by no means an easy task, in part because the difference between success and failure in science is often a fine line, and the temptation to cut corners or hide failures can be high. It is also tempting because scientific research demands a great deal of time, energy, and money, and because most researchers have a natural desire to confirm their preliminary assumptions and theories. Unfortunately, the results do not always deliver the goods. Most of all, there are considerations of ego at play here: People are reluctant to admit their mistakes, especially people with an inflated sense of their own importance.
- **The principle of refutability.** It is customary to say that scientific truth is correct "until further notice." That is to say, a new finding could always emerge and shed new light on empirical reality. Unlike metaphysical statements, including theological truth statements, in science truth statements must be potentially open to refutation (a principle formulated by the philosopher Karl Popper). For example, the statement that God exists is unscientific—not because it is necessarily untrue, but because in principle, there is no possibility of refuting it (and therefore of confirming it).
- **Encouragement of criticism and debate**. Scientific truth is not monolithic and rigid, but rather flexible and dynamic. It is subject to the limitations of the senses and the human intellect, as well as to the development and precision of the tools used in research. As opposed to theological truth, which announces itself as a divine message and thus imposes a credo upon the believer, science cheers on doubt and criticism. It cherishes controversy, because, as the Talmud says, jealousy between writers increases wisdom, and because debate is a crucial tool for the validation and clarification of claims. Herein lies also the beauty of science, as the clash between thesis

and antithesis in scientific interpretation produces the synthesis, and so on ad infinitum.

- **Striving for maximum objectivity**. No one is immune to bias or prejudice, but awareness of psychological distractions can minimize their potentially ruinous influence and make space for objective judgment. Successful research is contingent upon scientists' ongoing effort to neutralize inner noises and detach themselves, just like judges in the courtroom.
- **Total transparency and documentation**. Scientific knowledge is composed of infinite tiny attempts to solve the riddle of the universe. In order to validate his or her findings and ensure the advancement of the scientific community at large, scientists must put all their cards on the table for their colleagues. That is, they must fully and publicly report and document their research process, their findings, and the way their conclusions were drawn. The principle of transparency not only allows colleagues to review the phases and logic of their research, but also to replicate them. A study that yields different results from the original study when repeated is liable to be unfounded, incorrect, and in some cases even fake. But the replicability, repeatability, and reproducibility principle—in layman's terms, getting the same results again and again—is important not only for assessing the reliability of the study, but also because it allows other researchers to follow in the footsteps of the previous study and to add an additional floor to the building of shared knowledge. As the well-known Israeli proverbist Hananya Reichman put it: "From the general ocean, and a drop of my own."
- **Research hypotheses**. Many people naively assume that scientific discoveries are a twist of fate, something like an inexplicable muse landing on the artist's head. Indeed, science has an element of "celestial" inspiration—a kind of inward sense which some would call intuition, or perhaps an intelligence which is difficult to explain. Still, science is fundamentally based on "practical thinking" or "guided imagination," both of which are more than a mere gut feeling.

  Most studies are the result of Sisyphean efforts, and their pace is like a box step: two steps forward, two steps backward. Only rarely does a real leap take place in the form of a remarkable discovery or an innovative new theory.

  As a rule, studies do not begin with indefinite observations through a wide lens, but rather with a focused hypothesis that seeks to confirm an intuition. A wise and experienced scientist does not throw his or her net into a wide ocean, but rather navigates the boat to potential fishing areas. In many cases, the databases—including statistical files, archives, and genetic databases—are what dictates the study's area of focus. Therefore, good science thrives where there are rich databases and an awareness of the value of documentation and archiving. Naturally, one should be cautious of confirmation bias and the danger of creating a self-fulfilling prophecy.

An initial hypothesis is also important because it saves time, energy, and resources. Often, the scientist raises a number of competing hypotheses and seeks to discover the truth by process of elimination.

- **Inductive generalization**. Empirical research is built by generating knowledge about the world through the physical senses or through instruments that enhance them, such as microscopes, cameras, and the like. That process is based in part on the principle of induction: generalizing laws of nature out of isolated cases that repeat themselves often enough to rule out the possibility of random occurrence. How many isolated cases are required to produce a valid generalization? Sometimes, the answer is intuitive—for instance, when a phenomenon repeats itself systematically, continuously, and without substantial changes, and there is no other way to explain it. Sometimes the answer lies in statistics, i.e. correct sampling and the significance test. Laboratory experiments must be repeated at least once in order to verify their findings; the general consensus in science is that they should be repeated twice.

  It should be noted that that any proof of causal correlation between variables is never 100 percent certain and will always be speculative to some degree. There is always a possibility that the correlation identified by the study is actually random. The level of certainty in the study is known as the "confidence level." The scientist defines the confidence level in advance when constructing the statistical model of the research; the general convention is 95%. So, even when a causal link has been proved, there is still a 5% probability that we were wrong. In our world, where none of us knows our beginnings or our end, extrapolating past experience from the present always involves an element of gambling. However, generalization should be an educated guess, based on a basic understanding of the dynamics of existence: a chain of cause-and-effect responses with a clear direction (past→present→future) and a certain stability which characterizes life on earth, just as the sun always rises again in the morning.
- **Deductive inference**. Science also makes generalizations about the world which are not based on observational experience, but rather on logical analysis. Sometimes scientists formulate laws of nature or develop theories about the world through pure reasoning, the apex of human thinking. Each

isolated empirical case which behaves in accord with the theory confirms the rule. Although theories are developed in all disciplines of science, philosophy and mathematics are deductive by their very nature, as they are not based on sensory observations or experience.

- **Multiplicity and diversity of evidence as a basis for conclusions**. Humans tend to draw hasty, and therefore incorrect, conclusions on the basis of a single personal experience. By contrast, science is based on neutralizing the element of random occurrence which is the adversary of truth. In order to cement a wide and solid basis for the truth, the scientist must cross-check as much evidence as possible. For this reason, studies that use a wide variety of research methods and sources are more sound and convincing.
- **Prudence and caution**. The scientist has to be skeptical, cautious, critical, and modest in his or her arguments, even when the findings are well-validated. Overly high expectations and over-conclusiveness are a bad recipe for good science. Therefore, scientific conclusions—and especially their interpretations—should always be formulated in a moderate and judicious style ("as it seems," "probably," "it can be assumed" and so forth). This is also why many scientific papers end with a sincere account of the research's limitations.
- **Systematicity and accuracy**. Science is not just the discovery of new findings about the world, but also the systematic organization of information, the mapping of natural phenomena, and the assembly of a puzzle of empirical pieces. Scientific research entails systematic and accurate work at all of its stages, namely data collection, isolation of variables, controlled measurements, detailed documentation, and the writing and publication of a final report, with clear language and images for the benefit of readers.
- **Simplicity**. Every study consists essentially of three stages: collecting data, drawing conclusions (generalization), and explanation (interpretation). The scientific account must appeal to common sense and stay away from metaphysics, mysticism, self-persuasion, and social pandering. Claims in the style of "I believe it's true" are unacceptable in science. Furthermore, the scientific interpretation demands that priority be given to the simplest of all possible explanations, in the spirit of the "Occam's Razor" principle: an explanation that immediately sounds convincing to the reader; an explanation that requires few previous assumptions; an explanation that is consistent with patterns found in other phenomena; an explanation whose inner logic prevails over alternative explanations.

Obviously, one should refrain from ruling out explanations that seem odd or "insane," as the truth is often hidden in unexpected places. In fact, many facts and explanations which we take for granted today were met in their time with disdain, contempt, and anger. Myths, axioms and ingrained conventions can often be major obstacles to science.

The Scientific Journal

Modern science has flourished primarily as a result of the formation of learned societies. These societies were wise enough to exchange information and ideas, to critique and cross-pollinate one another, and thereby to build an impressive tower of science floor by floor. One of the most important fruits of the learned societies' labor was the development of university presses and scientific journals.

The first learned society, the Royal Society of London, was established in 1660 and included approximately forty academics, doctors, and intellectuals from various fields. They would meet several times every month in order to hear and deliver lectures, and to discuss what was then known as "natural philosophy" and would eventually receive the name "science."

Until then, the marketplace of ideas among the learned circles of Europe took three different forms: face-to-face gatherings, which led to the development of lectures and university seminars; the writing of books, in which researchers summarized their investigations; and letter correspondence between colleagues, a few of which would ultimately be compiled and stored in university archives and libraries. The role of the secretary of the Royal Society of London at that time, Henry Oldenburg, was primarily to keep a record of the Society's meetings and read letters from scientists who were unable to attend aloud to those present. With time, a brilliant idea began to form in Oldenburg's mind: to establish a monthly periodical in which would be published the content of the meetings, the letters, and an overview of the most recent scientific treatises to come off the presses. Later on, the monthly also began to feature papers which explicated the research and theories of Britain's greatest minds, and the most important publication format in science was born—the scientific journal.

The first issue produced by Oldenburg was published in 1665, under the unusual name "Philosophical Transactions of the Royal Society of London." It was preceded a few months earlier by the French "Journal des Sçavans" (Journal of the Learned), which was also considered scientific; that said, most historians of science agree that the first out of the gate was the British journal.[276]

Early on in the process Oldenburg understood the economic potential of the journal, and published it as a private enterprise despite using the society's name. The innovative new product enjoyed immediate success, and already in its first few years "Philosophical Transactions" featured papers by scientists who have left their mark on history, such as Isaac Newton, Robert Hooke (the first to discover the cells which make up living bodies), Antony van Leewenhoeck (the first to observe germs), Michael Faraday (who pioneered the study of electromagnetism and invented the electric motor), and Charles Darwin. This journal acted as a model for additional journals which began to appear around Europe, and their number steadily increased alongside the growing institutionalization and expansion of the learned societies.

There is no science without consistent communication between scientists, and the fact that the British led the world in transportation granted them an additional advantage in the development of scientific correspondence—first through letters, then through the distribution of books and journals. Major advances in communications technology would go on to play a critical role in the development of scientific publishing.

In the late 1700s, the American Revolution created a new English-speaking democracy which began to lead humanity in many fields, including science. "The American Philosophical Society" was formed in 1743, the journal *Nature* published its first article in 1869, and the journal *Science* was founded in 1880. No research took place in American institutions of higher education until the end of the 19th century, but already at the beginning of the 20th century the United States had become a scientific power. Ever since, the U.S. has led and continues to lead the world not only in research but in the field of scientific journals and publishing—both in terms of quantity and reputation.[277]

The scientific communications of the 21st century include diverse methods, most of them digital, and the scientific conversation also takes place outside of professional platforms—in newspapers, in widely read popular science ("pop science") magazines, on the radio, on television, and in documentary films. But the most significant platform for the dissemination of scientific information was and has stayed the scientific journal.

The format of the scientific journal has undergone an evolutionary process,[278] chiefly manifested by several important improvements. For example, while the first papers published in scientific journals resembled personal letters to colleagues and were written in first person, today the strict code which governs the writing of scientific papers requires the author to stay detached and leave personal opinions out of the text. The writing style of these papers has become drier and more concise, and even their style of presentation has been standardized. This has made for convenient reading and skimming in a specific order: abstract, introduction, literature review, research hypotheses, research methods and data, results, conclusion and interpretation, and a bibliographical list at the end. Sometimes, the paper will also include relevant images and graphics for the purposes of clarification and illustration.

That said, despite the large common denominator, there are also differences between the journals. These differences may stem from the particular research discipline, the tradition of each platform, or the policies or emphases of the journals' editors. There are also noticeable differences in technical details (such as the method of citation), level of content, writing style, and quality of editing. All of these factors are influenced by the target audience, and at the same time determine who the readers of the journal will be. A paper on celestial bodies which is submitted to *Nature*, a publication which can also be found on the coffee tables of stockbrokers and lawyers, will obviously be worded differently than a paper on the same topic submitted to the official journal of the Society of Physics.

The constant growth in the number of scientists in every field, as well as the trend towards narrow research concentrations, has brought about a parallel growth in the number of specialized scientific journals. Today, most scientific disciplines and subdisciplines have their own journals, but the most prestigious journals are interdisciplinary—and from the top of the mountain shine the three beacons: *Nature*, *Science*, and *Cell*.

The scientific papers published today cover an enormous variety of fields and research topics. A few of them concentrate on local and national areas of study (the geography, history, literature, or sociology of a specific country), while others cover universal subject matter. Many journals are published in the local languages of their countries—especially in the humanities, social sciences, arts, law, and education—but most scientific journals, particularly prestigious ones, are produced in English, which is considered the language of science. English may only be the world's third-most-spoken language—after Chinese and Spanish—but it is the official language of over sixty countries, and it is studied as a second language more often than any other language on Earth.[279] It is important to note that most of the pioneering works of modern science were written in Latin (for example, the Principia, the monumental series written by Isaac Newton in 1687, which contains the laws of motion and gravity), but America's rise as a scientific power in the 20th century granted English an unshakable command over scientific culture.[280]

A typical scientific paper is between five and twenty pages long, containing three thousand to ten thousand words, but some double that amount or even multiply it many times over. Since the 1970s, there has been a significant trend towards shorter scientific papers, because of the massive volume of papers submitted to journals, the higher odds of acceptance for short papers, and sometimes because the authors split up a single long paper into several short papers in order to earn a few more lines on their publication lists (we will go on to discuss this at length).[281]

Alongside papers which present the findings of original, empirical studies, every so often other kinds of scientific writing appear in academic journals: survey papers, which provide an overview of publications in a certain field, as well as shorter texts such as reviews of new books, letters to the editor, and editorials. In addition to journals, scientific papers also appear in anthologies and "conference proceedings," collections of the papers presented at an academic conference.

We must emphasize for the layman: scientific journals are the beating heart of science. Their editors and, most of all, their publishers wield enormous power. Remarkably, however, although we might have expected that the founding of a new scientific journal would entail some sort of licensing process and be subject to quality assurance, this is not the case. In theory, any person or organization, in any country in the world, can launch a scientific journal with no need for permission. That said, because a scientific journal must have a stamp of quality, credibility, and prestige in order to draw an audience of readers, in practice most of the founders of academic journals are well-respected scientists in their field, scientific societies, scientific institutions, or well-known publishers (we will discuss the fictitious scientific journals which have flooded the world of science elsewhere). In most instances, the journals are funded by institutions of higher education, research institutes, public non-profit organizations, public and private publishing houses, and philanthropists.

The Industry of Science

The first study to provide systematic information on the growth in the quantity of scientific papers over time was conducted by the British historian and physicist Derek de Solla Price and published in 1961.[282] Price is considered the father of "Scientometrics," the field of study which concerns the quantification of scientific output. He concentrated only on the number of papers, excluding books and other publications, and examined a period of three hundred years (1650-1950). He found an increase of 5.6% per year, which meant that the number of scientific papers doubled every thirteen years. In Price's footsteps, a tradition of measuring scientific output began which became more and more sophisticated over time. A study published in 2010 found that between the years of 1665 and 2009, a total of fifty million scientific papers had been published throughout the world.[283] The number of journals grew in that period at an average rate of 3.5% per year; in the last decade, this rate has accelerated to 5-6% every year.[284]

Eight million scientists around the world publish over three million papers in total every year, in no fewer than 33,100 peer-reviewed journals in English alone. Many additional papers are published in scientific journals in other languages—all in all, making up a total of 42,500 journals in all languages in 2018.[285] Scientific output in general, including papers, books, and more, is flourishing at a furious pace of 8-9% per year.[286]

This phenomenal quantitative growth in research yield stems from a long line of causes:

- **There are more institutions and faculty members.** In the past fifty years, there has been a massive increase in the number of colleges and universities around the world, not to mention the number of scientists (a growth of 4-5% per year).[287] In 2010, China surpassed the United States in total number of scientists, and the percentage of researchers among the general population in China is close to the international average. (Israel, by the way, tops the chart with 0.8% scientists—eight times the worldwide average).[288] Because full-fledged academic faculty members are expected to research and publish, the number of publications has grown accordingly.

  In this context, it must be noted that alongside the establishment of new institutions, existing institutions of post-high school education has been elevated to a new standard: venerable colleges have been converted to universities, and teachers' colleges and vocational schools have received the badge of "academic colleges." This process has had dramatic ramifications for the volume of scientific publication, as professors at these colleges, who once primarily dedicated themselves to teaching, are now required to perform research, and their advancement is conditional on the publication of papers in journals. Moreover, because the competition in the market of higher education has grown fiercer, the most august institutions distinguish themselves partly through "status symbols" of research, including the number of publications by their faculty. This is also the reason for the semantic update from "universities" to "research universities."[289]
- **Countries on the margins of science are submitting more papers.** The world of scientific publishing is highly concentrated and controlled by a handful of scientific powers. In 2003, for example, thirty-one countries produced 97.5% of the papers which were cited most often in other papers. As we will explain at length, one of the most important measures of a paper's success is its impact factor—the number of times it is cited by other scientific papers.[290] That said, in recent years, the circle of scientific production is

expanding, and many countries that once contributed a minuscule number of studies—and even fewer cited studies—are picking up the pace. This is primarily true of countries with growing economies. International reports have shown that the fastest growth in scientific output between 1990 and 2010 was recorded in the Middle East and Asia; the leaders of the pack were Iran, South Korea, Turkey, Cyprus, China, and Oman.[291]

- **The number of research students has gone up.** The massive rise in the number of master's students, Ph.Ds, and postdocs provide veteran researchers with more potential collaborators with whom to perform studies and write papers.Many of these research students become workers on the fast-paced assembly line of scientific papers (for instance, between 2000 and 2015, the number of postdocs in the United States ballooned by 150%).[292]

  Unlike in the past, today Ph.Ds are asked to publish papers as part of the standard requirements to receive their doctoral degree.[293] The expectations in this area are different from field to field and institution to institution, but the general trend is to replace the extended doctoral thesis (dissertation) with papers in journals. In India, for example, a regulation was passed in 2013 which made the publication of two papers a necessary condition to receive a Ph.D. At that time, over one hundred and sixty thousand students were studying for a Ph.D in India.[294]

  Moreover, the competition for academic positions has become more cutthroat over the years, and the result is an inflationary rise in expectations and entrance requirements even for postdoc programs. In order to be granted an academic position at a college or university, or even to submit their candidacy, young researchers are asked to present an abundant portfolio, which will be evaluated based on the number of the researcher's publications and the quality of the journals in which they were published. Even adjunct professors do their best to publish as many papers as possible, so that they will have the best possible jumping-off point for a permanent position.
- **Papers are published within the framework of conferences.** The publication of papers as part of an active participation in scientific conferences has become popular in recent years, and contributes a respectable number of papers to the pool from a different direction.[295] Many of these conferences and publications are the initiatives of scientific societies, whose numbers have increased with the years, reaching 17,500 today.[296] The largest scientific society in the world is the American Association for the Advancement of Science, with over one hundred and twenty thousand members. This is the society which produces the prestigious journal *Science*.[297]

- **It is easier, cheaper, and quicker to produce papers.** The rise in the worldwide level of education (including language learning) has made the selection of available editors, translators, and producers wider. It has also made the production of printed material cheaper. Add to this the electronic revolution: the word processor has replaced the typewriter, and complicated calculations are performed today by programs on one's personal computer. In the age of e-mail, correspondence has become instantaneous, and this, too, has simplified and abbreviated the process by which papers are produced.
- **The journals market themselves aggressively.** The heightened competition in the publishing market has brought with it an aggressive marketing war. Scientists' inboxes are swamped with countless e-mails from journals, encouraging them—and often imploring them—to send papers for publication.
- **The number of specialized journals has risen**. The growth in the number of journals which focus on a narrow scientific field has enabled the publication of papers that once struggled to find a home because they were considered too "niche."
- **There are more research foundations.** The number of foundations distributing research grants has gone up with the years, and so have the sums of each grant. This allows researchers who have received grants to create an assembly line of laboratory technicians, research assistants, interviewers, data transcribers, statisticians, translators, and language editors who produce papers for them as contractors.

The Hidden (and Rising) Bar

Anglo-American culture, which has dominated the world of science and characterized the leading scientific powers for many years, is based on three complementary values: continuous growth, competition and ambition, and the measurement of output. The fundamental principle is that one cannot be satisfied with what already exists. One must maximize his or her personal wealth, no holds barred, by triumphing over his or her competitors—including potential or even imaginary competitors. Supposedly, this can be accomplished through hard work, which both gets results and improves one's abilities along the way.

This principle has been difficult to incorporate into scientific culture, because research is not an ordinary "product." Therefore, in most of the world's academic institutions, it was once customary to content oneself with general conventions of excellence, with more of an emphasis on the professional reputation of the scientist and less on the number of his or her publications. All this has changed in the past few years, because of four factors: a) the overwhelming influence of American culture, which loves to quantify everything in sight and swoons over comparisons and charts; b) the increased value placed on transparency, especially when it comes to the use of taxpayer funds; c) the rise in governmental oversight of colleges and universities; and d) the economic crisis. In recent years, the funding available for scientific research has become much more limited, and the competition for that funding is fiercer. Because governments, foundations, and donors want to make sure that they are investing wisely and enabling success, they evaluate the output of faculty members as an additional criterion for grants.[298]

In this way, the equation linking faculty members' productivity to the number of their publications has become deeply rooted in scientific culture, while measures of quality that are harder to quantify have become less significant or even disappeared entirely. Administrators, treasurers, and other "Excel prophets" are the standard-bearers of an ideology, and a practical policy standard, in which decisions are made on the basis of the quantifiable. And when this narrow definition of productivity becomes the face of science, the bar for quantity is sure to rise consistently. The fact that the phrase "scientific output" has become a common figure of speech in academia testifies to a shift in values that is changing the way the game is played. In other words: academic faculty members are demanded, explicitly and implicitly, to generate and publish as many papers as possible. The number sets the tone, and oh, does it set the tone!

Over the years, many studies have examined the causes and characteristics which influence scientific productivity (that is, output of papers); among them are gender, seniority, and motives in publishing the paper. A few researchers have also measured the differences between generations and among disciplines.[299] Strangely, however—and this is probably not a coincidence—no study has yet examined whether the number of publications required of faculty members at institutions of higher education has in fact gone up over the years. Why has this not been investigated? A few reasons come to mind:

- The appointment and promotion committees for faculty members are confidential and exempt from transparency requirements, and transcripts of promotion debates are off-limits even to the candidates under discussion.
- Many scientists do not share their full resumes publicly; therefore, it is difficult to get a clear picture of their output, because central databases of papers do not include all of the published papers in the world.
- There are major differences between countries, institutions, and scientific disciplines in what is expected of faculty members, as well as in opportunities for publication.

- All that said, the most important reason is that no academic institution in the world ever publishes an official "rate" for the number of papers required for professional advancement at every stage of academia. The rate, such as it is, is passed along by word of mouth. For this reason, it is difficult to follow the change in expectations over time. The official excuse for this lack of transparency (always stated in the most general and vague terms possible) is that "the committees consider quality and not just quantity, and every application is judged on its own merits." This mantra is also repeated on online forums for academics. Most of the time, the question is asked by young people trying to ascertain how many papers they must publish at each stage, and their older colleagues provide them only with this parroted answer. But in practice, the committees really do consider quantity,[300] and the expectations rise from day to day, for reasons which will be explained below.

As of now, there is no way of empirically verifying the accepted hypothesis that the number of publications required of faculty members at every level of academia has indeed risen over the years around the world. Therefore, we must rely on indirect indicators. For instance, a study which examined the "productivity" of 374 faculty members in the field of economics over the course of twenty-two years (1971-1993) found that two-thirds of them published fewer than five papers over that period, and about half did not publish at all. In our day, this number would not even be enough to be hired for a position at many institutions.[301]

For the sake of this book, we conducted a little experiment. It may not have been scientific in its metholodology (it was not a representative sample), but it certainly hints at the reality on the ground. We compared the publication lists of twenty retired professors (professors emeritus) in Israel, from three research universities and four disciplines (biology, physics, education, and sociology), with the publication lists of twenty scientists from the same universities who had only just received permanent positions (mostly between the ages of thirty and forty). The result was not surprising: although the retired professors' careers had been twice as long or even more, the publication lists of the young professors were much more extensive. Incidentally, studies conducted in Spain and France, among more representative samples than ours, yielded similar results.[302]

A random glance at the publication lists of internationally renowned scientists, including Nobel Prize winners, reveals that they contain a much more modest number of publications than that of many scientists today, including the young and inexperienced. In fact, many of those very same renowned and respected scientists would not have been accepted or promoted at the leading institutions today. The publication list of Professor Aage Bohr, for example, included only eight papers when he won the Nobel Prize in Physics in 1975. Each of his publications was, of course, brilliant—but there were only eight of them. Today, with a number like this, the well-known Danish physicist would not have received a permanent position at most of the world's academic institutions. Another physicist and 2013 Nobel laureate, the British professor Peter Higgs, said in an interview that if he had been required in his youth (in the 1960s) to meet the typical expectations for publication today, he doubted that he would have attained the scientific accomplishments he did. "I don't think I would be regarded as productive enough," he remarked with a bitter smile.[303]

In a 2017 article in the *Guardian* on the corruption of contemporary science, the writer and scientist Stephen Buranyi noted that the biochemist Frederick Sanger, considered one of the most important scientists of the 20th century, published very little in the two decades between his first Nobel Prize (in 1958) and his second (in 1980). Had he been subject to the customary approach today, Sanger "may well have found himself out of a job" over those twenty-two years.[304] Jonathan Dancy, a senior British philosopher and professor of philosophy, was also asked about this particular topic. He responded that at the beginning of his career, he and his colleagues were granted abundant time to contemplate the world, to learn and teach, and especially to develop their intellectual abilities—without anyone prodding them to devote most of their time to publication.[305]

The culture of "output" is causing major damage to science, on which we will elaborate below. In the meantime, we must identify the causes of the increasing demands. A number of explanations seem feasible:

- **The measurement craze.** From the moment that the obsessive tracking of scientific output began, and as the tendency to draw comparisons between scientists, institutions, and journals has grown, the pressure on scientists to heap new papers on the mountain of publications has spiraled out of control.
- **The humanities and social sciences are jealous.** The qualitative, "soft" sciences have always suffered from an inferiority complex next to the quantitative sciences, as their empirical basis is shakier. In order to improve their "unscientific" image, the qualitative sciences have adopted a more quantitative aesthetic—which is sometimes no more than a costume. Because it is easier and faster to produce a paper based on quantitative research methods (especially computer processing of raw data within scientific databases) than

one based on quantitative methods (observations, ideas, searching through archives, and so on), the number of papers has grown, and with it the expectations. The equation is simple: more measurements + more statistics = more papers, which means more lines on your resume and an improved position in your career. Quantitative research in the social sciences has already been nicknamed “the meat grinder”—a machine that makes hot dogs and hamburgers from a paste of quality ingredients and inferior fillers.[306]

The result is a vicious cycle: quantitative scientists publish more and therefore climb the ladder of academia faster, receive positions of power in academia (seats on promotion committees or on grant review committees for foundations, administrative positions), and demand from their qualitative colleagues at least the same number of publications—or preferably even more.

- **The promotion committees have raised their standards.** University promotion committees do not have official standards for promotion tailored to each individual academic field. Their debates and decisions are largely the result of negotiation between committee members, and are influenced by stereotypes and myths, internal politics, and all manner of psychological anomalies which we will go on to describe. Representatives of many different faculties and departments sit on these committees, with the result that committee members in fields in which it is easy to publish using “contractors” often set the same bar for candidates in fields where publication is slower and more difficult. Everyone is required to fall in line with the highest numbers, and no concessions are made to the vast differences between disciplines.

  Moreover, when the general advice to young people is “publish as much as you can,” the leaders of the pack—a small minority—set the norm for everyone.[307] The records which are broken anew every morning raise the bar of expectations, because they create an illusion that any hardworking and productive academic can achieve those astronomic numbers. In practice, this extraordinary quantity is achieved not through excellence in science, but in many cases through some combination of luck, a knack for getting grants and budgets, a new and fashionable area of research, or a domineering personality which enslaves one’s personal life to the profession. The next in line are required to keep pace with the record-holders. As for the members of the promotion committee, most of them are veteran scientists who have already arrived at the top of the food chain and are no longer required to undergo review—and they don’t really care that others are being left behind. On the contrary, it adds prestige to their own positions. After all, it's not as though anyone is going to check their resumes.

- **Competition for positions and ranks has grown.** Academia was once a small, closed-off club, and the competition for each position was much less brutal. Because the demand for academic positions has grown much faster than the positions on offer, today candidates fight tooth and nail over each opening. One of the weapons deployed in combat is the number of one's publications.
- **The war over every dollar is getting fiercer.** As scientific budgets are shrinking, and battles are waged over every allocation from governments, foundations, or donors, it is easier for the holders of the purse strings to distribute funds according to scientists' output. In other words: yet another reason to pressure faculty members to publish and publish.

Publish or Perish

From the outside, many imagine the academic world as a pastoral, tranquil scene—a sort of monastery of wisdom and knowledge, where geniuses are immersed in their attempts to solve the mysteries of existence, with no one to cut short their musings. The reality is nothing of the kind. The academic career indeed began hundreds of years ago as a pleasant occupation for the scions of nobility, but it has long since ceased to be a peaceful or serene place to work. Officially speaking, there are no production quotas for scientists, but most of them toil around the clock. They do this because the work is challenging and even addictive, and because their profession is often their hobby, as in the arts. But they also do it because they are constantly subjected to the informal pressure of expectations—from colleagues, competitors, or the very same institutions that employ them.

No one knows who was the first to coin the mythological phrase "publish or perish."[308] What is clear is that it first reared its head at the beginning of the 20th century, back when academia was still a small, exclusive, and prestigious club of the well-born, who spent most of their time on conversation, social gatherings, reading, and other intellectual pursuits. More importantly, that winking advice—seemingly intended to encourage the scientist to prioritize his or her research—is understood today as an entirely unfunny alarm: not to publish is to commit professional and financial suicide. Your professional advancement will grind to a halt, your income will be damaged, and your status at your institution will waver—in fact, they might even show you the door.

For all intents and purposes, the academic profession is one of the only professions in the world in which the organization incentivizes its workers neither through a clear work plan nor through compensation for certain quantifiable achievements, but mainly through the use of fear. This is also the reason that the increasing pressure to publish is discussed not only inside the walls of the institutions (where everyone talks about promotion and publication at every turn), but also in scientific journals and online platforms. More and more articles and books are attacking this phenomenon, and more studies providing worrisome data about its destructive consequences.[309]

The articles can bark all they want, but the long trail of publications is just getting longer. Despite the criticism and the outcry, in most academic institutions the pressure has not let up—in fact, it is getting even worse. But although there is no official rate for demands of quantity, the interviews we conducted, as well as blogs and various discussion platforms for academics, reveal that the accepted minimum rate (at least for institutions included on international rankings lists) is between two and three papers per year. Is this realistic?

The publication of a quality paper requires a certain minimum amount of time: time to prepare a research proposal, time to raise funds for the budget, time to review background literature, time to train the research team, time to perform the research, time to manage the budget and write interim reports, time to process and analyze the data, time to write and edit the paper, and time to get the paper accepted for publication. Studies show that it takes an average of seventeen weeks for a manuscript to be accepted for publication in a scientific journal. After that, three additional weeks are required to revise the essay according to peer reviewers' comments. That is to say, the average total time is about twenty weeks. Considering that, in most cases, essays are not accepted for publication the first time around, and the researcher is forced to make additional attempts in other journals until the paper is accepted (if at all), and considering that researchers are prohibited from submitting the same paper to several journals at once—this means that the average time it takes for a researcher to publish a scientific paper is over six months. For many papers, it can be over a year.[310]

One would think that the institutional expectations for output would take the factor of time into account, including the element of chance in the acceptance of papers for publication (the identity of the peer reviewers and the editors, the heavy volume of submissions, and so on), the differences between research methods and disciplines, the difference between a paper written on one's own and one written in collaboration with others (many institutions demand that professors, particularly in the humanities and social sciences, write some of their papers on their own in order to prove independence). This is without even taking into account other academic responsibilities. And if we wanted to go above and beyond in our calculation of a time standard, we would also have to factor in researchers' age, marital status, the stage of their career, and perhaps even gender (young female faculty members often experience limitations caused by pregnancy and birth, and often by traditional expectations of their role within the family unit). But not only is no weight given to considerations such as these, but paradoxically enough, the expectations are especially high at the earliest stage of one's career—when the researcher is not yet experienced, and is busy exploring his or her options, learning the system, making connections, and trying to build romantic relationships and family on the side. This is also the hardest stage in terms of curriculum-building, and the stage at which many institutions heap on additional administrative tasks, because the young professor is in no position to refuse.

As strange as it seems, as far as we know no institution has ever discussed the obvious question: Are the demands for quantitative output reasonable or worthwhile? Put another way, the demands have grown higher and higher, and no one has bothered to ask: does this still make sense? Is this moral?

A quick and crude calculation of the time investment required to publish two to three papers per year shows that this expectation is unrealistic. But how do more than a few scientists around the world manage it? And how do some of these scientists succeed in publishing an even higher number of papers?

In 1926, the American mathematician-physicist-chemist-statistician Alfred Lotka published what was known in those days as the "Law of Scientific Productivity," which in part established that a minuscule fraction of scientists are responsible for the distribution of the overwhelming majority of scientific publications.[311] Today, it turns out that "Lotka's Law"—or, as many have nicknamed it, the "Power Law"—is more valid than ever.

Eighty-eight years later, in 2014, the American journal *PLOS One* published a study whose results might come as a surprise. The researchers behind the study wanted to ascertain the percentage of scientists in the world who manage to publish a paper every year, and to pinpoint the characteristics of that supposedly productive group. They investigated the papers published on the database Scopus between the years 1996 and 2001, and found that approximately fifteen million scientists published papers during those years. Surprisingly (or not), it turns out that only 1% of them successfully published at least one paper every year over the six years examined. By the way, there was an extremely small group (3,269 scientists) of "publishing machines" who managed to generate over ten papers per year.

Furthermore, the study found that the power of the highest percentile, those who published at least one paper every year, was several times higher upon examination of the papers' impact—that is, the number of citations they received: 40%

of all papers cited by the scientific community (according to the same database, in the same years), and approximately 80% of the papers cited over a thousand times during that period, were written by the tiny "super-productive" group (on which we will expand later in the chapter).[312]

A study published one year later by the journal *Higher Education* presented a similar picture. A survey of seventeen thousand researchers from research institutes and universities, performed across eleven European countries, found that only a tenth of the researchers produced approximately half of all scientific output. This pattern held true across all research disciplines, and it turned out that the same gap between the massive output of a small minority and the lower output of the vast majority also characterized highly productive countries and elite institutions, where one would think that all of the scientists would be extremely prolific.[313]

This means that a tiny elite sets the tone for norms of publication in institutions of higher education all over the world.[314] This raises an interesting question: what about the 99% of scientists who are not included in the category of "publication machines?" In our estimation, they can be divided into three subgroups:

- The first group is composed of scientists who publish very little or do not publish at all.[315] These tend to be members of small guilds which are privileged, well-connected, and often have an element of nepotism. In many of the world's nations, receiving an academic position and advancing up the ladder is not dependent on one's talents or achievement record, but rather on seniority and connections. Even in developed countries with feudal roots and traditions—such as Spain, Greece, Portugal, and Italy—scientific output is not always the most instrumental criterion for academic appointments or promotion.
- The second group is made up of scientists who are extremely productive, but not in international platforms and not in English. Many of these scientists primarily publish books, reports, or popular articles in their own languages. Although some of them are extremely talented and influential—at least in their own nations—they are not counted in the official international statistics, and therefore they have flown under the radar of the studies on "productivity." Many of them belong to an older generation, are concentrated in the humanities, social sciences, law, and the arts, and work in countries that are not counted among the major scientific powers (according to the international criteria).
- The third group is comprised of scientists who publish papers from time to time in international platforms, but mostly do not publish in leading

journals. Most of them are employed by institutions ranked low on the international rankings, or not ranked at all: small universities, community colleges, professional/vocational schools, teachers' colleges, or small research institutes. A few of these are researchers employed by more respected institutions who find it hard to advance on the academic ladder because their rate of publication does not meet the demands. This large group is becoming more and more frustrated by the status quo, and is increasingly bitter and alienated. We will expand on the process of promotion and all it entails in a separate chapter.

But another intriguing question remains: How do the ultra-productive researchers do it? This question is lent extra force by the objective time constraints described above.

An ordinary observer is likely to assume that the scientists at the top of the publication chart are the most gifted. If all the others can't keep up the pace, of course they must be less talented. Actually, the picture is much more complex and deceptive, and reflects the stratification and inequality in which science has always been steeped—today more than ever. Just as the wealthiest (or the "well-off") are not necessarily the most intelligent, but rather have certain advantages in their particular field, the same is true for science.

The most prolific scientists are blessed with one or more of the following advantages:

- **The advantage of the English language.** The fact that most journals, especially the leading journals, are published in English grants a significant advantage to scientists for whom English is their first language.[316] German speakers also have a certain advantage, because there are also many journals in German, but much less than the advantage granted by English.[317] Not only can English speakers write more quickly, because they have no need of translation (and they don't have to pay for it), they are also more familiar with the linguistic nuances that might influence the editors, peer reviewers, and readers for better or for worse. English speakers have a similar advantage in winning grants from research foundations, because the judges of the research proposals submitted to the large foundations tend to be English speakers; the same is true for international scientific consortiums.[318]
- **The advantage of wealth.** Research budgets granted by public and private research foundations are the primary factor that transforms a study from idea to reality. Because many foundations give preference—conscious or

unconscious—to researchers from prestigious institutions, these researchers profit twice over: more studies and more publications. As usual, money attracts money.

- **The advantage of seniority and status.** The review process for scientific papers is ostensibly objective, but in effect it is influenced by the researcher's background and connections. The set of researchers who publish many essays is generally the same set of researchers that hang out at all the same conferences, host one another during their sabbaticals, and invite one another to lectures. One of the perks of belonging to a clique of this kind is a hidden barter system: "If you publish me, I'll publish you." The ones who suffer—as usual—are the scientists who don't have the right connections in the right places with the right people.[319]
- **The advantage of discipline and method.** Research in any given field may demand more or less time, depending on time and circumstances. However, there are scientific fields which, generally speaking, allow for sped-up research and publication because of their quantitative and laboratory-based nature. Moreover, many researchers in the "hard sciences," and particularly the life sciences, maintain large support teams, including doctorate students and postdocs, who work on several studies at once and in a single season, thus freeing up the senior scientist to apply for more grants and put out more papers.[320]

  These areas of science have an additional headstart for publication which grants them an advantage: they do not touch on politically sensitive topics, and therefore their chances of being disqualified on this basis are lower. Of course, even the life sciences occasionally scrape up against political sensitivities—for example, studies addressing the connection between genetics and behavior, or investigating environmental pollution or global warming—but these are exceptions. In other words, it is harder to publish a paper which deals with social or political subjects, because by their very nature these papers are more sensitive and controversial than a paper on molecules or galaxies.

  Even within the humanities and social sciences, the number of publications is dependent on the field of research and the method. Thus, for example, it is easier to generate a high number of papers when the studies are based on technical processing of statistics and data than when the studies are based on field observations and ideas—which gives an advantage to fields such as economics, business administration, or quantitative sociology. By the same token, historians focusing on specific time periods and who base their research on a small number of sources will find it easier to produce papers than their colleagues who study broader phenomena.

- **The advantage of maleness.** Like the expectations in any other field, the expectations in the world of science are dictated and propagated by men, who are driven by competitive and achievement-oriented "male" thinking in the "anything you can do, I can do better" spirit. The motivation to win often justifies the means, and pushes societal and familial obligations to the back burner. In short, in order to adorn yourself with a garland of publications, you have to become a slave to work and forget about many other aspects of life which are no less important. Men tend to do this more easily than women, and this is why the decisive majority of the "super-productive" are men.[321] It is true that more women have learned to adapt to a male-dominated culture today than in the past, and a fair number of female researchers successfully meet the high bar of the expectations for publication, but the studies show that they pay a heavy personal cost (we will discuss the particular difficulties faced by women in academia later in the book).
- **The advantage of selfishness.** Studies indicate that researchers who place their individual advancement over altruistic motives—that is to say, they devote less time and effort to teaching and administrative functions, and shirk their responsibilities to the department, the university, and the general public—rack up more publications. Studies also show that competitive "pressure-cooker" institutions indeed succeed in squeezing more publications out of their faculty members—at a high mental and emotional price, of course.[322]

Many victims of this uncompromising pressure are unaware of the tariff that this "forced labor" collects from them. Comprehension will only dawn on them at the end of their careers, just before retirement. And many do not raise their voices against the institutional demands because they are convinced that these demands are necessary,[323] and that someone higher up has already weighed the rationale. As we know, most of the slaves in the world, even "white-collar slaves," accept their fate as part of nature's course, and justify it because of the ultra-capitalist brainwashing they have undergone—mostly because they struggle to come to terms with the understanding that they are the wretched victims of an unfair and illogical system. Psychological research even shows that the more that is demanded of people, the more they tend to justify the demands that were placed on them after the fact—this, after they have slaved away and somehow barely managed to meet the expectations. No one wants to admit that he or she has been cynically and brutally exploited over the years. Or in less academic terms: no one likes to feel like, and certainly not admit that they were, a sucker.

- **The advantage of groups.** Important inventions and groundbreaking scientific theories were once ascribed to lone geniuses such as Mendeleev, Gauss, Newton, Freud, or Einstein. Ordinary folks imagined that researchers were squirreled away in a workroom or a laboratory, calculating complex strings of numbers and phrasing their earth-shattering papers alone. No longer. From the 1970s onward, a rise has been observed in the number of collaborations between scientists—whether in the execution of studies or their publication. In parallel, the percentage of papers written by a single author has taken a nosedive, from 60% in the 1970s to 15% today.[324] Even in subject areas in which research is performed individually, the phenomenon of the single author is disappearing.

  In 2018, the prestigious journal PNAS, the official journal of the American National Academy of Sciences, published a study examining changes in certain aspects of an academic career, and especially in publication patterns, among scientists from three disciplines—astronomy (physics), ecology (life sciences), and robotics (computer science and engineering)—over more than fifty years (from the 1960s on). The findings were no less than astounding: it turns out that a dramatic growth (from 25% to 60%) had taken place in the number of scientists who never published a single paper as the primary author over the course of their career. In many cases they played second or even third fiddle, or performed some minor function in the larger orchestra (including as technicians, research aides, laboratory assistants, and so on).[325]

  Another study investigated the relative contribution of each researcher to the various papers published under his or her name every year (between 2003 and 2013). The formula was simple: if there are four authors of a paper, the relative contribution of each author equals 0.25. It turned out that the researchers contributed on average a little over half a paper (0.56). This means that the researchers were able to produce a paper every two years, or alternately, a single paper with a single colleague once a year.[326] The conclusion: Today's scientists publish more papers than their predecessors not because they are more talented or work harder, but because they split their time between several co-researchers and "co-papers." Simply put, in the present day, better to invest time and effort in collaborative papers, which lead to more lines on the resume, than in independent research, which is worth only a single line.[327]

  An extreme aspect of this collaboration inflation (including "hitching a ride" on others' work) finds its expression in the massive increase in the number of papers with a conspicuously high, even record-breaking, number of co-authors. This phenomenon has become known as "hyperauthorship." Thus, the number of papers catalogued in the database WoS which listed a thousand or more authors doubled in the five years between 2014 and 2018.[328] Two papers on the ATLAS experiment using the particle accelerator at CERN (the European Organization for Nuclear Research) were published under the names of no fewer than 2,929 and 3,171 authors. A paper on another particle accelerator project was published by 5,154 authors, and a paper on the subject of the human genome was published by 2,900 authors.[329]

In 2018, *Nature* published a study that attempted to characterize the "hyperprolific" scientists. Believe it or not, there are scientists who manage to publish under their names, on average, a paper every five days. The investigation was conducted on the database Scopus between the years 2000 and 2016, and found that there were approximately nine thousand scientists of this kind. An analysis of their profiles revealed that 86% of them published in physics journals, and that most of their papers were the result of international group projects in which the number of participants and authors could easily reach one thousand.

Approximately a tenth of the scientists on the list had Chinese or Korean names.

In order to cancel out any extraneous variables and deviations, the researchers emailed 265 other scientists on the list who were not physicists and did not have Chinese or Korean names. They asked these scientists whether they had any insights on how they had reached that remarkable level of "productivity." Only about a third (eighty-one) answered, and they specified a number of reasons: hard work, passion for the study in question, mentorship of many young researchers, leadership of research staff, intensive cooperation with colleagues, working on a number of projects in parallel, availability of sources and scientific databases, core values of generosity and collaboration, accumulated experience, and…fewer hours of sleep (in other words: workaholism).[330]

Struggling to Keep Up the Pace

As is typical of Anglo-American culture—first society creates the distress, then an army of coaches and advice-mongers make a buck off miserable people seeking support, guidance, and comfort. But the advice doesn't really help them very much, and the time and effort invested in curing a symptom (despair and depression) only delays and weakens the person's ability to fight the disease itself (the unreasonable demands for publication).[331]

In the meantime, in order to earn a few more lines on their resume, exhausted scientists are forced to deploy a variety of tricks, some of which are found in the "gray areas" of science and a few of which go well over the lines of morality and integrity.[332] This phenomenon has dragged science into a serious crisis; it is a mortal wound to science's quality, reliability, and the logic of its hiring practices.

Here are the five most common tricks used by scientists to boost their personal stash of publications:

- **Servants to many masters.** For newcomers to the field, working as part of a team led by a veteran scientist can have its advantages. Time spent alongside an experienced researcher and involvement in real research is an important experience for every beginning scientist. In an age where research collaborations have become a necessity, it is a good thing that young researchers have this opportunity to try their hand at working with a team. The problem is that all this would be true if internships on research teams were really intended for the good of the young researchers. In practice, it is first and foremost meant to serve the experienced mentors, to make it easier for them to complete multiple studies and put out papers on a regular basis.

  This pattern of employment, which has become more common than ever, is problematic for several reasons:

  - Interns do not receive the credit due to them for their dedication and achievements, not only in that their name is pushed to the very bottom of the list of authors, but in that their term of employment is brief and dependent on grants. In more than a few instances, they are laid off before the research comes to an end, and the next intern in line finishes what the first one started.

    One might see nothing wrong with a mentor taking credit for a study which was in effect performed and written by his or her students—after all, the mentor is supposed to act as a kind of "big boss," setting the path, supervising the process, dispensing advice and tips, answering any questions that should arise, solving any problems that might come up (and they always come up), and acting as a role model along the way. The trouble is that many mentors are only minimally involved—if at all—in the research itself, and mostly devote their efforts to scoring budgets and managing logistics.[333] Even the laboratories themselves do not always function as learning environments for students, but rather as assembly lines for papers, primarily serving the interests of the mentor. More than one or two young people told us that their laboratory heads barely remembered their names. In the "soft sciences," the problem is no less dire, as the mentors do not even supervise laboratory work, nor, in many cases, do they bring in budgets.

- Professors tend to direct students towards research questions that mainly interest the professors themselves. Graduate and doctoral students become "assistants" in fields that are not their top priority—or, to put it plainly, they become grunt workers. And when research students put the ideas of their mentors into practice, they are not fulfilling the basic principle of science—original, out-of-the-box thinking—and inherit a flawed model of scientific work.
- Many budding researchers are exploited as cheap labor, with inconceivable working conditions and salaries.[334] Numerous young scientists find themselves wandering from grant to grant, from laboratory to laboratory, and from institution to institution, in the fruitless hope that someday they will find an academic position. There were those who claimed to us that they were treated as disposable equipment, not as human beings.[335] One American postdoc, who worked in a massive laboratory at a prestigious university, told us about research budgets of millions of dollars, and about the army of postdocs who worked from dawn until dusk in order to "put out seven to ten papers a year for *Nature* or *Science*. And when we didn't work hard enough, they sometimes yelled at us until we cried." We must emphasize that this describes the exploitation of thousands of young researchers around the world. Most of them have little wiggle room, if any, to turn down a job or complain about its conditions, because they are almost utterly dependent on their research mentors—including the hope of someday receiving recommendation letters, without which they have no chance of accomplishing anything in academia.[336]

■ **Fishy collaborations.** There is no doubt that research collaborations between scientists have significant advantages. The intellectual whole is almost always greater than the sum of its parts, and interaction between scientists generates brainstorming and cross-pollination. As we have already noted, studies demonstrate that most of the most innovative and influential papers in science over the past few years were written by a number of researchers working hand in hand; this is illustrated by the number of joint Nobel laureates.[337] Studies have also shown that when collaborations include scientists from geographically distant countries and a team that spans different cultures and traditions, the synthesis of ideas tends to be more creative and influential.

The upward trend in collaborations also seems both necessary and beneficial because science has become more sophisticated and complex, and in many cases requires scientists from various fields in order to produce valuable, updated research—for example, one team member who is responsible for the operation of advanced equipment, another who performs statistical calculations or builds a database, and a third who contributes the theoretical aspect. Many studies also straddle the line between disciplines—for example, studies in biochemistry, sociohistory, geoeconomics, or educational psychology—and it is only natural that they should be conducted collaboratively.

All this talk of scientific importance is well and good, but it turns out that the motivation to collaborate stems also partially, or perhaps mainly, from another cause: the goal of tacking on a few more items to the publication list. This leads to the creation of countless sham collaborations—that is to say, some of the collaborations don't actually take place, and instead are a kind of "you scratch my back, I'll scratch yours" The crooked deal goes like this: I'll add you as an author to my paper today, you'll add me as an author to your paper tomorrow, and we'll both get double the publication credits. And thus, once again, rather than uniting in protest against the cruel decree which sets absurd expectations for publication, professors unite to concoct made-up resumes for themselves.[338] Sometimes a well-known and veteran scientist will sign on as a co-author, even if he or she contributed nothing to the paper, in order to lend the paper an air of importance, increase its potential for publication, and open certain doors. One of our interviewees explained the deal as follows: "The magic word is 'consortium.' If someone crams you in over and over again, your name will show up on lots of well-respected papers. You'll only read some of them for the first time when they are published."

The "name trick," in all its many forms, clogs up the works of science not only because it creates lies, but because it increases mutual suspicion between colleagues and adds an additional layer of difficulty to committees' review and selection processes. They must read between the lines in an attempt to ascertain who really contributed what to the study.[339] The lack of trust is so staggering that, alongside publications submitted for consideration, the appointment committees of certain institutions require candidates to attach an explanation of each author's relative contribution.

- **Copy-paste.** One of the common tactics for packing the publication list is copying significant chunks of text from papers that were published on other platforms while concealing the original publication.[340] This duplication is mostly accomplished by adding a few cosmetic changes, such as changes in phrasing or structure. For all intents and purposes, it is identical to the student practice of submitting the same work—with slight variations or altered titles—to a number of different courses and/or by different students and/or over several years. An increasing number of journals now require authors to sign a proclamation that the paper has never been published in another platform, but no one in the scientific establishment or the academic community has asked themselves the obvious question: how did we get to the point where the entire system of science runs on a culture of lying and fraud, of suspicion and a lack of trust?

- **"Salami" papers.** Every junior scientist learns quickly that dissertations and thick tomes are like salamis. You need to cut them up into thin slices not only to take the edge off the strong taste, but also to maximize your investment.[341] In the past, it was common practice to rework interesting dissertations into book form. Today, most Ph.Ds prefer to take maximum advantage of their findings through parcelization—that is, by slicing up their dissertation into as many papers as possible. They accomplish this by breaking up chapters of the larger study into papers and "mini-papers," all with the same introduction and literature review. It is worth noting that "salami slicing" is not unique to the initial stages of a scientific career. The breaking-up of a research project's findings into the maximum possible number of shorter papers has already led scientific circles to coin the term—with a sarcasm that barely masks concern—"the least publishable unit."[342]

On the face of it, there may not be anything wrong with splitting up a study into smaller, more concentrated papers. It may even make the subject matter more approachable. But the reality on the ground shows us that in many cases this is a mixed blessing for researchers and studies, as a full report makes it easier for readers to understand the full significance and context of the research, and allows for a deeper and more comprehensive understanding of the findings. Breaking up a study can also endanger the validity of the findings, as it is liable to create a problem of statistical significance.[343] And no less serious: the division of papers into smaller units may wipe not only books, but also macro and deeper studies off the scientific map. Everything has become so specific and narrow as to be boring. Even *Nature* has already warned against the dangerous phenomenon, and did not hesitate to ascribe its expansion to "the 'publish or perish' climate that has evolved over recent decades."[344]

- **Publication-friendly research topics.** Because they must continue to "feed the beast," many scientists choose their research topics according to the ease of generating a "publishable" scientific product. That is to say, they make choices that are safe, and try to avoid taking risks with adventurous studies[345] or out-of-the-ordinary interpretations that might not please the peer reviewers. Proponents of quick publication tend to stay away from subjects that require prolonged background research (extended data collection, reading piles of documents and secondary sources, and the like). If this does not help them, studies have already proved that scientists under intense pressure to publish tend to exaggerate the impact and significance of their research findings in order to ensure that they will be published.[346] Thus, academia in our day has become an incubator for "composers on the cheap." Their achievements are little more than plagiarism, barely disguised by variations on the same recurring motifs and by various cover versions (We will expand on the quality of papers later on).[347]

The Poll-Itis Epidemic

The roots of modern statistics were planted at the end of the 18th and the beginning of the 19th century, when statistics became a useful tool to find mathematical order in the world spinning around us and draw clear lines in the midst of uncertainty. But only in the second half of the 20th century did statistics take center stage and their use become common in every scientific discipline.[348] The fact that an introductory statistics course is considered one of the fundamental courses in many different fields testifies clearly to this phenomenon.

The widespread use of statistical procedures has been heavily influenced by the rapid growth of computing power in the past few decades. Powerful computers solve the most complicated mathematical equations at lightning speed, and the personal computer allows thousands of scientists to generate new findings on a ramped-up assembly line.[349] Moreover, the field of statistics has burst through the borders of science and become part of the day-to-day conversation in popular culture. The media and the news are chock-full of statistical figures, sometimes pseudo-scientific, provided by an endless parade of number-crunchers: from opinion polls and customer satisfaction surveys, to market segmentation and distributions, to data on output and performance in every possible area of life.

Indeed, the discipline of statistics is effective and useful, and in many cases even thrilling in its ability to discover hidden connections between stimuli, quantify phenomena, expose psychological tendencies, and monitor social trends. That said, statistics has earned a bad name among the wider public. Many see it as dangerous speculation or as a crafty method of proving any given thesis, including flatly untrue theories. The ubiquitous use of statistics in election polls (which are often wrong in their predictions) has also contributed to its dubious public image. By 1906, Mark Twain had already written: "There are three kinds of lies: lies, damned lies, and statistics." Since then, more and more disparaging quips have been penned in the same spirit: "A statistician drowned in a pool that was three feet deep on average"; "If you put one foot in freezing water and one foot in boiling water, on average you'll feel great"; and "If you torture the numbers long enough, they'll confess to anything."

This criticism is more than a little exaggerated. Most of the folk stereotypes about statistics are based in plain ignorance. The vast majority of the public is unfamiliar or only barely familiar with basic statistical terms such as "standard deviation," "probability," "significance" "dispersion" or "normal curve," and they poke fun at what they do not understand. Many also tend to ignore the most important axiom of statistics, the central limit theorem: Even if a sample is completely representative, and even if all of the premises are correct, a study's results can only approximate the true results with reasonable certainty—not complete certainty. In fact, even when everything works as it should, one out of every twenty projections will be mistaken.

That said, underlying the false prejudice there is also a painful truth: as the pressure to publish increases, the use of statistics gives rise to more than a few negligent, manipulative, and superficial studies.[350] The computer has become an additional assistant, sometimes the most important in the room, which operates as a data-making machine for the instant production of papers. Many scientists pay statistics and computation experts to do the work for them, without fully understanding the significance of the data that will appear in the papers which they have signed off on. It is no wonder that, in many cases, the result is scientific junk.

And there is something else, too: Scientists also love statistics because statistics save them the trouble of thought and depth, and allow them to market a shoddy scientific product in a sparkly box. Numerical findings have always had a more scientific look and a stronger aura of reliability than results that are written out. This is one of the reasons that the use of statistics has become so common in the social sciences and humanities, up to the point that it has been nicknamed "the fetishism of numbers." The truth of the matter is, often statistics that look impressive—in Excel tables and especially in colorful, meticulously designed graphs—are there to cover up a simplistic study which dumbs down complicated realities and barely scratches the surface of the topic at hand.[351]

Statistics is also a minefield in science because many scientists make haphazard and sloppy use of computer output, ignoring human subtleties, context, environmental influences (place, time, culture, etc.), and randomness entirely. It is also not unusual to find studies which derived their findings from non-representative samples (too small or poorly distributed),[352] spurious correlations (mistaking an effect for a cause or ignoring a hidden variable), or an overly generous statistical significance level.[353] Furthermore, statistics in the social sciences are based on data collected in the field, and therefore are dependent on the staff who collected them. Often, these are exhausted research assistants, for whom the study is far from the highest priority, or sub-contractors who receive starvation wages for filling out surveys. The results are exactly what you would expect…

In 2005, a paper appeared in the prestigious journal *PLOS Medicine* under the unusual and provocative title "Why Most Research Findings are False."[354] No less than false! The author of the paper was Prof. John Ioannidis, an expert in medicine, health policy, and statistics at the University of Stanford. Of course, he was not the first to point out the misuse of statistics in science, but his dramatic claim about the high percentage of flawed studies and the fact that he was a senior scientist at one of the world's best universities, along with his eye-opening analysis (which lent a shocking quantitative dimension to his explanations)—all these factors did their work. His paper was downloaded over one hundred thousand times, a record in the history of the journal. Over half a million web surfers found their way to it, and it became one of the most-quoted papers in the history of science.[355] Ioannidis raised important points against scientists' exaggerated tendency to rely on statistical analyses, even when they are based on too-small samples and too-lenient significance tests. Since then, he has become one of the most prominent critics of scientific research, and founded a center for the study and improvement of scientific practices—the Meta-Research Innovation Center at Stanford (METRICS).[356]

The paper unmuzzled some of the editors of scientific journals, and they joined the attack on the manipulative use of statistics. In April 2015, Richard Horton, the editor of the prestigious medical journal *Lancet*, published a paper in which appeared the remarkable statement: "much of the scientific literature, perhaps half, may simply be untrue. Afflicted by studies with small sample sizes, tiny effects, invalid exploratory analyses, and flagrant conflicts of interest, together with an obsession for pursuing fashionable trends of dubious importance, science has taken a turn towards darkness."[357] He claimed that everyone involved in the industry of scientific publishing bore some portion of the guilt, and particularly the madness that had gripped institutions of higher education—to publish, publish, and publish some more. Even editors of scientific journals did not escape the blame, because they had done nothing to stop the spread of the blight.

A variety of strategies were suggested to put a stop to the crisis—for example, raising the requisite significance level,[358] or encouraging scientists to use larger sample sizes. But this sort of suggestion joined the endless parade of attempts to address the symptom and not the problem itself, the very same problem pinpointed by the editor of *Lancet*: publication psychosis, which had transformed statistics into a performance-enhancing tool, much like steroids in sports.

The growing criticism of statistical manipulation went beyond the borders of the scientific community, and popular newspapers began to express their concern about the pollution of science. The *New Yorker*, for example, asked in a lengthy article, "Is there Something Wrong with the Scientific Method?"[359] The *Atlantic* published an extensive piece entitled "Lies, Damned Lies, and Medical Science."[360] The *Boston Globe* reported that "Studies Show Many Studies Are False,"[361] the *Economist* announced "How Science Goes Wrong"[362] and the magazine *Reason* published a broadsheet feature under the title "Most Scientific Findings Are Wrong or Useless."[363]

Most of the claims focused on the life sciences and medicine, in which mistakes also pose more serious risks. However, the social sciences suffer no less—indeed, even more—from an obsession with numbers and statistics. This is because it is easier to commit fraud in the social sciences, primarily by presenting fraudulent data, and because in the social sciences it is hard—perhaps even impossible—to verify the reliability of poll results after the fact. How could you possibly know, for example, how the subjects of the poll understood the survey questions, and how many questionnaires they actually filled out or marked in practice? When a new polling institute springs up every day, and a sensational new poll is published every hour (contradicting the one before it, of course), people lose faith in this tool—for good reason.

Particularly cutting criticism has been directed at political polling in general, and election exit polls specifically, which are often performed under the supervision of academics and according to the accepted methods in the social sciences—an epidemic that could be termed "poll-it is." The criticism touches on two central aspects:

- Polls have long since become a means of entertainment, intended to create artificial suspense and bated breath among viewers, listeners, or readers throughout election season, much like a horse race. This use of polls makes the political conversation shallow and transforms it from an ideological disagreement about solutions, values, and principles into a lurid reality show. As if that were not enough, the politicians are also influenced by the manipulative polls and run their campaigns according to the results—not according to coherent policy positions, vision, or ideology.[364]

- The slip-ups—not to mention the colossal blunders—that have become more common in the past few years shamefully expose the polling industry in all its shoddiness, and throw a dark shadow over the usefulness of polling as a prediction tool. Many attribute this phenomenon to: the growing unwillingness of those polled to cooperate with the pollsters (people are just sick of it all); intentional deception of the pollsters on political grounds; positions which constantly fluctuate in the age of mass communication; or the simple fact that many voters are on the fence and will not decide until the very last minute. And above all these float the cynical interests of the polling companies, who have a stake in providing customers with results they will enjoy—to hell with ethics—and/or in manufacturing an artificial buzz in order to kickstart a self-fulfilling process of anticipation.

Regardless, the market for polls is packed and going strong; the result is that it is full of all kinds of charlatans without a twinge of conscience or professional ethics, and criticism of these swindlers and their polls are entirely justified. That said, to criticize them alone would be hypocrisy. The assumptions associated with commercial polls are also commonplace in scientific polls, upon which thousands of studies in the social sciences are based.

Here are the errors characteristic of polls of all kinds:

- **Misleading samples.** One of the most common polling errors takes place when not everyone polled is ready or willing to respond to the poll, the pollster makes no effort to investigate and factor in those who did not respond, and at the end of the day he or she has no idea whether the delicate balance of the sample has been upset. This phenomenon is particularly common in voluntary online polls. In many cases, the subjects who made the effort to open up the webpage and answer the poll have an interest in the poll's results (unlike Internet polls answered by fixed panels).
- **Intentional misrepresentation.** Subjects of polls sometimes lie to pollsters because they are reluctant to expose their real positions to a stranger, or because of what is nicknamed in Britain "the shy Tory factor." In America, the same phenomenon is known as "the Bradley effect," after Tom Bradley, an African-American candidate for mayor of California, who lost the election although polls predicted a decisive victory—because white voters were embarrassed to admit to pollsters that they intended to vote for the white

candidate. There are also those who intentionally try to skew poll results out of political motives. Experience teaches us that it is extremely difficult for pollsters to identify intentional skewing of this kind.

- **Timing bias.** Poll results are often inextricably tied to the moment in time when they were performed. News events or heated public debate on a certain topic are liable to cause a 180-degree turnaround in poll results.
- **Social desirability bias.** In many cases, those polled answer the questions according to what they think the pollster wants to hear, in order to please the pollster. This isn't always done consciously, but it is also certainly a bias.
- **Question bias.** Most researchers in the social sciences are skilled in executing the basic elements of a poll: modeling and statistical processing. The problem is that only a few know how to ask the right questions. Because polls cost a fortune, researchers are forced to keep the number of questions low—and so they use those questions to "fish" for the answers to the questions they did not ask. As a result, most questions are general and vague; for this reason, they lead to trivial, predictable, and unfocused answers.

  So many errors are made in asking questions that there is no room to address them all here. We will merely point out a few of the most common pitfalls: unclear (using terms that can be interpreted in a variety of ways) or flat-out biased phrasing; a too-small number of answer options which do not reflect the diverse possibilities; overlap between answers, which makes it difficult for the subject to choose only one; a single question that contains multiple secondary questions, when it is conceivable that the subject would answer every one of those questions differently; complex terms which are articulated in an overly simplistic manner and understood differently by different responders; the presentation of a certain opinion as the leading opinion (for example: most… agree that…), which tilts the answer in that direction; and researchers with a political agenda (of which there are many in the social sciences) who ask leading questions in order to confirm a thesis which they "brought from home." Even the order in which questions appear is liable to influence the answers—a long questionnaire tires people out.

For all these reasons, and because mistakes and misfires have become more and more frequent in the polls published by the media, polls (questionnaires) are starting to lose their status as a reliable research tool—and, as a result, so are scientific studies based on this tool. This necessary change is already taking place in practice, but it is mostly happening outside of academic circles. In order to keep their fingers on the pulse, more private companies use better tools than polls, such as data mining (especially from social media).

Junk Science

Texts Without Readers

Assuming that a paper—scientific or otherwise—has value only if it is read, an intriguing question arises: how many of the papers in the sea of scientific publications are actually read, fully or partially, by someone other than the people who wrote them and the people who accepted them for publication? Sophisticated tools have already been developed to track the number of searches, the number of downloads, the amount of time spent looking at a paper, and so on, but the scientific publishing industry still does not supply sufficient data on the "achievements" of each paper from this perspective, or on reading habits in academia in general—probably for good reason.

A handful of studies have tried to measure reading rates in various fields, but they suffered from methodological flaws—for example, they did not fully cover a variety of journals in every discipline and in every language.[365] Truthfully, even in the digital age it is difficult to track reading habits, because people use the texts they have opened in many different ways: many read only the abstract of the paper, and yet more only use it in order to cite it in the literature review of their own papers. Even when the paper is read in full, it is hard to know whether it has been read thoroughly or merely skimmed, or whether it has left any impact at all on the reader.

The statistics on reading that have been released until now also miss an important aspect: reading rates of scientific material among the wider public and not only in the scientific community. There are indeed fields which ordinary folks not initiated into the secrets of the discipline have no chance of understanding. However, in many fields, not only are the papers not difficult to understand, but it is even important that the wider public read them.

Because of the increase in the number of papers, and because of the growing criticism directed at the mechanisms of scientific publishing, the claim that most scientific papers are in fact read by only a few people, if at all, is getting ever stronger.[366] These murmurings are not particularly pleasant to the ears of the publishers, who choose not to respond or to release data which sort-of contradicts the claim—data which has not undergone stringent scientific validation. For instance, in 2012, a report was released by a European research institution which counted multiple large publishers among its numbers. The report found that 99% of papers were downloaded at least once within half a year of their publication.[367] This finding makes one wonder, among other reasons because the sample included papers that had not yet been published and by their very nature were in line for feedback, and because not all publishers and journals were represented. Moreover, it is reasonable that every paper would be downloaded at least once—by its author (and once more by his or her mother, of course).

An additional example is the 2018 summary report released by the International Association of Scientific, Technical, and Medical Publishers (STM), which claimed that the yearly number of downloads of full papers was approximately three billion. One might think that this data was a pleasant surprise, a reflection of widespread interest in scientific publications, but in practice it raises a number of questions. Not only does the document stipulate that this was an "informal survey," but the writers themselves qualify the statement by pointing out that the download of a paper does not mean that it will be read in full, or even read at all. More to the point, it does not indicate how many unique readers there were, nor which papers were downloaded. It is reasonable to assume that a small percentage of papers among the general inventory were downloaded many times, as opposed to the vast majority, which barely earned a single download.[368]

Citations provide a more precise indication of the percentage of scientific papers that are read. Here, the data is no less than remarkable, as it turns out that not only do most scientific papers receive very few citations, but many are not cited at all (we will expand on this in the chapter on the rankings crisis and the academic obsession with measurement).[369]

Even papers published in the most prestigious scientific platforms are barely cited. Already two decades ago, it was found that only 45% of the papers published in 4,500 leading journals were cited in the five years after their publication. Since then, the percentage has only gone down, and stood at only 40% in 2009.[370] We must pause and emphasize that not every paper which is read will necessarily be cited. Still, the point still stands that a high percentage of papers which are not cited at all or cited very little hints at a real problem; at the very least, it raises certain questions about the connection between the financial investment that goes into producing the deluge of scientific papers and the actual benefit of these papers.

In an age in which people spend their days chasing their tails and live with a constant sense of "unfinished business," it is no wonder that studies have found that the amount of time devoted to reading scientific articles is decreasing from year to year.[371] In other words, most scientists do not really take the time to read what their colleagues publish.

More Quantity, Less Quality

A decline in the reading of papers does not necessarily imply a decline in the quality of those papers. One could easily claim that a paper's chance of being read or cited has naturally gone down as the number of papers on offer has gone up.[372] There is simply not enough time to read them all. However, this is not the only reason, and perhaps not even the main reason. We may reasonably estimate that one of the primary reasons for the lower percentage of papers that are read or cited is the inferior quality and uselessness of all the rest. As we have noted multiple times, researchers are forced to publish worthless papers in order to meet the enormous publication quota required of them. They address subjects that interest almost no one and contribute even less. Many of these papers are also badly written, and there is no pleasure to be taken in reading them.

We must stop here and note that as yet, no authoritative and systematic study has yet been conducted to investigate the average quality of scientific papers in various disciplines. Because there is no standard definition for reasonable quality in science, it is of course difficult to prove empirically—over a wide swath and over time—that there has been an increase of mediocre or even bad science. We are also aware of the all-too-human tendency to view the past through rose-colored glasses. That said, there is a widely-held sense that mediocrity—or even worse—has become more common in the research produced today, and that the percentage of "junk papers" has gone up to an extent that threatens the effectiveness, credibility, and good name of scientific research.[373]

When Professor Kostas Kampourakis stepped down from his position as the editor-in-chief of the journal *Science and Education*, he published an article unlike anything else on the academic horizon. In the article, he described his frustration at the quality of papers that he and his colleagues had been forced to grapple with in the past few years. He wrote frankly that much of his time had been dedicated to the Sisyphean task of editing dreadful papers; he attributed the phenomenon to the increasing pressure on researchers to put out more and more, and in particular, the counsel to "publish like crazy or you are out of the competition."[374] Many editors we spoke to identified with Kampourakis's account.

Most people encounter scientific papers for the first time during their undergraduate studies. This experience is remembered by many as not particularly positive, because most of these texts are difficult to understand, exhausting at best and torturous at worst. This is probably also the main reason that many students need study aids (translations, outlines, summaries, and so on) which will make the material simpler for them. It is also common for students, in their innocence, to blame themselves for their difficulty in understanding the text, when in reality the guilt usually falls on the authors of the paper—not to mention the professors, who choose to use these materials in their teaching.

In his article "Why academics stink at writing," Steven Pinker, a professor of psychology at Harvard, chair of the advisory committee of the American Heritage Dictionary, and the well-known author of several best-sellers, wrote:[375] "Together with wearing earth tones, driving Priuses, and having a foreign policy, the most conspicuous trait of the American professoriate may be the prose style called academese. [...] But the familiarity of bad academic writing raises a puzzle. Why should a profession that trades in words and dedicates itself to the transmission of knowledge so often turn out prose that is turgid, soggy, wooden, bloated, clumsy, obscure, unpleasant to read, and impossible to understand?"

Pinker dismisses the explanation that "academese" is clear to the experts to whom it is targeted right off the bat. He also refuses to accept the excuse that the gatekeepers of academia demand flowery language in order to give the text an air of gravitas and depth. In his view, it should be no problem to write about anything, no matter how complicated, in an accessible and user-friendly way. He suggests a number of more logical explanations for the phenomenon of unreadable academic writing:

- Many researchers hide themselves away in a fog of highfalutin vocabulary in order to hide the fact that they have nothing to say. They dress up the trivial and the banal in garments of scientific sophistication, in hopes that the blah-blah-blah will cover up their nakedness. By the way, Albert Einstein has been quoted as saying, "If you can't explain it simply, you don't understand it well enough."
- Pretentious writing, which is particularly common in the soft sciences, and in many cases reflects professional narcissism. Many researchers see themselves as the great intellectual lights of their generation, and therefore crown themselves with flowery expressions.
- Many scientists are so egocentric that it does not even occur to them that some of their readers do not know the things they have already forgotten and are not fluent in the technical jargon of their field. Because they assume that the paper will interest only a small, insular group of their colleagues anyway, they do not make an effort to make the text accessible to laymen.
- Scientific communication is subjected to strict codes of proper writing, and therefore it is difficult even for talented writers to thrill readers with an inventive turn of phrase. Moreover, as in legal discourse, scientific discourse (particularly in the hard sciences) aims to stay as factual and on-topic as possible, and therefore does its best to keep the literary element to a minimum.
- Another explanation for academics' terrible writing is the fact that there are no real incentives for good writing. "...By and large," writes Pinker, "academe

> does not [reward good writing]. Few graduate programs teach writing. Few academic journals stipulate clarity among their criteria for acceptance, and few reviewers and editors enforce it. While no academic would confess to shoddy methodology or slapdash reading, many are blasé about their incompetence at writing. Enough already. Our indifference to how we share the fruits of our intellectual labors is a betrayal of our calling to enhance the spread of knowledge. In writing badly, we are wasting each other's time, sowing confusion and error, and turning our profession into a laughingstock."

We will add another two explanations to Pinker's:

- Ambiguous language, which can be interpreted in two different ways and prevents the writer from saying anything explicitly, is intended to defend the paper from criticism. On one of the academic mailing lists, a humorous table was circulated which featured the classic phrases typically used by scientists to prettify the truth. For example, the real meaning of "It has been known" is "I didn't look up the original reference." "While it has not been possible to provide definite answers" actually means "An unsuccessful experiment, but I still hope to get it published."
- It pains us to admit it, but many scientists are not necessarily smart. What is more, even those who are gifted with significant intellectual talent in one field are not necessarily skilled in others (writing, for example). In fact, many scientists could be lumped into the well-known category of the "one-track mind."

But the low quality of a paper is often unrelated to the quality of its writing and editing, but is rather connected to the low quality of the study or the choice of topic itself. As we know, you can't make a good cake with bad ingredients. In 2000, the physicist Robert Park published a book titled "Voodoo Science: The Road from Foolishness to Fraud,"[376] in which he harshly criticized the fact that more and more researchers are publishing pseudo-science papers that are a world away from the foundational principles of science. Prof. Park is not the only one. In fact, from the many pseudoscientific follies that have clogged up the newspapers in recent years, the general public has learned that just because something is called "science" and its author a "researcher" doesn't make it so.

The "Ig-Nobel" prize is a satirical scientific award granted annually at Harvard University to scientists who have published particularly absurd and idiotic studies. The name of the prize is, of course, derived from the word "ignoble," and many of its awardees prefer not to attend the ceremony. (There are also those who demonstrate courage and a sense of self-deprecating humor and show up to accept the not-so-complimentary honor.) The problem is that the papers which "merit" entrance into this entertaining and bizarre category are no longer unusual in being empty and unnecessary. It only takes a random glance at the titles of the papers published in scientific journals to see that the list of candidates for the Ig-Nobel is growing longer every year. Many academic papers today appear utterly redundant, with no real point and no valuable new ideas. In many cases, these papers prove what is already obvious, in the style of "Texting While Walking Raises Senior Citizens' Risk of Falling." They are nicknamed, and rightfully so, "cookie-cutter research."[377]

The assembly line which constantly ups its output gives rise not only to endless papers with no conceivable benefit, but also to an upsurge in the number of scientific platforms. Many of these are characterized by poor quality, deal in esoteric subjects, and in fact are every bit as unnecessary as the papers they publish.[378]

A Leg Up from Musk

The discussion of the value and vitality of the scientific publishing system received unexpected momentum and crossed the borders of the internal academic conversation when the renowned entrepreneur Elon Musk blurted out a tangential remark in an interview with Khan Academy, a website which enables users to watch thousands of recorded lessons for free. Musk was discussing the reasons he left his doctoral studies in applied physics at Stanford at the age of twenty-four, after two days (!), and chose the world of high-tech over the academic career that would have been at his fingertips. In the interview, he said, "…most papers are pretty useless. I mean, how many Ph.D papers are actually used by someone ever? Percentage-wise, it's not good."[379]

That was, as we have said, an off-the-cuff remark, that was taken out of context and not intended to disrespect scientists or attack the model of academic publishing—but because it was provocative (at least by American standards), and because it had come out of the mouth of a well-known and successful personality, it went viral and led to heated debate on social media. Beyond that, there was another and more important reason for the keen interest in Musk's remarks: the growing sense among many observers both inside and outside of academia that the system of scientific publishing was indeed spinning out of control—and headed in a bad direction.

An especially interesting debate developed on the popular question-and-answer forum Quora. There were those on the forum who saw Musk's statement as a clumsy and crude generalization, and argued that not only did he not bother to make clear what he meant by "useless" and back up his claim with hard data, he also did not explain what he saw as a valuable contribution to science. One of the replies noted that if the claim that scientific publication was worthless was mostly based on the average number of citations per paper, it was important to point out that many of the papers were highly professional in nature and targeted in advance towards a small community of experts. Even an educated layman such as Musk would not be expected to understand them, and certainly not to judge their particular value.

A few of Musk's critics saw his statement as the infuriating condescension of a wealthy high-tech type, sure that only financially sustainable products with palpable value to the wider public were worthy of investment—and that all the rest were a waste of time and money. He had forgotten, or so they claimed, that in industry (and especially in high-tech) most investments lose money, because that is the nature not only of science but also of high-tech. One response mocked Musk: "Of course he is correct. Also, most apps are useless. Most start-ups fail. Most patents never yield anything valuable. Most dates don't lead to marriage. My point being: When trying to create something new, there will always be far more useless creations than useful creations."[380] Another reply sarcastically cited Sturgeon's Law, which says: "ninety percent of everything is crap." Why should academia be different from any other field in this respect? (The statement, which became a "law" with the years, was coined by the science fiction author Theodore Sturgeon. When critics claimed that "ninety percent of science fiction is crud," Sturgeon retorted that this was nothing new: "ninety percent of everything is crud.")[381]

But the weightiest criticism was directed at the grandiose attempts of Musk and his compatriots to estimate the value and influence of scientific papers. History proves that many times something that seems useless, or even an outrageous waste, in the present may one day reveal itself to be revolutionary and lead to immense tangible benefit. And even if we can all agree that there is a major difference between various researchers' contributions to humanity, science is the accumulation of countless small efforts. Therefore, even if a certain paper contributes only a tiny bit, it is still a cog in the machine that moves humanity forward. Moreover, just as in sports, in science not every player is a record-breaker, certainly not in every sprint. The framework of competition pushes sports higher, faster, farther, stronger—and with it, humanity. The little victories along the way, and indeed even the failures, bring about real victories in the end.

There were those who maintained that publication—whether of texts or of visual material—has been made easier and more accessible in the digital world, and therefore it is natural that lesser-quality and less important papers will also be published. Conversely, as the quantity goes up, so does the potential for quality. This can be compared to the influence of the digital camera on the quality of photography:

now that every smartphone is also a multi-mega-pixel camera, the number of photographs has grown to unthinkable dimensions. Most of these photographs are workaday and insignificant, and most of them of poor quality, but as the gross earnings grow, so do the net earnings—the real profit. Even if you give a monkey the camera, one picture in a million will surely be worthy to hang in an exhibit.

Furthermore, one would think that the negative influence of quantity on quality would be less relevant in our day, because we have access to speedy search engines which can find a needle in a haystack with a few keywords and cross-checks. The moment that every publication on Earth is located on the shared virtual Cloud, information becomes accessible to everyone, and it contributes—if it contributes—in its own time and in its own way. It should also be taken into account that every "customer" of science has individual needs, and Joe Schmo and John Doe might not be looking for the same things.

On the other hand, there were those who saw Musk as a hero who had tossed political correctness aside and told academia the truth to its face. They saw Musk as the child from "The Emperor's New Clothes," who dared to say out loud what the house-trained faculty members dared only whisper behind closed doors. There is no doubt that his words would not have inspired such a furious wave of replies had Musk not touched a nerve and put his finger on a real problem: the very same approach which once led science to extraordinary heights is now beginning to drag it backwards—and threatening its credibility and its image. It also creates an enormous waste of money.

In 2012, the total expenses of scientific research and development worldwide were estimated at 1.5 trillion dollars. That same year, 1.9 million peer-reviewed papers were published (we will expand on the mechanism of peer review for papers in the chapter dealing with the crisis of quality control). Based on a simple calculation, we can say that every paper (most of which summarize research) needs to justify an average of seven hundred and ninety thousand dollars—an incredible sum, no matter how you slice it.[382] Of course, this is a crude and exaggerated estimate, because it does not include studies not published in academic platforms, but it gives an idea of the exorbitant cost of science—a large part of which could be saved if and when the approach to publication were to change.

Deceit in the Name of Truth

A Breach of Trust

When scientists concentrate on their personal resumes—because they are required to fill their baskets with as many studies as possible, and the number of papers is more or less the most important thing—science also becomes selfish and even tainted. In 2007, the journal *Science and Engineering Ethics* published a study exposing what the researchers behind it called "the dark side of competition in science." The study was based on a focus group made up of fifty-one American scientists at the beginning and in the middle of their careers.[383] Conversations with them revealed that the fierce competition they faced tainted the relationships between scientists and created a problematic professional environment. In the paper's abstract, the researchers wrote: "When competition is pervasive, such effects may jeopardize the progress, efficiency and integrity of science."

It is difficult to expose fraud, and all the more so to indicate a general increase or decrease in its scope. In science, the challenge is even more daunting, because academia (at least in the Western world) does not have a scientific police or secret service. Ethics committees and academic unions, such as the American Office of Research Integrity (ORI) or the Austrian Agency for Research Integrity (OeAWI), may deal with ethics code violations, and international networks such as the Enhancing the Quality and Transparency of Health Research (EQUATOR) Network and the Committee on Publication Ethics (COPE) may work towards increased transparency in science, but most of these entities concentrate on the field of medicine and mostly deal with exceptional cases. They miss innumerable ethical transgressions.

Science operates under an agreed-upon code of credibility and integrity, and therefore anyone who wants to game the system can take advantage of its "innocence" and do so easily. It is also hard to catch fraud in science because in many cases, these behaviors are in gray areas, among researchers who drift into those gray areas unconsciously—who "just" round off a certain figure here and "just" ignore a certain finding there.

The really brazen fraudsters tend to use sophisticated stratagems in order to make themselves harder to catch. Moreover, because academia is an insular clique full of intrigues, it is governed by mafia-esque codes of silence. That is to say, even someone who knows about acts of fraud will not hurry to expose them, because one hand washes the other: those liars could be the writers of your recommendation letters, the reviewers of your paper, or the decision-makers about your promotion or budget tomorrow.[384] Many also worry about revenge by the institution whose name has been sullied. In a culture where so many things take place in secret, it is easy to settle scores with "traitors" and "tattletales."

Most institutions of higher education do not have an effective and discreet avenue for internal auditing, in which it would be possible to report out-of-the-ordinary events without being exposed. It is difficult to report such events to external bodies, because fraud in science is usually not considered a criminal offense. Furthermore, the legal system and public law enforcement authorities are hesitant to get involved in events that take place in academia because of the extensive academic freedom protections granted to scientists and the trust placed in them.[385] And the peer reviewers of papers, who are supposed to check every word with a magnifying glass, are unable to stand in the breach because of the flood of material they are required to handle.

There are a huge number of schemes and tricks in academia, but some are especially widespread:

- **Subcontracted research.** Someone else performs the study, and the "researcher" signs off on results and a paper that are not his. The compensation may be financial or some other perk, such as a job or promotion.
- **Cherrypicking data** in order to get the expected result or clarify insufficiently decisive results.
- **Falsified data and findings**. For example, researchers may report more trials or subjects than the real number or artificially alter visual evidence (such as microscope photographs) in order to achieve the desired effect.[386]
- **Concealing data**. Researchers may destroy the database upon which they relied in order to prevent fellow researchers from checking or using the data.
- **Ethical violations in experiments**, ignoring the boundaries of "permitted" and "forbidden" in modern science.[387]
- **Cheating in peer review,** such as when a peer reviewer knows the researcher personally, and does not exempt him or herself or even report the connection. If his or her acquaintance with the researcher influences his verdict, the violation is all the more serious.

What's Yours Is Mine

The care taken in science to credit ideas, terms, and publications is a norm that developed in academia at the end of the 19th century. It finds its expression in various practices: positioning the names of a paper's authors in a prominent place at the top of the paper, citing references in the body of the text, and attaching a full bibliography at the end of the paper.[388] However, although failure to give proper credit is considered unethical—and of course unsportsmanlike—behavior in academia, the phenomenon is fairly common.

The sociologist James Evans of the University of Chicago surveyed a database of thirty-four million papers published over sixty years (1945-2005), and checked their citation patterns. He found that researchers today tend to cite only a small reserve of papers, almost all "young," ignoring older papers completely.[389] One could perhaps understand this phenomenon as a result of the logical tendency to rely on the most updated studies. One could also claim that today's search engines allow users to winnow the wheat from the chaff and make sure that only the most important sources find their way into the bibliography. Well, not exactly. Evans attributed this phenomenon to the narrowing horizons of contemporary science. It seems, however, that there might be a simpler explanation: In a culture which exerts constant pressure on researchers to publish, there is a limit on the amount of time they can invest in seeking out and reading sources, whether for general education or for research. Therefore, "first come, first served": researchers rely on and cite the first sources they manage to fish out of the lake.

But there is another, much more serious reason: literary theft, also known as plagiarism. In practice, this usually means copying parts of other scientists' papers or co-opting their published ideas without giving them credit.[390] The digital age has made the problem worse, because today it is easier than ever to "copy-paste," then cover up the evidence with a few small changes to the wording or structure of the stolen text. Studies have found that the percentage of repurposed texts in the past few years (15% and over in certain countries) is so high that editors of journals recommend the regular use of plagiarism filter software in order to identify literary theft.[391] In *Nature*, the editors have already recommended putting out a blacklist of scientists who have committed theft of this sort.[392]

Incidentally, the scientific mind has come up with a few other tricks of this kind—for instance, in the area of references. As we have stated, a scientific paper is supposed to include references within the body of the text and a full bibliography at the end. But because reading takes time and is liable to slow down the publication of the paper, many researchers combine "manufactured" references to texts which they have never read, but which seem well-suited because of their title or abstract. Researchers who deploy this practice make a reasonable assumption: that their peer reviewers do not have the time to check whether their references are correct.

It is also not unusual for researchers to avoid referencing others' past studies in their own papers, not only to hide plagiarism, but also to obscure the fact that their research barely covers anything new, if at all. They also rely on the limited time allotted to peer reviewers for checking, and are aware that, in their attempts to ascertain whether the research indeed has something new to say, most of the peer reviewers in effect rely on their memories or on the integrity of the authors.[393]

Unraveling the Knot of Silence

Half-Hearted Confessions

In 2016, *The New Atlantis* published a long article under the dramatic title "Saving Science." It opened with a sentence that sent chills down the spine: "Science, pride of modernity, our one source of objective knowledge, is in deep trouble."[394] The author, Prof. Daniel Sarewitz, a professor at *Arizona State University's School of Life Sciences,* presented a woeful picture of the increase in misleading findings in science, and cautioned that the decline was growing ever steeper. Of course, he was not the first to point out the problem, but the respected platform, the comprehensive overview, and the less sanitized wording all made the article a significant turning point.

Is this really a crisis on a global scale?

Investigations of misconduct in scientific research began to gather momentum in the 1980s, when the American government began to examine the problem systematically. One of the factors which inspired the initiative was a book by William Broad and Nicholas Wade, published in 1982, with the provocative title "Betrayers of the Truth: Fraud and Deceit in the Halls of Science."[395] The book presented a series of falsifications in research—from the manipulation of data to the all-out fabrication of results—which hung a black cloud over scientific culture. The claim was that this was just the tip of the iceberg, because for every major scientific scandal exposed, there were hundreds and even thousands more tricks which were not made public. Most critics, and probably most readers, were skeptical of the book's claims and left feeling that its authors had exaggerated.[396] They expected—justifiably, from their point of view—clearer proofs on which to base the condemnation.

Even today, the dry data does not prove a sharp rise in the number or percentage of inappropriate incidents which end in a conviction.[397] However, as with sexual harassment, where only a tiny fraction of cases are reported at all and even fewer translate into an indictment, there is a distinct impression that the more the phenomenon of fabrication in science is investigated, its sheer breadth and depth become more shocking. There are already those who make the dramatic claim that most scientific findings in our day are either incorrect or pointless.[398]

When the scientists themselves are asked about fraud in science, they conjure up a sort of ambivalent picture. Only a few (under 10%) admit openly that they or their colleagues in the field have fabricated findings or intentionally committed fraud. At the same time, a non-trivial percentage (one-third) admit that they have been involved, whether indirectly or directly, in less-than-exemplary behavior such as: attaching their name to a study to which they did not contribute; cutting corners in data, findings, research methods, or interpretation; or plagiarism.[399] If one takes into account that questions of this kind are sensitive, and that most of us do not willingly tend to admit to the objectionable things that they or their friends have done, one can assume that this is a much wider phenomenon than the percentages above.[400]

The media has also showed an increasing interest in the corruption of scientific research. Until a few years ago, it was common practice for newspapers to report mostly on public scandals concerning fraud and chicanery in economics, politics, and security. Recently, features on scandals in the scientific world have been added to the list. In the past few years, more and more significant deceptions have been exposed, including studies that were published in influential publications and even considered groundbreaking.[401] It is one scandal after another, to the extent that Wikipedia has established a new page, "List of scientific misconduct incidents," which boasts no fewer than seventy incidents from every conceivable discipline—from biomedicine to computers, chemistry, physics, biology, and the social sciences. And what is no less disturbing: Mistakes, deceptions, whole-cloth inventions, and exaggerations have been exposed in the field of medicine, including among papers which provided a basis for medical treatment protocols.[402]

In summary, it is important to emphasize that the problem neither begins nor ends with roiling scandals. Qualitative change almost always goes hand in hand with quantitative change, and the extreme end of the scale can tell the story of the entire scale: as the number of big-time frauds goes up, the number of small-time frauds rises along with it. That said, the phenomenon of scientific trickery might not have made it to the headlines or drawn the attention of the scientific community, had three disturbing phenomena not been reported over and over again. Reports of these phenomena reinforced concern and suspicion that this plague was several times more dangerous than anything we had dared to imagine.

You Can't Get the Same Results Twice

The principle of replicability, which is part of the empirical scientific method and necessary for scientific ethics, maintains that a researcher who publishes a study must provide his or her readers with the ability—at least in principle—to replicate the process by which the results were found. This is why every scientific publication opens with as detailed and clear a description as possible of the existing data and the research methods used.[403] Even in studies not based on experiments, researchers are expected to faithfully record the source of their data (poll questions, number of subjects polled, sampling methods, reference numbers of archived files, and so on) and the ways they arrived at any general statements (cross-referencing testimonies, analyzing texts, and so forth). Occasionally, challenges arise in attempting to expose the relevant data to the reader, when interviewees insist on staying anonymous or observations are conducted only once, but even then, researchers are expected to provide the most thorough information possible on the source of their data and the method by which it was derived, so that the reader can understand how conclusions were concluded and comparisons compared.

Many papers have provided inspiration for follow-up studies, in which scientists use and expand on the data and methods of their predecessors, but relatively few studies have been replicated one-for-one with the aim of confirming their findings. In the past decade, as the percentage of suspected forgeries has increased, more and more systematic investigations have been conducted into the reliability of scientific publications. The results were no less than astounding, or should we say misery-inducing: replication failed in over half of the experiments,[404] including significant and influential studies.[405] The problem has become so widespread and disturbing that in 2010, it was termed the "replication crisis."[406]

What began in medicine[407] has continued on to experimental psychology[408] and infected the remaining disciplines. The problem is many times more severe if we take into account that in most of the soft sciences, no one even tries to check the reliability of research findings, let alone replicate the research process (except for a few rare cases, mostly in the wake of historical disagreement about politically significant facts). A poll conducted by *Nature* among 1,600 scientists and published in 2016 revealed that more than half of those polled saw the replication crisis as a serious problem. 75% claimed that one could rely on papers from their discipline, obviously to defend their own honor and that of their profession, but over 70% admitted that they had failed to replicate the experiment of a colleague. The seriousness with which the bond of silence is taken is reflected by the fact that only 20% attempted to contact the researcher whose work they had failed to reproduce.[409]

Because the problem of replication throws a dark shadow over the credibility of science, in recent years it has earned almost regular coverage in scientific journals and been debated at conferences, seminars, and workshops. In the United States, the National Institutes of Health (NIH) and the National Science Foundation (NSF) have founded think tanks to address the problem, and funds have been raised to research the topic and come up with solutions.[410] But again, these solutions are mostly directed at the symptoms and not the root of the problem—the anachronistic approach to publication and the pressure to publish as often as possible.

Positive Results Only

When you investigate a research hypothesis, you're liable to end up negating it. Scientific integrity requires that findings of this kind also be published. In practice, however, this is not always done,[411] because people usually tend to share their successes more readily than their failures. Positive results also give the scientist a greater personal and professional payoff, and perhaps this is also the reason that scientists tend to present their research findings in exaggerated language. Research has already found that the frequency of use of the words "innovative," "groundbreaking" and "novel" in the abstracts which appeared on the database PubMed (a database of papers in biomedicine and the life sciences) rose by 2,500% (!) in the forty years between 1974 and 2014.[412]

But most of all, a paper reporting positive results has a higher chance of publication, because it is likely to lead to more citations[413]—and the number of citations has an influence on the journal's ranking. This is the reason that the tendency to publish only positive results is especially prominent in the journals found at the top of the prestige ladder.[414]

Selective publication and covering up "negative" results damages science because important information is withheld from the researcher's colleagues, because concealment of this kind leads to wasted resources (other scientists will perform the same unnecessary study), and because it increases the temptation to eke out positive results by less-than-kosher means. A particularly common type of manipulation is after-the-fact alteration of the research hypothesis to match the results of the study. In other words, once the arrow lands, you draw the target around it.[415] This is usually not done with malicious intent: researchers simply convince themselves that the sample wasn't good enough, that something went wrong in measurement, or that the hypothesis was poorly phrased.[416] The problem is that the line between small changes and big-time fraud is very fine indeed.

The fear of negative results damages research because scientists are prevented from initiating adventurous experiments. One often hears that one of the most notable characteristics of any organization which deals in innovations is the right to fail—some might even say the requirement to fail. It is said of Moshe Peled, the CEO of the Israeli defense technology company Rafael in the 1980s, that he said of his researchers' findings: "If everything succeeded, it's a sign that you weren't daring enough. I would expect that 50% would end in failure."[417]

One suggestion intended to combat the phenomenon of concealment in research is advance documentation of the protocol of the planned research, so that it will be possible to follow the research process step by step.[418] That said, this suggestion and others like it ignore (as usual) the primary cause of this distortion of results: the heavy pressure to publish. A study has already found that the more competitive (that is, demanding and stressful) the environment in which the researcher operates, the more the tendency to publish only papers with positive results increases.[419]

Take It Back

Most of the mistakes found in scientific papers are of a scientific nature: incorrectly formatted references, misspellings of names, minor calculation errors (which have no impact on the paper's findings or its conclusions), and the like. Only a few of these mistakes are corrected shortly after publication, and most of them are not officially reported as corrections. By contrast, when a meaningful error is discovered that could rattle or even contradict the paper's content, or when fraud is uncovered in a paper, the journal in which the paper was published is required to issue a message and do one of two things: to make the required correction in the body of the paper, or to cancel the publication—that is, to pull the flawed paper.

One would think that the retraction of a paper would testify to the credibility and integrity of the journal, but in many cases it actually damages the paper's image, because it hints at insufficiently rigorous peer review. This is why some journals do not retract flawed papers, in a crooked attempt to defend their own good name.[420]

In the past two decades, a significant rise has been recorded in the number of papers retracted—a much higher rate than the general growth rate of the number of papers published in the major scientific platforms.[421] It is important to emphasize that this is still a negligible number, and indeed the phenomenon is marginal.[422] Nonetheless, there is still room for worry, because the change in the extreme end of the scale generally indicates a change in the scale as a whole.

What has raised a clear red flag in this context is the fact that most of the retractions did not stem from technical factors, but rather from inappropriate scientific behavior, including copyright violations, methodological errors, and reproducing one's older work.[423] An interesting additional fact is that a high percentage of scientists who knowingly defrauded journals did it more than one time.[424] In other words, this is not an anomalous occurrence, but rather the modus operandi of serial cheaters.[425]

One of the most effective tools for locating flawed papers is the blog *Retraction Watch*, which reports the papers' removal. On their website, the founders of the blog, Adam Marcus and Ivan Oransky, explained their motives in creating it:

- To keep journals disciplined and cause them to shorten the time from when they discover the problem to when they retract the misleading paper, in order to prevent the mistake from perpetuating itself through citation of the flawed paper in additional papers.
- To expose papers that deserve retraction, but have not yet been identified or tagged.
- To concentrate information on the retraction of papers, such as the response time of every journal and the way in which the mistake is "confessed," in order to encourage a maximum of transparency.[426]

Marcus and Oransky may not have said this explicitly, but it sounds as though their primary goal in founding the blog was to intimidate fraudsters—which is why the names of the offending scientists are featured prominently on *Retraction Watch.* Since the blog was first aired in 2010, it has become extremely popular among the scientific community, as this was the first public platform to indirectly create a shaming effect—targeted both at the intellectual thieves whose papers are taken down and at the journals who do not rush to retract erroneous papers and/or do not publish the reasons for their retraction. Naturally, the blog's popularity also comes from the element of gossip, as well as the schaudenfreude it creates.

And Yet—Denial

As the problem of credibility in science grows worse, the question must be asked: Why is this happening?

There are those who place the blame for the problem on the heavy traffic faced by journals. As we know, it is easy to supervise a hand-crafted product, and much harder to supervise one mass-produced on an assembly line. Others call attention to the growing connection between academia and industry (especially the pharmaceutical industry) as a central factor in the rise in rotten apples in the publication bunch. An additional explanation points the finger of blame at countries that were once considered part of the Third World, and have recently entered the sphere of international publication.[427] According to this claim, the democratic tradition is weaker in these nations, and therefore they maintain lower transparency and put in less effort to expose fraud.[428] Moreover, many institutions in developing economies grant significant financial incentives to scientists for successful scientific publication, and this too drives scientists to try and achieve it by low-down and lesser means.

In India, for example, it is common practice to reward scientists with bonuses for publication in prestigious journals. Not only that, the Indian government recently established a program for doctoral students which compensated them in cash for publication—to the tune of fifty thousand rupees (about seven hundred dollars) for a paper published in a well-known international journal, and twenty thousand rupees for publication in a local journal. The concept drew criticism from the local scientific community, and there were those who warned that these bonuses would increase the temptation to commit fraud and exacerbate a problem that had already reached the scale of an epidemic in India.[429]

China is also infamous for the bonuses it grants to its scientists upon publication. The scientific output of this giant nation has indeed risen lately at a dizzying pace, but at the same time, so has the percentage of tricks and manipulations.[430] In certain fields, such as biomedicine, it reaches remarkable levels—even up to 40%

of publications.[431] In the decade between 2007 and 2017, the American Institute of Electrical and Electronics Engineers (IEEE), the world's largest association of electrical, electronics, communications, computer, and information technology engineers, quietly retracted thousands of abstracts of conference presentations, mostly authored by Chinese scientists.[432] The Chinese themselves have begun to recognize the phenomenon and its dire ramifications, and have initiated surveys to identify and deal with the problem.[433]

But alongside all these there is another explanation, which casts light on the problem of credibility in science from an entirely different, even opposite, angle: there are scientists who maintain that the growth in the number of fraudulent incidents identified is actually a good sign.[434] They claim that this figure testifies not to a growing tendency to cheat, but rather to growing consciousness and sensitivity on the topic, as well as an improved level of monitoring, with the help of programs meant to locate errors and frauds. This may explain, for example, the fact that the leading journals have also seen a recent rise in retractions.[435] This may also explain why the length of time between the date of publication and the retraction has grown shorter—although it is still too long, particularly in terms of the fast-moving digital age (the average length of time for the retraction of disqualified papers in biomedicine was thirty-two months in 2013).[436]

Even the founders and administrators of *Retraction Watch* share the opinion that the rise in the number and percentage of retractions does not attest to a rise in the percentage of manipulations, but rather to a growing trend of exposure and subsequent admission—in which they themselves have led the charge.

Is this really so?

If the phenomenon of scientific fraud was really marginal and required only improved tools for identification, there would be no need for a blog such as *Retraction Watch*. The very fact that this important blog is funded by foundations, but not by a single publisher, scientific journal, or academic institution, attests that the latter have something to hide—or at least to repress.

The denial of the growth of this phenomenon has also dictated the kinds of solutions that have been suggested and attempted around the world. They tend to center around strengthening "the scientific secret police" rather than damming up the flow of wrongdoers: Journal editors have been called to take responsibility and report mistakes and falsifications honestly, clearly, and quickly; methods of monitoring have become more widespread and sophisticated; digital databases have opened for the storage of raw data and scientists' research protocol, in order to keep a tighter watch on the ways they arrive at their conclusions;[437] programs for students of graduate and doctoral degrees on the subject of credibility in research have been augmented;[438] the ethical codes in institutions of higher education have been tightened, and detailed and updated agreements produced; scientists have been required to submit an extensive report on their research methods and protocol for approval before beginning their research.

But all these solutions start from the assumption (or perhaps the wishful thinking) that the fraud itself is the problem, when in practice it is only an indication of a much deeper and more essential problem: the increasing, unreasonable pressure on scientists to publish more and more.[439] As competition for academic positions, research budgets, and academic promotion grows fiercer, and as public and private funding becomes more and more dependent on measurable output, scientific research becomes a dog-eat-dog world. Deception is simply one more step along the slippery slope of despair and anxiety. When academic suicide is a tangible possibility, and the pressure to publish hangs over your head like the sword of Damocles, you will be more tempted to cross boundaries of policy and morality.[440] In other words, science is suffering from a plague of lies and not a mere issue of discipline—because the method itself is the source of the problem, not the people who practice it. An opinion article published in the *New York Times* by the creators of *Retraction Watch* expressed this well: "Economists like to say there are no bad people, just bad incentives. The incentives to publish today are corrupting the scientific literature and the media that covers it. Until those incentives change, we'll all get fooled again."[441]

It is important to note that some researchers rule out a connection between the pressure to publish and fraud in publication, and present as proof the datum that most of the schemes discovered are carried out by scientists who publish very few papers and in journals without much of a reputation. We believe that this opinion is mistaken, because it is natural that those who struggle to publish will nonetheless be tempted to commit fraud in order to push their way through to the "big leagues." Therefore, it is no wonder that fraud is also more common among scientists at the beginning of their careers, and among scientists from developing or non-English-speaking nations. On the other hand, it is reasonable to assume that the experienced, "productive" scientists are less suspected, know better how to square circles and wipe away footprints, and are therefore caught in the act less often.[442]

In 2012, an important and brave article was published in the education supplement of the *Guardian* by two psychologists from the University of Cardiff, Petroc Sumner and Chris Chambers, who described in striking words the real motives that push researchers to violate the truth without a moment's pause: "It comes as no surprise, then, that to survive in academia, let alone thrive, scientists must now game the system in ways that would have appalled our forebears. Outright fraud is just the tip [of] the iceberg. Beneath it churns an ocean of dubious practices that spans the physical, biological and social sciences… The uncomfortable truth is that the fraudsters aren't that different to the rest of us, they just pushed themselves further along the continuum. If fraud is on the rise it is precisely because we – the scientific community – have nurtured a system that encourages it."[443]

The Black Market of Scientific Publishing

At the beginning of the millennium, when "open access" scientific journals—journals which enable direct access to papers at no cost—began to appear in the online realm, they received a cold shoulder from the academic establishment (we will expand on the open-access trend in a separate chapter). The high priests of the "Cathedral of Knowledge" worried that the new format would rattle the foundations of scientific quality assurance, and would allow pseudo-academic entities—and even for-profit entities—to enter the gates of science.

Not long after, the prophecy of doom came true—but not for the reasons the naysayers predicted. Many researchers around the world began to receive emails from supposedly respectable journals, with a tempting invitation inside: to publish your paper with a friendly and sped-up peer-review process. Occasionally, the message was personalized and even more enticing: The journal appreciates and respects your talent and your scientific endeavors, and because you are considered a prominent researcher in your field, you are invited to join the editorial board (a highly respected function that is also excellent for networking, and that assigns positions on the basis of extensive scientific and publication experience and international reputation). All that was required in exchange for this bounty was a check for a few hundred dollars.[444]

The "fake journal" seems at first glance like an ordinary scientific journal. However, it was masterminded and is run by wheeler-dealers who pretend that they belong to the academic world. Their method of operation is identical to the traditional format in scientific culture, except for one itty-bitty thing: what interests them is financial gain and not the quality or veracity of the publications.

Because even in established scientific journals, the scientists who send their papers to be published generally do not know who is "on the other end of the line" and what his or her scientific qualifications are, as we will explore in detail in the chapter concerning the disease of peer review, and because legitimate open-access academic journals were founded at the same time, scientists did not always have reason to be suspicious. No one in the venerable and haughty establishment of the veteran scientific journals imagined for a moment that a replacement would pop up which could compete with them in the cartel-like market.

Black markets and the knockoff industry always flourish where there is the potential for profit, and where the demand for a product is higher than the supply. This is exactly what has happened in the scientific publishing market: the rapid rise in the number of scientists and the growing pressure to publish has produced a bottleneck in the traditional journals. This weakness has been exploited by shrewd entrepreneurs, who understood that thousands of despairing scientists would be ready to pay hefty sums in order to get their papers published on a scientific-looking platform, especially on an abbreviated schedule. And there was another reason for the appearance of the "fake journals": the ease and speed with which it is possible to cook up new websites and publish information. All you need is a language editor, a graphic designer, and a tech-support type to maintain the site.

The economic model of the false online journals is suited to the new world of commerce, and their formula for profit is laughably simple: the journal collects sums of between one hundred and a few thousand dollars from the authors for publication (sometimes the price is set only after publication).[445] In exchange, the journal provides a sort-of-scientific platform, complete with a sort-of-peer review process—or, in many cases, an entirely fictional peer review. In a few of these cases, papers were not published even after the authors ponied up—plain old theft carried out by criminals who hoodwinked the gullible.[446]

Many, many researchers have fallen into the trap—not only because of the pressure to publish, but because the fake journals adorn themselves with forged status symbols which cover up the trick:

- Names in a style reminiscent of well-known, legitimate journals.[447] Many of them use keywords characteristic of the scientific milieu, such as "journal of," "advanced," "research," "science," "scientific," "archives," "reports," "international," "applied," "innovations" and/or "contemporary."
- A long list of editors, on which are often planted the names of famous scientists who have no idea that their names are being used (occasionally the deception is pulled off by using names similar, but not identical, to the original).[448]
- A fabricated impact factor (we will discuss the impact factor, which ranks the importance of scientific journals according to the number of citations of papers they have published, at length in the chapter on the crisis of rankings and the obsession with measurement).[449]

- In many cases, even the journal's International Standard Serial Number (ISSN)—which identifies every journal in every medium, printed and electronic alike—is also a forgery.[450]

Often, the scientists who got caught in the trap were prevented from getting cold feet and pulling the paper if and when they discovered that they had been played.[451] Among those who had regrets, many hesitated to admit their mistake because they were afraid to make fools of themselves. Even those for whom the original, seductive emails inspired doubt and even suspicion did not imagine that this phenomenon could possibly be so widespread. It was easier to believe that this was a passing, marginal phenomenon that had been carried along on the wings of the digital revolution.[452]

But like every organized con throughout history, sooner or later sharp-eyed, courageous people will come along and expose the injustice:

The first meaningful public exposé of the fake journals took place in 2005, when two researchers from UCLA and NYU, David Mazieres and Eddie Kohler, sent one of the spam journals a ten-page paper entitled "Get Me Off Your Fucking Mailing List." The text of the paper was nothing but the same request repeated over and over again.[453] Embarrassingly, the paper was accepted for publication. That is, it was published without the website's owners even bothering to check its content.

Sting operations of this kind quickly became a competitive sport, in part because in the same year a group of students at MIT built a scientific paper generator known as SCIgen, programmed to produce scientific papers built according to a typical design and layout template (with proper wording, graphics, quotations, and references)—but entirely devoid of meaning. Their goal was to create fake papers in order to entrap the fake journals and point out their nakedness to the world. Over the years, stings such as these have multiplied, including the submission of papers written in gibberish. A few of them have earned coverage in the popular media, which has begun to understand the extent of the epidemic and trumpet its serious repercussions.[454]

One of the best-known pranks was the initiative of four researchers from Poland. The four created a fake scientist who submitted her candidacy to serve on the journal's editorial board in a letter that was sent to three hundred and sixty journals (two-thirds legitimate, one-third fake). A third of the fake journals accepted the made-up scientist to the position, usually after a few days and occasionally within hours. Four of them even offered her the coveted position of editor-in-chief. But no less embarrassing and serious—indeed, a travesty of the whole culture of publication in science—is the fact that no fewer than eight (!) of the legitimate journals also accepted her to their boards.[455]

At the same time that the fake journals appeared, the "open access" phenomenon in science began to gain momentum. Its aim was to present a more successful alternative to the old-fashioned model of closed-off and expensive journals. The rising subscription expenses of the traditional journals, along with a flourishing ethos of increased access to science, added an ideological dimension to the movement. Therefore, the fake journals were the worst nightmare of the open access movement's leaders, because these journals threatened to shoot down their vision.

In order to defend themselves, the publishers of open science journals established an association, the Open Access Scholarly Publishers Association, and announced that it had two goals: to make sure that open publishers were implementing stringent selection criteria, and to condemn pretend journals.[456]

This, of course, was not enough. The battle for the good name of science required a brave and authoritative combatant who would compile a public blacklist of fake journals. The first to take up the gauntlet was a librarian named Jeffrey Beall, who had racked up dozens of years of experience as the librarian of the University of Colorado-Denver. Beall himself was a researcher, a member of the editorial board of the Cataloging & Classification Quarterly journal, and had published multiple papers in the field of database management. His interest in open publishing began in 2009, when he worked on a review of a new (and legitimate) online publisher by the name of Bentham Open. To his shock, he discovered that the phenomenon of fake journals was much wider than anyone had estimated.

Beall made the obvious assumption: that many scientists, primarily young scientists and researchers from developing countries, fell into the trap of fake publication because of their lack of experience, the limited options open to them, or their naivete.[457] He defined the fake journals as "predatory journals," a phrase which became a common figure of speech in academic circles.

But the librarian from Colorado was not content to criticize. He pioneered the publication of a blacklist of untrustworthy journals which "successfully" fulfilled the criteria he defined. "Beall's List" was published for the first time in 2010 on his personal blog, was updated consistently for seven years running, and became a useful tool for scientists, database managers, editors, committees, and a variety of institutions.[458]

In 2013, the project received a (temporary) blast of wind in the sails from John Bohannon, a member of *Science*'s editorial board, who decided to investigate the scope of the phenomenon of fake journals using an extensive and controlled experiment. Bohannon sent an error-ridden medical paper to 304 open access publishers, including some of those featured on Beall's list. The results were confusing: On the one hand, 82% of the fake journals took the bait and published the lousy paper—which seemingly lent empirical confirmation to Beall's selection process. On the other hand, the remaining 18% rejected the paper, which proved that Beall's List also included journals which were "not guilty." An additional finding revealed that India was the largest (and therefore presumably praiseworthy) hub of open access journals, with sixty-four open access publishers. However, at the same time, India was the primary source of fakes, with 90% of journals published in India falling into the trap set by Bohannon. The United States was in second place: twenty-nine publishers accepted the worthless paper for publication, while only twenty-six rejected it.

But the finding which caused the loudest uproar was the one which showed that 45% of supposedly established and respectable open access journals—including those published by well-known publishing houses such as Sage or Elsevier—also ate up the lie. In other words: in attempting to expose the bad apples spoiling the pristine bunch, Bohannon revealed that the bunch itself was rotten—that some of the lawbreakers were working from within the traditional scientific establishment. The Directory of Open Access Journals, a site which put together an ever-changing list of legitimate open access journals, quickly tightened its criteria, but the stain on the culture of scientific publishing was not washed out.[459] The results of the investigation were published in *Science* under the title "Who's Afraid of Peer Review?" alongside a map which indicated the locations of the pretend publishers and their editors.[460] The publication took off and inspired intense public debate, both inside and outside the academic bubble.[461]

Like every messenger bearing unpopular tidings, Jeffrey Beall sustained criticism from two different directions. On the one hand, he was accused of leading a witch hunt which exaggerated the phenomenon's dimensions and unjustly sullied open access publishing as a whole.[462] On the other hand, he was attacked for concentrating on little-known journals in the developing world and ignoring the suspect journals within the academic mainstream.[463] There was also criticism around the effectiveness of publishing a blacklist instead of, or addition to, a "whitelist" of journals whose credibility had been proved.

Beall attempted to respond to his critics in writing, but the pressure placed on him by publishers became insufferable with time, and included not only harassment and threats but libel suits,[464] not to mention pressure placed on his workplace, the University of Colorado. He chose to take down his blog in 2017,[465] and summarized his attempt in a paper entitled "What I Learned From Predatory Publishers."[466]

Permit us to note that the academic community and the tycoons of science did not shed a single tear over Beall's retirement from this important endeavor, and preferred to stand aside. Their thunderous silence illustrated the denial, conservatism, and even hypocrisy which characterize the scientific world and prevent it from healing its many maladies.[467]

That said, Beall's blacklist has not entirely been taken offline; it continues to appear with the help of a small group of anonymous research and scientists.[468] At the same time, sister blacklists have appeared on the Internet.[469] For example, there is Cabell's blacklist, first published by the Council of Science Editors (CSE) in 2017.[470] The list is published by the company Cabell's International, which offers analytics services in the field of scientific publishing. Unlike Beall's list, a fee is required to access Cabell's list, which only illustrates the ridiculous way that science operates today: even when an initiative is launched for the express purpose of defending the precious commodity of credibility in scientific platforms, it is exploited for profit by the people who hold the purse strings.[471]

Additional initiatives to combat the plague of fake journals include the production of guides to identifying journals of this kind for scientists (especially young scientists), academic committees, and librarians.[472] The Open Access Scholarly Publishers Association (OASPA) currently investigates its members with extreme care,[473] and informational sites which review journals have begun to provide information on the quality of the journals' selection process and peer review.[474] Suggestions have also been raised to increase the transparency of the peer review process and set down measures which would rank journals according to the level of their peer review and selection.[475]

In 2016, an initial attempt was made to strike a blow against the fake journals using legal means. The Federal Trade Commission (FTC) issued a lawsuit against the Indian publisher OMICS, the producer of over seven hundred journals. OMICS was accused of deceptive practices and convicted in a groundbreaking verdict in 2017.[476]

A Mirror Up to Science

Despite all efforts, the phenomenon of fake journals shows no signs of disappearing. If 18 publishers of journals of this kind had been located in 2011, by the end of 2016 the number was over fifty times greater: 923. At the same time, the number of papers published in these journals went up, and reached the nice round number of 420,000 (as of late 2016). In the same year, it was reported that over a quarter of the journals in the Directory of Open Access Journals were removed from the list after it was found that they were fake.[477] It is estimated that 6% of the papers published by American researchers today appear in these shady platforms.[478] And the price? A 2015 investigation of three hundred journals from Beall's list found a range of prices for the publication of a paper, all the way from $4 to $2,286 (the median was $86).[479]

We can learn the true seriousness of the problem of fake journals, as well as its impact not only on science but on the public at large, from a 2017 study which investigated the scope of fabricated papers in biomedicine and their common denominators. The researchers found that almost a quarter of the studies published in these journals were funded by 345 legitimate public entities—mainly academic institutions and government agencies. The highest number of these papers came from India (27%). Coming up a not-so-complimentary second were the scientists of the United States, 15% of whom were employed by prestigious universities.[480] In the same year, the *New Yorker* compared denial of the pollution threatening the scientific climate to denial of the climate change threatening life on Earth.[481]

The phenomenon of fake journals has not been vanquished and has not disappeared from the scientific landscape, and even continues to grow, for a number of reasons:

- The publishers of fake journals have become more sophisticated, and despite the warnings and the attempts to track them down, it is hard to identify them. They have also learned to conceal evidence and tread carefully in the gray areas of scientific publishing.[482]
- As noted above, many scientists who publish their studies on these platforms are active in countries outside the first-order circle of scientific powers.[483] In these countries, lines on one's resume are often there for appearances' sake in order to justify promotion for nepotistic reasons.[484]
- Fake journals are part of a larger global phenomenon: online black and gray markets, which are an inevitable side effect of the information revolution (the Internet is still in need of major regulation). It is difficult, and maybe even impossible, to curb the phenomenon entirely—at the moment, there are simply neither sufficient resources to address the problem, nor international legislation that will genuinely deter offenders.
- The publication of fake journals has increased because of the traffic jam in the system. Many scientists cannot find legitimate platforms for publication, and they are forced to make compromises.[485] For this reason, alongside the ridiculous and untrustworthy papers that are published in fake platforms, there are also papers of perfectly good quality—mainly papers whose authors

could not find another platform. Incidentally, a rare and quite brave study which illustrated the hypocrisy of the academic establishment when it comes to fake journals found that the heads of many business schools and economics departments, who take pride in public awareness and responsibility, had published papers in these journals (they probably had good reasons). Not only did they climb further up the professional ladder (and reached the highest possible rung, that of a tenured professor) and were appointed to coveted positions on the basis of a supposedly fishy resume, many of them had been awarded at least one prize for research excellence by the institutions which employed them.[486]

- Although they collect fees (often exorbitant) for publication, many of the fake journals are cheaper than their legitimate open access competitors. The academic establishment, which denounces fake science, hypocritically refuses to admit that the greed of the fakers is precisely the same greed and lust for lucre shown by the legitimate publishers who have dominated the world of scientific publishing. It is no wonder that they too were caught red-handed when their journals agreed to publish made-up papers.[487]

The activities of the fake journals could be compared to the black-market industry of knockoff brands. Counterfeiters of brand-name products may be criminals who steal copyrights from the big firms and market a lesser-quality product under the name of the original, but the buyers generally know that they are buying a knockoff brand. They choose to purchase the knockoff because they have no way of getting the original, and because in practice the difference between the two is barely noticeable, if at all. The original brand is many times more expensive, mostly because of the name and the image, and less because of differences in quality and production costs.

The war against fake journals once again illustrates that the leaders of the scientific world have mixed up the cause with the consequence. As long as they continue to demand that scientists put out massive quantities of papers, and as long as scientific publishing remains captive in the hands of profiteers and does not move to open and free Internet platforms, not only will the black-market phenomenon in science not come to an end—it will continue to flourish and bloom.[488]

Fake Conferences, Too

It's Not What You Know, It's Who You Know

Gatherings of professionals, intended to enable the exchange of ideas and the advancement of mutual interests, have existed for hundreds of years. However, the rapid development of industry, commerce, science, and education in the past two hundred years have expanded the format and made it more sophisticated. Luxurious conference centers appeared for the first time in Europe in the mid-19th century, and today, conference centers around the world host countless conferences in every imaginable field. But it seems that there is no profession identified more strongly with conferences than the academic profession.[489]

The basic structure of the scientific conference came together in the 20th century and became an inseparable part of academic culture. Its stated goals were to allow scientists to present new studies and findings, to cross-pollinate one another, and to take part in an unmediated critical conversation. These meetups are also intended to build work connections and strengthen collaborations, to formulate professional and organizational policies, to discuss problems in the researchers' shared discipline, to pay mutual respect to one another, to stake out ownership of innovations and new ideas (through lectures in front of an audience), to define and strengthen attendees' professional status, and to cultivate the identity and solidarity of scientific communities by means of a face-to-face meeting. And of course, there is also the unstated goal: the sheer pleasure of trips all over the world and hotel vacations, funded entirely or at least partly by the employing institution.

The conference format differs for every discipline, conference organizer, central topic, and location. That said, academic conferences can be sorted into two main categories, both of which exist in most disciplines: meetups and workshops, which are targeted at a smaller crowd and focus on a particular subject, and more general conferences, which address a number of different topics and draw a large number of researchers.

Academic conferences are generally organized by a local, national, or international association of scientific professionals, or by a group of researchers with shared interests. They take place at fixed times, usually once a year. Once the conference organizers have confirmed the technical details (date, locations, central topics, schedule, and so on), a "Call for Papers" (CFP) or "Call for Abstracts" is published. Once, this call was printed in the relevant journals; today, it is primarily circulated on the Internet and via direct email. It sets a deadline for the submission of lecture proposals and papers to the conference committee or a board of judges appointed in its stead.

Most conference participants do not pay the expenses from their own pockets, but rather are covered by the research foundations or institutions where they work. There are conferences for distinguished scholars which collect high participation fees and take place in exclusive, expensive hotels. On the other hand, there are also conferences that do not collect participation fees, or ask for only a modest sum.

This way or that, for most conferences the scientist is still required to cover all or part of the travel and lodging costs.

These conferences have a professional air about them, take place in a language familiar mostly to the scientific clique, and are largely based on short lectures (10-30 minutes), with the exception of a few keynote speakers which open and close the conference. In addition, most conferences include interactive panels in front of an audience, as well as workshops, roundtables, and scientific presentations known as "poster sessions." In poster sessions, large placards display pithy summaries of studies which are currently in progress or have already finished, and the audience is invited to ask the presenters (the researchers) questions of clarification on their research. Usually, after the conference has finished, a summary booklet is released under the title "Conference Proceedings"; this booklet contains the participants' papers, which expand upon the content of their lectures.

Over the past few decades, the academic world has experienced rapid growth in the number and variety of conferences, and every year thousands of conferences of all kinds take place around the globe. This growth can be attributed to several factors: a rise in the quality of life and decline in the cost of air travel; private companies who have entered the field and accumulated experience in the production of events which combine professional training, networking, vacation, and entertainment;[490] Internet search engines, which allow researchers to pinpoint relevant conferences not only by area of interest but by location, date, price, and so on; the massive growth in the number of scientists and scientific societies; for-profit companies which sponsor scientific conferences in order to promote their products; and institutions of higher education, for whom conferences are yet another promotion and marketing tool in the competitive market of science and education.

But it seems that the primary reason for the rapid growth in conference offerings is their importance to the advancement of an academic career. Even putting aside the fact that a lecture at a scientific conference adds another line to your resume, it contributes to the personal networking which is all-important in science. If the editor of a journal or a member of an important scientific committee knows you personally—maybe you even made a friendly connection—it is only natural that they will do you a favor if and when your paper, research proposal, or resume lands on their desk. One of our interviewees put it this way: "For me, there is no substitute for a face-to-face meeting, because it allows me to whisper in someone's ear 'I was the reviewer of your paper' and hint that they owe me. This also lets me meet the potential judges of my own papers. So when I go to conferences, I barely go into the lectures—mostly, I talk to people."

Too Good to Pass Up

As we know, where there is demand and there is money—swindlers are never far behind. And indeed, the pseudo-scientific mafia has also sent out tendrils into the field of conferences. Alongside the siren calls to publish papers in fake journals, the email inboxes of scientists have been flooded in recent years with invitations to bogus academic conferences, also known as predatory conferences.[491] In fact, many of the companies which produce the fake journals also produce fake conferences.[492]

One would think that it would be harder to fake a conference than a journal, because the organizers show themselves. The speakers see who is speaking before and after them and who sits beside them on a panel; the audience in the lecture hall sees and hears the speakers and their quality, and they can even catch the speakers for a conversation at the hotel bar. Nevertheless, it turns out that it is easy to tempt scientists to come to conferences like this not only because of the desperate desire to publish, but because it is always fun to travel the world on the boss's dollar. Moreover, an additional temptation to attend these conferences are the leisure activities offered by the organizers at attractive prices (in many cases at a lower price than is typical of regular scientific conferences) and at enticing tourist sites.[493]

The general structure of the fake conferences is similar to that of mainstream scientific conferences, but in contrast to the traditional model, in which the speakers are accepted to lecture on the basis of an evaluation of the paper or abstract which they sent to the program committee, at fake conferences the right to lecture is guaranteed to anyone who wants it (even if there is a kind of pretend review process) as long as the money arrives on time.[494] In most cases, falling into the trap is not so painful, because the conference takes place overseas and in a nice hotel. However, it can still come at a high cost, because even after you figure out that you've been suckered, you have no way of backing out—or getting your money back.[495]

Like the phenomenon of fake journals, fake conferences have been exposed in all their treachery, ridiculousness, and sheer scale in part by means of entertaining email traps. Prof. Christoph Bartneck of New Zealand, for example, chose to answer a call for papers for a conference known as the "International Conference on Atomic and Nuclear Physics." He sent to the listed address a paper composed of two words, "atomic" and "nuclear," connected by whatever his iPhone's autocomplete function suggested. Three hours after his submission, the organizers informed him that his paper had been accepted, and he was invited to register for the conference. The cost: $1,099. For an additional cost, Prof. Bartneck was invited to give the opening or closing (keynote) address.[496]

The scientific image and the attractiveness of bogus conferences are achieved in part by imitating the names of real conferences. Many are difficult to distinguish as frauds, because people do not see the difference, or are not interested in finding the difference, between a real Louis Vuitton and a knockoff. Furthermore, in order to give themselves an air of respectability, the organizers of the fake conferences occasionally publish the names of senior speakers who wil supposedly appear at the conference, when in practice this is an empty promise. It is also hard to notice bogus conferences because these conferences are exceptionally well-organized according to all the rules of the scientific tradition. At many conferences, prizes and certificates for exceptional lectures are also awarded, and as we know, no one has ever turned down a compliment. A few of the honorees (including winners of prestigious scientific prizes), especially retirees, say “yes” to an invitation to deliver the conference’s keynote address, whether because they cannot see that it is a sham or because they cannot resist the temptation of VIP hospitality, especially when it’s on the house.[497] Even if some are skeptical, the general feeling is that this is not necessarily fraud, but rather a shortcut and a “wink” of the sort that is relatively commonplace in today’s scientific culture.

The Hypocrisy of the Rich

The response of the academic establishment to the phenomenon of fake conferences was much like its response to fake journalism. It started with mockery, continued to anger, made its way to concern, and eventually reached horror (when the number of conferences reached worrisome levels). But again, in this case too the little swindlers expose the big swindle—the agreed-upon lie surrounding the tradition of scientific conferences.

Fake conferences make a laughingstock of the culture of scientific conferences, because most of the accusations directed against them by the academic establishment would also be worth targeting at “legitimate” conferences:

- The legitimate conferences also collect high participation fees (as high as hundreds of dollars)—both for the right to lecture and for publication in the conference proceedings booklet distributed at the end.[498] In fact, many respected scientific conferences are in effect for-profit initiatives aimed at milking attendees for funds, and are an integral component of the creeping industrialization and commercialization of science.[499]

  On his Facebook page, Prof. Gad Yair, a sociologist at the Hebrew University of Jerusalem, published typical and representative impressions of the American Sociological Association’s yearly conference: “I stood to the side a little bit, alienated from everything going on around me. Total chaos. Many come, many go. A motley multitude. This group is staying in that hotel, and this group in another. These people are dining at this restaurant, and those are nibbling snacks along the way. Airplanes are bringing in scientists from all over the world, taxi drivers are driving thousands of participants here and there and back. Alongside the conference there are various nourishment and transportation endeavors, lodging and tourism endeavors, units for cleaning and for leisure activities. Yes, a scientific conference of this kind turns over a lot of money. It takes it straight from the hands of the scientists and puts it into the hands of business owners. Give-and-take. Science, if so, is part of capitalism. The conference is part of the city's economy, and part of the political economy of academia.[…] No doubt, the wheel of fortune of scientific conferences is a giant wheel.[…] As I stood there on the side, I thought that many of the participants were entirely unaware of the enormous financial operation powering them: standing them in lines, lifting checkbooks and credit cards out of their pockets, getting them excited to present their inventory of research before four attendees, and indeed forcing them to take part in this economic game against their will."[500]

- In the same breath that the heads of academic institutions criticize the bogus conference industry, they reduce financial support for the conference travel expenses of their junior and adjunct professors. The result is that legitimate conferences primarily serve wealthy scientists, those who have sources of funding and free time. It is no accident that, in the past few years, more and louder voices of protest have criticized the hidden costs of these conferences and the discrimination they cause in the scientific community.[501]
- The critics of fake conferences give the misleading impression that conferences are still crucially important to science. In practice, it would be better to keep them to a minimum, or to cancel them entirely. In the past, it was important for scientists to meet face to face in order to present their studies to one another, because there were no other platforms or means. But in our day, when technology allows us to transfer media files in a tenth of a second and make information and lectures accessible in real time to countless viewers around the world, there is no longer a need for the old format.[502] In fact, the social media outlets in each academic field allow for an ongoing scientific conference in the form of an online convention, with continuous conversation between hundreds and even thousands of scientists, unbounded by time or place. Tools such as WikiStage, video conferencing, webinars, webcasts, and web conferencing are already creating cheaper and

> more efficient alternatives. Even traditional conferences often allow virtual participation at a much lower cost.
>
> Conferences in the traditional format have also largely become unnecessary because the strengthening of connections between scientists in this medium is in many cases a mere façade. Most of the professors who come to conferences from the edges of the earth stay at the conference only for a short time. They serve their time, then rush out as soon as they can to go sightseeing in the city streets or hang out in the hotel pool. The result is that most of the lecture halls are nearly empty, and often panel members lecture only to one another. One of our interviewees put it this way: "Let's just say that it's like going to church or synagogue. See, nobody really prays. Who has the energy for that? Some of them don't actually believe in God. They go in order to mumble a few words, move their head a little, then talk to people and eat. And why do they need the prayer? Because otherwise it would just be a class party. This way, they have an excuse to come, and this is the excuse that everyone has agreed on but no one says out loud. You're not coming? It's as though you don't exist, God help you."

The gap between the dull scientific conferences and the dynamic world of the online sharing of information in the 21st century is growing larger every year, and making the academic world and its anachronistic rituals look silly. At many conferences, the lectures are a random buffet of presentations which don't really go together.[503] Three or four speakers mount the stage in turn and read a text from notes or a PowerPoint to the dozing crowd, if there is a crowd at all. Most of the speakers are not skilled at preparing presentations, and therefore the presentations, too, are amateur and laughable. The content—of both the lectures and the papers—is rarely on a high level, and in many cases is even embarrassing (many come to present their research before the research is finished and before they have final results, in order to publicize the research and get the coveted line on their resume). Many lectures cover esoteric subjects and add little to nothing of interest. Their titles sound like gibberish or a secret code that is primarily clear to the lecturer.[504]

Moreover, academic conferences are often organized in an unprofessional manner, because the organizers are academics with little talent for production (in contrast to the professional con artists of the fake conferences). Many young scientists who pay plenty of money to participate say to themselves: the show isn't worth the investment. The lectures are annoying, the interactions are limited, and the leisure activities are meant for old people. Most of them feel like a third wheel on an event that is too slow, too dry, and ineffective.

On the entertaining (or depressing) website *100 Reasons NOT to Go to Graduate School*, the scientific conference makes an appearance. From the website: "To the casual observer, an academic conference must appear to be one of the strangest of modern rituals. At various sessions, speakers present their own research by reading aloud to an audience. Someone who has attended a full day of sessions will have listened to people reading for five or six hours. How well do you suppose the audience members are listening? They sit politely and at least pretend to listen, because when their own turn comes to stand up and read aloud, they would like others to extend the same courtesy to them. Sparks fly occasionally during question time, which can be mean-spirited or enlightening, but decorous boredom is typically the order of the day. The real purpose of the conference is to provide speakers with another line for their CVs, to which they all must add lines constantly. Before you go to graduate school, attend an academic conference in the field that interests you, sit through a few sessions, and then ask yourself if it still interests you. While you're there, get a sense of the anxiety among the attendees looking for work. For them, every conference is a gathering of competitors."[505]

Incidentally, criticism of the traditional format has recently also come from two additional directions. The first is the sustainability angle; the claim is that conferences generate unnecessary cross-continental traffic, cause the waste of natural resources, and exacerbate environmental pollution.[506] The second angle sees conferences as a further expression of academic colonialism, because they grant a clear advantage to scientists from wealthy nations and English speakers.[507]

If so, why is the tradition of conferences not going away?

First, in spite of all the criticism, there are still conferences that genuinely serve science. Second, and more to the point: The barons of science and the nobility of academia cling to this format, because in the final analysis it is a financial bonus, particularly for the well-connected, which has earned the droll sobriquet "conference hopping." One of the first to mockingly expose the conference culture of the closed-off academic insiders' club was David Lodge. It started with his satirical campus novel "Small World: An Academic Romance," which was published in 1984 and became a popular television show of the same name four years later.

Nonetheless, it is doubtful whether the tradition will last much longer. Recently, the "Unconference" trend has appeared, a trend which is attempting to create up-to-date alternatives to traditional academic conferences in the spirit of our ever-changing world and the style of the younger generation. The digital alternative is of course not the only one. People still enjoy meeting one another, speaking face to face, and sharing experiences in the same physical space; it is only reasonable that better alternatives will spring up that address this aspect as well. One way or another, many academic institutions have already stopped paying for participation in conferences as a condition of employment. And in the world of low-cost flights and AirBnB hospitality, the flight overseas is no longer such a major and unusual perk.

Slowing Down the Rat Race

In 2010, an article appeared in the journal *The Chronicle of Higher Education* written by five respected professors in unrelated fields of expertise (English, mechanical engineering, medicine, management, and geography). Its title leaves no doubt as to its message: "We Must Stop the Avalanche of Low-Quality Research." An excerpt from the article: "We need policy makers and grant makers to focus not on money for current levels of publication, but rather on finding ways to increase high-quality work and curtail publication of low-quality work. […] We need to get rid of administrators who reward faculty members on printed pages and downloads alone, deans and provosts 'who can't read but can count,' as the saying goes. Most of all, we need to understand that there is such a thing as overpublication, and that pushing thousands of researchers to issue mediocre, forgettable arguments and findings is a terrible misuse of human, as well as fiscal, capital."[508]

Since then, a few more articles have been published—including articles by senior scientists—lobbing criticism at the growing pressure on scientists to show an unreasonable level of publication output.[509] Unfortunately, at the moment, these are still only shouts in the dark. The scientific establishment continues to cling to the existing policy and treat mainly the symptoms of the disease rather than its cause.

And yet there is room for optimism. The publication frenzy will almost certainly come to an end, and not because of the criticism. The culture of scientific output will simply and inevitably collapse in on itself, for several reasons:

- Galloping inflation always reaches a point where the weight of the burden becomes too much to bear. Not only does life in an unceasing race become hell, but people understand that they cannot win the competition, because they do not have the time, energy, or money required. Therefore, they resign or give up in advance. And indeed, more and more signs indicate that scientists leave the intensely competitive academic system of their own accord, or choose from the beginning not to enter the rat race (we will expand on this in the chapter on the career crisis).[510]

  In 2010, a manifesto was published (anonymously, of course) under the title "Slow Science," named after the "Slow Food" movement. It included the lines: "Science needs time to think. Science needs time to read, and time to fail. […] Slow science was pretty much the only science conceivable for hundreds of years; today, we argue, it deserves revival and needs protection. Society should give scientists the time they need, but more importantly, scientists must *take* their time."[511] A message in a similar spirit appeared six years later in the book "The Slow Professor: Challenging the Culture of Speed in the Academy."[512] To tell the truth, the call for a return to sanity in academia is part of a wider global trend. It falls naturally in with the cry of "hold your horses!" in every field, and with the wish to slow down the frenetic speed of life, which takes a painful toll on health, emotional and mental stability, and family.[513] Because this *cri de coeur* is authentic and justified, it is reasonable to assume that, at the end of the day, it will lead to significant change, including in academia.

- When everyone strives for the same status symbol, its value is eroded away. A familiar example from the field of conspicuous consumption is described in Robert Frank's book "Luxury Fever: Why Money Fails to Satisfy in an Era of Excess":[514] young people who compete to have the most luxurious weddings, and are entirely caught up in the pathetic need to impress, until all of their weddings ultimately look the same. At some point, once the conventional lies and the herd mentality are exposed, a backlash begins to gather momentum. This is easy to see in our day, when more and more young couples are choosing to cut back on their expenses and get married in modest ceremonies.

  And indeed, a number of institutions and organizations around the world (such as the Deutsche Forschungsgemeinschaft or German Research Foundation, the National Science Foundation, and the International Council for Science) have recently begun to request that the scientists they evaluate (for a position, promotion, grant, or the like) submit only three to five of their best publications (of their choosing) in place of a full and lengthy list.[515]

- As we have seen, the ramifications of publication inflation are so serious both for science and for the welfare of the scientists that someone from outside has to put a stop to it—for example, by changing the model of government funding, which is currently based on output (we will expand on this later). The first signs have begun to appear. In Australia, for example, Prime Minister Malcolm Turnbull announced in 2013 that there would be a new order of priority for the allocation of government resources to science funding, with top preference given to studies with an influence on civilian life and not necessarily those published in prestigious journals.[516]

- Over the years, the United States has led the world in the number of papers published in journals in English, with a contribution of approximately one-fourth of the general total. In 2016, China pushed the U.S. into second place, with 19% of worldwide scientific output (as opposed to the U.S.'s 18%).[517] This is a dramatic turning point which reflects China's meteoric rise as a world power, as well as a historic change in economic, political, cultural, and scientific power dynamics. It is worth qualifying the statement and pointing out that the rankings change when we talk about the number of times a paper is quoted, which is considered a measure of quality: the U.S. still marches on in first place, with 35% of all quotations, and China lags behind in 11th place, with only 6%.[518] When China does eventually reach the top, and that will happen in the not-so-distant future, those deposed from the throne will rush to change the rules of the game. That is to say, sanity will return to the Western world only when the naysayers and deniers deign to understand that under the old rules of engagement, the West has less of a chance to win. But most of all, the plague of publications is expected to implode simply because it does not pay off from an economic standpoint, is not effective for research, and institutes a culture of falsehood and hypocrisy. The world is moving—mostly thanks to technology—towards a more transparent, efficient, and to-the-point work culture. This shift will give rise to alternative models of scientific publishing which will render measures of quantity unnecessary.

  Of course, there is no need to give up—and no sense in giving up—examination of quantitative accomplishment in research, but the time has come to set realistic demands which take into consideration the characteristics of the discipline and the character of the research, and to define expectations according to criteria which are enlightened, logical (with regards to time invested), and known in advance both to the institution and the workers. An approach of this kind has already been applied in a number of academic institutions around the world, but at this stage it only manifests in financial bonuses on top of the basic salary. Faculty members receive a list of typical tasks which accompany the major components of their work (teaching and research)—for example, membership on an academic committee, fulfillment of an administrative function, development of an innovative course, or professional contribution to the wider community. In order to be entitled to financial bonuses, the faculty member must choose and complete a few of the tasks set down on the list (in Israel, this list is known as "criteria," and a scientist must fulfill four of the eleven criteria in order to receive a grant). It is all based on trust and flexibility. Therefore, there is no reason not to institute this approach in order to attain an all-inclusive estimate of scientists' accomplishments, including for the sake of their professional advancement.

4

The Great Science Robbery

The Crisis of Access

Maxwell's Magic Formula

The phenomenon of social media had already begun to emerge in the late 1990s. However, it was not until the launch of Facebook in 2004 that mass communication platforms became one of the most important and revolutionary developments of the digital age. Only five years later, in 2009, Facebook was already the most influential social network in the world, with millions of "friends." After Facebook's appearance, new applications and social networks such as Twitter and Instagram appeared on the scene, cementing the trend and expanding it even further.

Plenty of ink has been spilled about the dramatic effects of social networking on humanity in general and on the way we communicate in particular. One of these effects is access. For the first time in history, new communication platforms allow people from all over the world to exchange unlimited, instantaneous messages (both texts and images) free of charge.

Social networks, including Facebook, do have some restrictions in place—on text length, forms of distribution and expression (such as offensive content), and the like. Still, these are minimal limits which do not change the basic fact: A new era in human history has begun in which information previously guarded by the powerful and wealthy is slowly but surely being released from its shackles. Unfortunately, science is lagging behind the global trend, and still has anachronistic barriers preventing access to its publications.

In the early days of modern science, most journals were produced and distributed by scientific societies, which were funded by donations and operated for the sake of the common good—not for profit. That started to change after World War II. The economic boom and the rise of the modern democratic state induced more and more public and private resources to be diverted to science. And since most funding went directly to empirical research, it became difficult to maintain and expand publication platforms.

The one to overhaul the old system of scientific publishing and provide a creative solution to the academy's growing publicity needs was an ambitious Jewish refugee with personal charm and a keen commercial instinct. During World War II, he fled from Russia to England, changed his name from Jan Ludwig Benjamin Hoch to Robert Maxwell, served in the British Army until 1948, and became a successful businessman. Today, he is remembered as one of the most colorful figures in 1980s England, who fell from the heights of his power as a media emperor and MP into the depths of massive debt—most of which was discovered only in 1991, after Maxwell was found dead under mysterious circumstances. Most people are not aware of Maxwell's colossal impact on scientific publishing and on the world of science as a whole. The fascinating story was revealed at length in a 2017 article by Stephen Buranyi, published in the *Guardian*.[519]

Near the end of his military service, Maxwell served as a censor for the Allies; he took advantage of this role to build relationships with newspapers and publishers. After his release from the military, he worked for the publishing house Axel Springer, which had begun to grow into the largest publishing company in Europe. In 1951, he acquired a small publishing house called Butterworth-Springer and renamed it Pergamon Press, after one of the most important libraries in the ancient world. Within only a few years, Maxwell transformed Pergamon into an influential and prestigious publishing house which specialized in publications in the fields of STEM (science, technology, engineering, and math). In 1960, Pergamon Press already possessed close to 60 scientific journals; six years later, those numbers had almost tripled.[520]

Maxwell revolutionized the scientific publishing industry and made a fortune by coming up with a formula almost ridiculous in its simplicity, brilliance, and—unfortunately—its exploitative nature. It was based on several components:

- **Taking the production, management, and distribution of journals off the shoulders of the scientific societies.** Maxwell knew that scientific societies do not have the money and manpower to produce journals on the scale of a commercial enterprise. He also knew that they are dependent on donations, which are an unstable source of funding by their very nature. On the strength of these two facts, he proposed a new model to the scientific societies, in which a commercial publisher would efficiently manage their journals. This format appealed to the scientific societies because it lowered their expenses and simplified the bureaucracy and politics that had traditionally accompanied the production of a scientific journal. In effect, Pergamon provided them with outsourcing, which achieved a much higher level of quality in design, printing, and public relations. The role Pergamon left to the scientists was to act as gatekeepers of the journals' content.

- **Printing detailed and complex articles**. Until the Pergamon era, it was accepted that scientific journals would primarily publish news updates from the world of science and short reports on recent studies. Pergamon, the dynamic new publisher on the scene, initiated the production of detailed, in-depth, and longer articles, which over time would become a standard in science.
- **Utilizing a skilled and passionate workforce without paying wages**. Payments to authors, as well as salaries for editors and proofreaders, make up a significant portion of the expenses of any commercial publisher. Pergamon, followed by the other scientific publishing houses, is able to save these expenses, because the researcher-writers, the scientific editors, and the peer reviewers of the journal articles all agree to work in a volunteer capacity. This is possible because most scientists do not know which economic entity stands behind the journal in which they are publishing or reviewing material, and most of them are not really interested. Their priority is to ensure that science continues to progress as usual; they receive a salary anyway from the institutions that employ them. Over the years, many of these scientists have grown accustomed to seeing peer review, writing, and editing as integral to their academic duties, a sort of gentlemanly exchange between colleagues (hence the phrase "peer reviewers"), and it would not occur to them to demand compensation.[521] Furthermore, since the world of science is obsessed with matters of ego, many scientists adorn themselves with the professional recognition given to them as authors, reviewers, or editors, and are content with this symbolic reward alone.
- **Continuously increasing the number of specialized journals**. Each field of science has a limited number of publishing platforms. Consequently, the first to control those platforms is the first to gain the "captive audience" of

customers in that particular field. Maxwell understood this principle and made sure that his journal empire was constantly expanding. Like any merchant worth his salt, he did not wait in silence for the customers to enter his "store," but rather actively marketed his services. For instance, he regularly dropped in on scientific conferences in order to get a sense of the field, and enticed senior scientists and scientific societies to hire him to establish and operate their journals. Personal charm, a talent for persuasion, and the wisdom to compliment and indulge the right people at the right time—these traits helped Maxwell weave a wide-ranging network of connections in the scientific world. Over time, as Pergamon established its reputation, the scientists and societies began to chase after the commercial publisher.

- **Internationalizing science.** The worldwide political and economic transformations that took place in the wake of the Second World War, together with the technological developments that accelerated in the 1950s, strengthened international cooperation, especially in the West. Science—which has always aspired to globalization—was the first to get on the horse. The demographic profile of scientific societies became more multicultural, and meetings and collaborations between scientists from different countries and institutions became more common. Pergamon Press was smart enough to produce scientific journals in English, not only because it operated from the United Kingdom, but because the United States was where the big money was rolling in—and because English had established its status as the leading international language. It is important to recall that at the time, the English-speaking countries were already leading in most scientific disciplines. Publication in English was considered a sign of prestige, improving authors' chances to move up the ladder of academic recognition and rankings. Maxwell understood the economic potential of this demand, and managed to convince scientific societies and individual scientists around the world to give up the rights to their work in exchange for publication in English.
- **Expanding the company's footprint.** Maxwell widened the reach of his international dominance by increasing the number of Pergamon offices and branches around the world. This enormous footprint granted him an additional advantage over conventional publishers, which primarily operated in their local arenas.[522]
- **Subscription packages.** The keystone of the formula conceived and promoted by Maxwell was the sale of subscription packages to academic libraries. Before the age of Pergamon, scientific organizations would distribute copies of their journals to institutions of higher education or sell lone copies

to scientists who approached them with a request. Maxwell chose the sale of subscriptions, specifically subscription packages, not only because he understood the basic principles of marketing, but because he had learned the economics (and the weaknesses) of academia:

- Academic libraries need a constant supply of new publications, which is easier to receive from a single centralized distributor.
- Since scientific publication is serial—that is to say, it is structured as a series of issues with some thematic connection between them (for example, responses to papers published in previous issues)—libraries prefer to subscribe to a journal for a certain period of time rather than purchasing single issues independently.
- Scientists develop a dependence on serially published journals, because for most, the journal is the only publication in which they can publish their work and make a name for themselves. This dependence turns the scientific publishing market into what the economists term a "captive market."
- The subscription strategy allowed Pergamon to sell scientific journals of varying stature and quality as a "package deal," thereby ensuring that even inferior and less essential journals would sell. This kind of package deal gave the impression that it was making the acquisition of scientific journals cheaper, but in practice it filled the libraries with extraneous journals which the librarians would never have chosen to buy.[523]
- It's easy to sell to a customer who doesn't have to pay out of his own pocket. Academic libraries are allocated budgets, and as long as the money keeps coming in, it has to find its way out somehow. In an interview with *Global Business* in 1988, Maxwell admitted that "scientists are not as price-conscious as other professionals, mainly because they are not spending their own money."[524]
- Breaking into the field of academic publishing is a challenge, because it requires long-term connections with academic institutions, scientific societies, and scientists. This is an advantage for the large publishing corporations, because it keeps potential competition away.

From the late 1970s onwards, the end of the 20th century was marked by significant developments in scientific research. Revolutionary discoveries in molecular biology and computer science created a major impetus for new kinds of research in the life sciences and engineering. In addition, the behavioral sciences, the social sciences, and the humanities all experienced significant forward momentum as a result of empirical and theoretical developments, in particular the study of the personal and collective subconscious. These developments gave rise to a flood of written work, which increased the demand for new journals. Private publishers, whose numbers were steadily rising, were more than happy to fulfill this demand. They learned Maxwell's genius strategy for making easy money at the expense of science and scientists, and in the ultra-capitalist atmosphere that had taken over the world, the creeping transition of scientific publishing from public to private hands did not seem alarming to anyone. Quite the contrary—it was perceived as a necessary change under the free-market principles which society had begun to treat as axiomatic.[525]

The Reign of the Publishers

In 1991, after Maxwell's death, Pergamon was sold to the Dutch company Elsevier, which burst onto the international market for scientific publishing. The deal was highly beneficial for Elsevier and transformed the company into an empire, as Pergamon published no fewer than four hundred scientific journals at the time.[526] Elsevier's gambit was thoroughly consistent with the worldwide trend in which scientific publishing was becoming more centralized, more commercial, and extremely profitable.

Almost thirty years later, only a fifth of scientific journals in English are nonprofits, and most of those journals struggle to stay afloat financially.[527] The remaining four-fifths are designed from the get-go to make a profit—and a healthy profit at that.

The most profitable journals in the world today are published by only sixty publishers. Even more interesting: about half of all English papers that undergo scientific peer review, as well as academic books, information databases, and other scientific output, are published by five mega-publishers: Springer, Elsevier, SAGE Publishing, Taylor & Francis, and Wiley-Blackwell. These mega-publishers have successfully created an ultra-centralized, oligopolistic market (a market controlled by the vendors).[528]

The five publishing giants have several characteristics in common:

- Most of them were established in Europe at the end of the 19th century (with the exception of SAGE Publishing, which was founded in the United States), and made their economic leap forward in the late 20th century.
- Like many corporations, they achieved their tremendous size by means of buyouts and mergers, in particular by swallowing up smaller competitors.[529]
- All of them have dozens of branches in locations around the world, especially in the nations which are most dominant in the world of science (the

United States, Great Britain, Germany, Japan, Australia, and China), and employ thousands of workers.

- They publish a remarkable number of journals in a variety of fields, featuring millions of articles every year. Springer Nature, for example, presides over more than three thousand journals, in which over 260 thousand papers were published in 2016 alone.[530]
- All of them earn significant profits not only from journals but also from the publication of books and other scientific publications. Taylor & Francis, for example, publishes about 2,700 journals every year alongside almost seven thousand books per year (almost twenty books per day). Wiley-Blackwell publishes 1,500 journals and more than 1,500 books per year.[531]
- The profits for each of these publishers are astronomical. SAGE Publishing reported revenue of 105 million pounds sterling in 2014.[532] In 2017, Springer Nature reported revenue of 1.64 billion euros.[533]
- The five giant publishing corporations publish over 50% of the articles written in the life sciences and medicine, and over 70% in the social sciences. The only discipline that has remained relatively decentralized is the humanities. Only 20% of the academic journals in this field are in the hands of the giants (in particular Taylor & Francis, which specializes in the social sciences and humanities).[534] This is probably because the humanities, more than any other discipline, are distinctly connected to their local cultures (history, languages, literature, and so on).[535]

Elsevier is the publisher most identified with the scientific publishing market, whether because it inherited the legendary Pergamon or because it is the largest and most aggressive of the mega-publishers. The company was founded in 1880 as a family business; until 1930, it consisted of no more than ten employees. In 1936, Elsevier published its first scientific book, and after World War II, it launched a weekly news bulletin called *Elsevier Magazine*, which became extremely popular and profitable in the Netherlands. In the following decades, the company opened branches in the United States and in England, executed a series of mergers and acquisitions, and began to concentrate on the field of science. In the beginning of the 1990s—following its acquisition of Pergamon—Elsevier merged with the British publishing company Reed and became Reed Elsevier. Over the years, the company has continued to expand, devouring more and more competitors and growing into an empire.[536] Since 2015, the company has acted as one of the four pillars of the RELX group. In 2017, Elsevier alone employed no fewer than 7,200 workers in over seventy offices in twenty-four countries.[537]

A report published by Montreal University in 2015 revealed that Elsevier controls over a quarter of the scientific publishing market. This figure includes not only journals and books but also digital databases, among them the most important scientific abstract and citation database, Scopus, and the leading professional medical search engine and database for clinicians, ClinicalKey. According to the same report, Wiley-Blackwell and Springer each control more than 12% of the market.

In 2010, Elsevier reported higher profits than Apple, Google, and Amazon.[538] In 2012, the company reported revenue of 1.3 billion dollars—80% from sales to academic and scientific libraries.[539] Every year, Elsevier publishes more than 430 thousand papers in 2,500 journals (an average of almost 1,200 papers per day). The digital databases owned by the company contain upwards of thirteen million documents and thirty thousand digital books.[540] 1.5 million manuscripts every year find their way to journals owned by Elsevier—among them the prestigious journals *Lancet*, *Cell*, *ScienceDirect*, and the *Current Opinion* series.[541]

The Crisis of the Academic Libraries

In the 1980s, alongside the revolution in scientific marketing, another significant factor increased scientists' dependence on the publishing corporations and inflated the corporations' profits to extravagant levels: the digital revolution. There were several reasons for this:

- **The advantage of size.** The rise of computers, followed by the Internet revolution, increased the potential for worldwide sales; the benefits of this change were largely reaped by large corporations, publishing companies among them. They used the advantage of their size to invest in branding and to absorb the temporary shocks experienced by the global market during the process of acclimation. However, this was not enough for them. These massive whales swallowed every other fish swimming in their sea, whether their aim was to capitalize on the smaller publishers' innovations or simply to minimize the competition. In this way, the handful of mega-publishers became a kind of cartel in the field of scientific publishing. In a fast-paced, competitive, and even cutthroat market, there was no chance of survival for institutions of higher education or scientific societies, with their time-honored customs and practices. Already in 2004, half of the scientific societies were no longer able to publish and market their journals independently, and were forced to rely on commercial publishers.[542]
- **"Access fees" instead of acquisitions.** In the days of print publishing, libraries collected journals on their shelves, and readers could access them at any

time and rifle through old issues. By contrast, in the digital age, the end of a subscription to a journal means the loss of access not only to future issues, but to all previous issues. The payments collected by the publishers are, practically speaking, "access fees" to the archive (a sort of borrower's fee), with the result that the academic libraries are shackled to the publishers and do not have the luxury of canceling the subscription.[543]

- **The cultivation of prestigious academic journals.** The impact rankings of academic journals, which rely on computerized indexes, have granted a tremendous advantage to commercial publishers. This is because the rankings have highlighted and built brand recognition for the leading academic journals—most of which belong to the dominant publishing companies. Since all scientists aspire to publish their papers in these journals, it is only natural that self-respecting university libraries will pay for the subscription package which includes them.
- **Print out, screens in.** The symbolic and ceremonial significance of old-fashioned printing, which granted the printed word the stamp of respectability, as well as the conservatism and caution which pervade the scientific tradition, caused non-commercial scientific publishers to join the digital revolution only slowly and hesitantly.[544] The commercial publishers understood the benefits of the digital revolution faster, which allowed them to rack up several more significant advantages: faster and cheaper production of new issues; more text and higher-quality pictures in each issue; expansion of the customer pool, accessibility, and impact of the journals. But the greatest advantage of the transition to a digital format was the array of new possibilities for archiving, searching, and obtaining information.[545] Search engines completely changed the way that people read and utilized texts—all the more so complicated texts—and revolutionized the culture of scientific publication forever.

From the moment that the large commercial publishers began to appreciate the raw marketable potential of the revolution in scientific archiving, they began to target this front, too, at full blast, including huge investments. They built or purchased online indexes, which allowed them to develop, expand, and offer additional services including meta-data (information about the archived information, such as statistics, references, bibliographies, and impact ratings). The profits were never slow to arrive. About 80% of Elsevier's revenue, for example, comes from digital media.[546]

Because academia had become addicted to rankings (of scientists, journals, institutions, and so on), its reliance on indexes, and therefore on the mega-publishers, grew like drug addicts' reliance on their dealers. When governments also began to offer financial bonuses for publication in prestigious journals, and when the ranking of an institution became a significant factor in academic culture, the dependence on the commercial publishers became more extreme, which enriched the commercial publishers' coffers and caused institutions of higher education to sink further into the financial mire.[547]

We might have expected that the digital revolution would strengthen the journals, because it would make them much cheaper to produce. In practice, however, not only did production costs not go down, they skyrocketed upward.[548] The most infuriating aspect of this spike in costs is that it can be attributed to mere lust for profit. Experts who measured the profits of the leading scientific publishers found that they increased their revenue by a third—a tremendous amount in the world of economics.[549]

It is important to note that not a few debates have taken place around the high profits of the publishers, and many different figures have been suggested with regards to the cost of publishing a single paper (ranging from a couple of dollars to thirty thousand dollars).[550] The answer is not easy to come by, because each journal is different, and because most of the publishers do not conduct themselves with transparency and are unwilling to provide all of the necessary data.

The cynicism and greed of the publishing giants also gave rise to a differential rate: one price for access to journals on campus, and another, higher price for journal access off campus—that is to say, in researchers' and students' homes. The result is that professors and students at universities with scarcer resources must physically arrive on campus in order to read an essay, while their colleagues at wealthier institutions can bring up the same essay on their personal computers—in their beds, at their writing desks, or at the nearby coffee shop. In other words, the poor have more limits on their access.

The first signs of an impending financial crisis for the academic libraries began to appear in the early 1990s. The steep rise in subscription prices imposed a heavy burden on library budgets, along with a number of other factors: the massive growth in the amount of scientific material published around the world; the necessity of buying computers, scanners, and printers, as well as supplying tech support to take care of the new devices; and the need to develop extensive multimedia collections. As if this wasn't enough, at that very moment in history, higher education was undergoing its own financial crisis, which forced institutions to impose harsh budget cuts on the libraries.[551] Scholars in the social sciences and humanities were hardest hit, because of their heavy reliance on books and past issues of journals.[552] In order to meet their users' needs, many libraries were forced to improvise and juggle. For example, they would purchase individual articles rather than subscription packages, or sign resource sharing agreements with fellow libraries.[553]

The financial difficulties faced by academic libraries, which only became more severe with the years, earned the epithet "serial crisis," named for the serial—and therefore enslaving—character of the scientific journals. Suddenly it seemed that the library, too—one of the enduring symbols of academia—was collapsing. Dismay and fury over the situation gave rise to endless debates, criticism, and even protests, the latter mainly initiated by the librarians.[554] But as expected, these responses were fruitless, and were unable to change the status quo in the culture of scientific publishing.

Open Access Publishing, Ltd.

In the late 1980s and early 1990s, with the invention of the HTML programming language, which enabled links between digital files, and the breakout success of the WWW (World Wide Web), a worldwide trend of access to reading material rapidly began to flourish. If in 1995 the online space contained only a few hundred thousand websites, two years later the numbers had already risen over a million—a pattern which has continued at dizzying speed to this day.

Online correspondence swiftly pushed aside its forebears of ink, paper, envelopes, and stamps, and lowered the costs of communication by thousands of percentage points. What the printing industry had once offered at high prices, personal computers provide today at almost no cost. More than that, from the moment that print was released from its physical machinery and the Internet began to resemble electricity and telephone networks, it became possible to read texts and view images regardless of location or time, independent of old-fashioned distribution networks, and with no limit on quantity and scope.

The Internet contributes to the democratization of human knowledge, tears down barriers, and enables anyone with network access to present his or her work to the public, with a minimum of gatekeepers and obstacles along the way. In fact, the network transformed a product which had once been private and commercial into a public asset available for free or at negligible costs. Many tried—and are still trying—to make their millions through online publishing. Some of the attempts have been successful, and several have even turned a nice profit. However, at the end of the day, the rise of the Internet brought about an unstoppable global push towards unprecedented, free access to information, open to all who seek it. The reasons for this momentum are cultural (a basic human tendency to share thoughts and feelings with others), ideological (a desire to distribute resources and shared assets fairly), and technological (it is both difficult and expensive to build impassable digital walls).

For many years, most scientific publications were all but closed to the general public. Books and journals were purchased by university libraries and made accessible to students and faculty members, mainly for their research and learning needs. Scientists and students who wanted to read a book or an article had to seek out the relevant code and pull the publication in question off the shelf. The computer revolution converted paper filing systems to electronic indexes, accessible first on CD-ROMs, then via the library's Internet network. The library databases gradually expanded, and their search engines became more sophisticated. In 1995, JSTOR (Journal Storage) was founded; it compiled an astounding database of previously published papers and made them available to university libraries, eliminating the need to store back issues of journals on the library shelves.

The development of the Internet was supposed to make lending libraries irrelevant and wipe out academia's dependence on publishers. However, incredibly, the revolution in accessibility was much slower in the hallowed corridors of higher learning, and in a certain sense was even rejected wholesale. Even as most of the world's newspapers and journals moved to an open digital format, which readers were able to access for free or at merely symbolic prices, scientific literature largely remains off-limits to this day, locked up behind the impenetrable bars of social convention and passwords.

Already, well before the advent of the Internet, there were voices calling for open access to scientific material. They claimed that true access for all comers, especially access to scientific and philosophical discovery, was an essential element of the mission of scientists and higher education. They insisted that the general public has an inherent civil right to stay consistently informed about scientific developments, especially in the subject areas where these developments and discoveries would have a direct influence on their lives and everyday decisions—for example, patients whose lives could be saved by a new medicine or a pioneering experiment.[555] In the present day, however, now that science enjoys the support of massive budgets, most of which are drawn from the pockets of the taxpayers, and now that the tools for open access are both easy and inexpensive—its responsibility towards the public is greater than ever.[556]

In practice, however, today the public pays twice over: once to fund the research, and once to access the very same findings that they funded with their own money. Ironically, even policymakers—specifically, the very same policymakers responsible for science budgets—do not have free access to academic publications. If this were not astonishing enough, the researchers themselves have limited access to their own publications, as most academic institutions are reluctant to pay the subscription fees for their articles. Furthermore, this closing-off of information means that researchers who are not professional scientists are unable to take part in scientific progress. Industry leaders, amateur scientists, potential investors, media personalities, teachers, students, and "ordinary people" are all shut out of the ongoing scientific conversation, with the result that the true victim of closed access is science itself.

The ideal of free, open Internet access to scientific findings gained momentum in the late 20th century and was dubbed "open science." In 1998, several universities in North America founded the Public Knowledge Project, which flew the flag of open access.[557] Other new access projects followed soon after, including the American legislative initiative Access2Research, which pressured public foundations to make the results of taxpayer-funded studies available to the general public for free. Open-source coding, which became popular during that time, made it easier to develop online platforms for the dissemination of academic papers, and prepared the ground for a larger-scale, comprehensive realization of the open-access vision.

In December 2001, the Open Society Institute held a conference in Budapest. One of its major goals was to promote an international initiative that would encourage the founding of open-access scientific journals.[558] In the closing statement of the conference, which would later be regarded as a historic moment, the participants instituted the Budapest Open Access Initiative (BOAI), which stated that open-access publications had to fulfill three criteria: A) The full text must be consistently available online; B) Anyone with an Internet connection must be permitted to search, read, copy, print, download, circulate, and link to the full source—for free; C) The full text must allow digital indexing by means of programs which scan the network automatically, systematically, and serially, in order to allow effective indexing and increased access.

In 2003, two additional declarations in the same spirit were published, initiated by scientific societies and librarians around the world. The first, in Berlin, took place through the Max Planck Society—one of the most prestigious research institutes in the world for the life sciences and humanities.[559] The second, the Bethesda Statement on Open Access Publishing, was published by the headquarters of the Howard Hughes Medical Institute in Chevy Chase, Maryland. Both declarations demanded that a copy of every research article be archived in the digital records of an academic institution, research institute, government agency, or other officially recognized non-profit entity, both for its long-term preservation and for the common good.

Scientific journals were already accessible for free online at the end of the 1980s (the two pioneers were *Psycholoquy* and *Computer Systems Review*). However, just two open-access publishers, both of which were established in the early 2000s, were responsible for the initial turning point in the culture of scientific publishing. The first out of the gate was BioMed Central, which was established as a non-profit by the British organization Current Science Group, now known as the Science Navigation Group. The first journal issued by this digital publisher was *Genome Biology*, which made its appearance in the year 2000. It became the flagship scientific publication of BioMed Central, and paved BioMed Central's way to becoming one of the largest scientific publishers on Earth.[560] Initially, BioMed Central concentrated its efforts in the fields of biology and medicine, but with time it expanded to cover additional disciplines such as chemistry and physics. Some of the journals that appear on its Internet platform are managed independently by scientific organizations and other independent research bodies; BioMed Central provides them with a platform for publication, an Internet hosting service, and tools for marketing. In 2008, the publisher became the official and primary sponsor of the international initiative Healthcare Information for All, which fought for universal access to healthcare information.[561]

The second practical initiative to advance the trend towards open access in science was conceived as the result of a protest. The dire economic situation of academic libraries drove them to stand together in solidarity. In the late 20th century, they founded SPARC (the Scholarly Publishing and Academic Resource Coalition), an international association of academic libraries which brings together more than eight hundred institutions worldwide. The librarians joined forces in order to create a lobby that would push for lowered acquisition costs for scientific books and journals, among its other goals.[562] But this initiative had no hope of making a real change without the support of the journals' customers—the scientists.

The first real sea-change took place in 2001, when Patrick Brown, a biochemist at Stanford University, Michael Eisen, a biologist at the University of California-Berkeley, and Harold Varmus, the 1989 Nobel Laureate in Medicine, published an online petition which was unprecedented on the scientific horizon. Its title was: "An Open Letter to Scientific Publishers." In the petition, the three authors exhorted scientists across the world not to publish papers in journals that do not make their publications accessible for free online, either at the moment that the journal is published or after a brief cooling-off period. They claimed that there was no justification for the high prices of scientific journals in the Internet age—in fact, there was no good reason that for-profit corporations should be making a buck off of publicly funded studies beyond the minimum necessary to cover the costs of production.[563]

Thirty-four thousand researchers signed the petition, but the publishers did not blink an eye even when faced with this impressive opposition, and the protest sank quietly into oblivion. Brown, Eisen, and Varmus did not abandon the struggle, however. Two years later, they founded a new publishing company—and naturally, it was open-access and non-profit. This was the Public Library of Science, which became the familiar brand name PLOS.[564] The company's roots in protest and its support from the scientific establishment (including financial support from at least one well-respected foundation) put wind in its sails.[565] PLOS published *PLOS Biology*, the first journal in a series, in October 2003, followed soon after by six more. The best-known of these journals is the interdisciplinary *PLOS One*.

With time, the field of scientific publishing developed four primary models for online access to scientific papers:

- The paper is published in a journal which is closed to the general public, but the authors are permitted to distribute it themselves—either immediately after publication or after a brief cooling-off period (an "embargo") of six to twelve months—on their personal websites, on the website of the organization that funded the research, in an open database, or via any other platform.
- The authors are granted the initial rights to the paper by means of early publication on open academic platforms without peer review. After the paper undergoes peer review, the rights are passed on to the journal that reviewed and published it.
- The paper is published in an open-access journal and made accessible to readers for free, either immediately or after a cooling-off period of six to twenty-four months; the latter enables the journal to collect payment from readers who want to access the paper during the embargo period.[566]
- The journal opens some of its papers to the general public and reserves the rest for subscribers only, a model known as the "hybrid format."[567]

But, as we all know, there's no such thing as a free lunch. Open access, which rejected the subscription model, had to replace it with a new economic model in order to sustain itself. In fact, it had to find an alternate funding source, because the income from advertising (the source of revenue upon which the media industry usually relies) was not exactly sky-high for scientific websites in the decisive majority of cases. The solution was to pass the ball from the university libraries (that is to say, the readers) to the authors (the scientists) and/or their funding sources (usually research foundations)—or, more accurately, mostly the funding sources. A study published by *Nature* in 2013 found that only 10% of the costs of publication come from researchers' pockets. The rest is covered by the institutions which employ the researchers, along with research foundations.[568]

The payment collected by the researchers for open-access publication is different for every journal, and can range from paltry sums of a few dollars to thousands of dollars in the most prestigious journals.[569] In many cases, this can amount to serious costs; in order to ease the financial burden on scientists, journals offer "package deals" here, too. The options range from a package of one paper per year for a certain number of years, all the way up to "publish-what-you-can"—that is to say, an unlimited publication package. A tiny number of righteous publishers are willing to forgo payment from scientists who lack the means to pay;[570] there are also worldwide "socialistic" initiatives, such as the Global Participation Initiative (GPI), which allow scientists from developing countries to publish papers for free or at a steep discount.[571]

As open-access journals multiplied in number, this new model became more and more widely accepted. At the same time, general interest grew in the gradual transformation that it was bringing about in the academic world. In January 2007, the journal *Open Access Research* put out a call for papers on the subject of open access. This was the first scientific journal devoted to research of this phenomenon, and naturally, it was released in an open-access format.[572] Ever since, there has been an abundance of research on the topic of open access; this research has added another layer to the institutionalization of the open-access model and deepened its roots in academia.

The Disappointing "Academic Spring"

After the three respected scientists' protest in 2001, which ended not with a bang but with a whimper, the publishing corporations continued in their attempt to achieve total dominance over the resources of scientific publishing. Every so often, papers would appear criticizing this phenomenon and its ramifications, mostly in the science pages of popular daily newspapers in the United States and Great Britain, but they fell on deaf ears. Not a peep was heard from the scientific establishment, however. In fact, it made the problem worse with its enslavement to performance and impact rankings—supplied, of course, by the publishing giants.

But when the collective pressure on the locked gates grows stronger, even the most tenacious guards struggle to keep their grasp on the palace. And the pressure is indeed increasing, not only because the economic crisis of 2008 caused the financial situation of higher education to deteriorate, but because, outside of the scientific world, the accessibility revolution is progressing at lightning speed. Daily papers all over the world, especially the most prominent and influential ones, have moved to the Internet, and the age-old ritual of reading a newspaper in the morning—purchased at the corner newsstand or brought to your door —is fading away. Moreover, at the same time that Wikipedia is erasing the long-standing tradition of buying multi-volume encyclopedias, once a popular birthday gift for youngsters, Google has done its utmost to store away the tradition of libraries and book-borrowing by means of a massive digitization project (made possible by a 2005 settlement agreement in response to accusations of copyright infringement). Advances in screen technology and miniaturization have sped up the accessibility revolution from another direction, digging the grave for paper and printers. High-density servers, most recently the "Cloud," have also changed the rules of accessibility.

In parallel, the generational shift has done its work. The first generation of digital natives (Gen-Y, now followed by Gen-Z) have taken full advantage of the electronic medium, and prefer reading from display screens over sheets of paper. This generation is also characterized by its willingness to share and its highly developed awareness of consumerism, and therefore does not perceive creative rights as sacred. It is no surprise that countless hackers and data breachers of all kinds have emerged from this generation.

As online accessibility has become commonplace around the world, and with it wholesale violation of intellectual property rights, the corporations that had previously made a fortune from the online sale of creative works (particularly in the entertainment industry) have been forced to draft conservative politicians to their side in order to close the floodgates. In 2011, the House of Representatives and the Senate voted on three bills intended to ramp up enforcement against online copyright infringement and prevent the sharing of publications for free: The Stop Online Piracy Act (SOPA), the Protect IP Act (PIPA), and the Research Work Act. They were put forward by a powerful lobby comprised of the film studios, the record companies, the digital libraries, and the publishers.

But at this point, a political maneuver by a "coalition of the rich," working against the spirit of the times and against a natural sense of justice, could not pass quietly through. Mass protests assembled like clockwork. In June 2012, dozens of citizens' groups, young Internet activists, and technology entrepreneurs signed a declaration calling for a robust defense of free speech and open access on the Internet.[573] The widespread opposition successfully shot down the attempted legislation and signified another landmark in the evolution of information accessibility.

The protest against these American legislative steps—which, in practice, were intended to defend the rights of the rich to get richer and to put spokes in the wheels of change—once again roused the scientists. At the height of the campaign, in January 2012, the well-known British mathematician Timothy Gowers published a post on his blog in which he announced his intent to boycott the publisher Elsevier. Gowers, the 1998 Fields medalist, directed his criticism at all of the mega-publishers, but chose to concentrate on Elsevier because of its image as the largest and greediest of them all. He revealed that many of his colleagues were also boycotting the publisher but were unwilling to express their decision publicly[574]. The post was echoed in popular news media worldwide, including the *New York Times*, the *Independent*, the *Sunday Times*, the *Guardian*, and the *New Scientist*, and ignited another protest. Thirty-four mathematicians from the world's leading institutions, including several more Fields medalists, joined Gowers and circulated an online petition to cease all collaborations with Elsevier. They would refuse to submit manuscripts for publication or peer-review others' manuscripts in journals owned by Elsevier, and would turn down appointments to Elsevier's editorial boards.[575] The website on which the petition was published earned the symbolic name "The Cost of Knowledge." Within a month, five thousand scientists from across the globe had signed the petition, and at the end of 2018, the number of signatories had risen to seventeen thousand.[576]

In April 2012, two months after the publication of the mathematicians' petition, the faculty advisory council of the Harvard University Library circulated a memorandum with the title "Major Periodical Subscriptions Cannot Be Sustained." In this memo, the council claimed that in the previous six years, two of the large publishers had raised the subscription fees of their journals by 145%—many times more than the rise in the price index—and, as a result, scientists were struggling to access the articles necessary for their ongoing work.[577] The council exhorted faculty members at the university to stop publishing their papers in journals with restrictions on access, and to step down from the editorial boards of closed-access, price-gouging journals. At that time, Harvard was paying an exorbitant sum of 3.75 million dollars per year for subscriptions to journals, and the head of the library summarized the problem as follows: "We faculty do the research, write the papers, referee papers by other researchers, serve on editorial boards, all of it for free… and then we buy back the results of our labor at outrageous prices."[578]

The fact that such a document could be circulated at one of the world's wealthiest and most prestigious universities indicated the depth of the crisis, and, it seemed, the seriousness of the protest. The criticism in the newspapers, too, went up a notch. For example, in 2012, the British *Guardian* published a fierce critique of the publishers' exploitation under the title "Academic Publishers Make Murdoch Look Like a Socialist." The article referred to the publishers as enemies of science, economic parasites, and "privateers."[579]

Unfortunately, as could have been expected, in spite of the growing criticism and protest against the mega-publishers, nothing in the real world changed. Elsevier withdrew its support for legislation that would have cracked down even further on copyright violators, with the aim of clearing the cloud that hung over it, but the company showed no intention of either expanding access to its publications or giving up the enormous profits it raked in.[580]

"Robin Hoods" In the Name of Access

The public was mostly indifferent to the problem of access in science, both because the world of science was (and largely still is) closed off to them, and because this particular problem had no immediate impact on their daily lives. The first time that the subject climbed its way to front-page headlines and triggered widespread public debate was in 2013, after two dramatic acts of protest. This time, the instigators were not veteran scientists, who were satisfied with feeble petitions, restrained language, and temporary, partial boycotts of the extortionists. Rather, they were two young people, full of moxie and charged with a mission, who decided to wage war Robin Hood-style against the theft of scientific publications.

The news of the suicide of Aaron Swartz, an online journalist, hacker, and online activist for freedom of information, made waves in the international press and inspired a shocked and furious outcry.[581] Swartz put an end to his life in January 2013, at the young age of 26, after a long period in which he was relentlessly pursued by American law enforcement agencies. Two years earlier, in his capacity as a research fellow at Harvard University, he had been arrested and an indictment issued against him after he broke into the secure server room of the Massachusetts Institute of Technology (MIT) and downloaded four million papers from the JSTOR servers onto his personal computer. But he was no criminal in the conventional sense of the word—and he didn't do it for personal gain.

Swartz believed that the gap in access between students and faculty at wealthy institutions and those who had to make do with warmed-over leftovers was a grave injustice. An illustrative example: in 2008, the Harvard University Library acquired access to almost one hundred thousand journals, and Yale to seventy-five thousand, whereas the best-funded academic library in India, the Indian Institute of Science, was only able to purchase access to eleven thousand journals.[582] Swartz decided to endanger himself in an attempt to make the academic world fairer and more egalitarian. He could not have imagined, however, that the guerilla campaign on which he had embarked would put him up not only against the guardians of the old order, but against sheer malice. Although Swartz willingly relinquished the drive to which he had uploaded the "borrowed" files, and although JSTOR itself canceled its complaint against him and, in 2012, even softened its policy on the distribution of scientific material in its database—millions of academic papers which were once only available for a fee are now available for unlimited download from the company's servers—all the same, the Massachusetts attorney general ignored Swartz's altruistic motives and described Swartz as an unscrupulous hacker. He issued a lengthy list of criminal convictions against him, on the basis of which it would have been possible to submit "Aaron Hood" to draconian punishments (a fifty-year prison sentence and a million-dollar fine), even without providing any proof that there had been victims of his crime.[583]

Well before his breach of the JSTOR servers, Swartz had made a name for himself as a prominent fighter for freedom of information and sharing. He was an active member of the Wikipedia team; he developed the programming protocol for RSS (Rich Site Summary), which allows subscribers to receive updates from the sites of their choice; and he founded the communal news site Reddit, on which users can upload text, images, or links, and the uploaded content's placement on the page is determined by user ratings. Over the course of his work, Swartz identified and took advantage of loopholes in American law. For example, he published—without permission, naturally—the full bibliography of the Library of Congress on the website Open Library. He also obtained a fifth of the database of federal court records (2.7 million documents), which were available on the federal judiciary's official website.[584] And if that were not enough, Swartz was a member of an activist group that succeeded in shooting down the conservative legislative proposals mentioned earlier in this chapter.

The pressure exerted on MIT to withdraw the suit in light of Swartz's altruistic motives, as the administrators of the JSTOR database had done, led nowhere. Only after Swartz ended his own life did the administration of the wealthy institution express regret; MIT's president announced that the university would investigate everyone involved in the incident. However, these were crocodile tears, not an honest internalization of the meaning of the struggle. Although the case led to widespread public debate about intellectual property rights and set in motion new legislative initiatives (this time in support of freer access), the high priests of the scientific establishment and the barons of scientific publishing continued to do precisely what they had been doing, and did not draw the necessary conclusions. A cold comfort can perhaps be found in the posthumous transformation of Swartz to a hero and martyr in the eyes of millions. The international news agency Reuters termed him "An Online Icon,"[585] and he was the subject of eulogies and memorials around the globe.

As is often true of freedom fighters, a successor arose to fill Swartz's place: Alexandra Elbakyan, a computer science student at the Satbayev Kazakh National Technical

University in Almaty, the capital city of Kazakhstan. After obtaining her degree and finishing an internship in the field of information security, Elbakyan worked for a short time in computer security in Moscow. A year later, in 2010, she moved to the German city of Freiburg, where she began to work on a project involving brain-computer interface. After a brief internship at the Georgia Institute of Technology, she ultimately returned to her homeland. In 2011, at the age of 23, Elbakyan founded the pirate website Sci-Hub—the first website to offer unlimited access to an enormous selection of academic articles, at no cost (it was preceded by the pirate websites Library.NU and LibGen, probably the handiwork of Irish and Russian scientists respectively, but these websites were unsuccessful).[586]

In a departure from the usual methods of pirate initiatives, Elbakyan used a ridiculously simple method to obtain the articles and make them accessible: she drafted friends and colleagues from the international scientific community to join the revolution, and they provided her with entrance passwords to the databases and closed journals.[587] One could say that Elbakyan created an institutional framework for students' and researchers' long-standing custom of sharing articles with one another in order to avoid paying the astronomical costs. Sci-Hub quickly became a free database on a massive scale, and saved untold amounts of time and money for millions of researchers and students.

The large scientific publishers, who sensed the ground rumbling beneath their feet, did not sit on their hands. In 2015, Elsevier issued a fifteen-million-dollar lawsuit against Elbakyan and Sci-Hub on the grounds of copyright infringement.[588] In the suit, Elsevier claimed that it had suffered "irreparable damage" from pirated access to its articles, and priced the damage at between 150 and 750 million dollars per article. Elbakyan did not arrive at the courtroom in New York. She sent the judge a letter, explaining that access to important articles had been blocked to her and to her colleagues during her university studies, because the price had been over thirty dollars per article—an inconceivable sum if one takes into consideration the need for dozens if not hundreds of articles, even putting aside the meager buying power of the Kazakh tenge, evaluated at approximately twenty-five American cents (a single dollar contains approximately four hundred tenge). She emphasized that this pressing need, as well as her frustration in the face of gross injustice, spurred her to establish the website—which was intended to work around the barriers to access, teach the profiteers a lesson, and raise public consciousness about discrimination in access to science.[589]

Ever since the lawsuit was brought against her, Elbakyan has lived in hiding. Luckily for her, it is difficult for American authorities to extradite her. Although the original Sci-Hub domain name was erased on the order of the New York court, the site returned to operations under an alternate domain name, on a hidden server most likely based in Russia.[590] In 2015, the site drew over eighty thousand users per day, most of them scientists and students from developing countries; in February 2018, the site offered no fewer than sixty-four million scientific articles.[591]

Elbakyan may have lost her legal case, as expected, but the judge could not restrain himself from expressing a hint of sympathy for her cause—he noted that the incident "was worthy of public attention." Beyond the walls of the courtroom, Elbakyan was elevated to hero status in the eyes of many. Thousands of scientists identified publicly with her struggle, repulsed by Elsevier's lawsuit and the ruthlessness it represented.

One of Elbakyan's most vocal allies was John Willinsky, a professor of education at Stanford University, and the founder and administrator of the Public Knowledge Project, defined as a "multi-university initiative… to improve the quality and reach of scholarly publishing." In an interview with the *New York Times*, Willinsky stated that many members of the scientific community saw Sci-Hub's copyright infringement as significantly less severe than Elsevier's routine blocking of access to scientific articles funded by taxpayers. In his eyes, the financial damage caused by Elbakyan and Sci-Hub was incalculably less than the ongoing damage caused by Elsevier to the scientists and students who were prevented access to twenty-six million articles.[592]

Many journalists and bloggers wrote in praise of Elbakyan,[593] and even publishers themselves showed a certain level of understanding. For instance, *Science* described Sci-Hub as "an awe-inspiring act of altruism or a massive criminal enterprise, depending on whom you ask." *Nature* was less ambivalent, going so far as to include Elbakyan in its 2016 Top Ten list of important figures in science.[594]

If You Can't Beat 'Em – Buy 'Em

The worthy deeds of Swartz and Elbakyan were supposed to inspire a wave of protest across the world, which would release academia from its destructive dependence on commercial publishers, or at least cause prices to be lowered. In practice, the protest indeed gained some traction and the criticism of scientific publishers grew harsher in tone, particularly against Elsevier,[595] but these were mere pinpricks in the flesh of the economic Gulliver. Most of the time, the publishers made no effort even to respond to the claims, and when they did respond, it was with laughable and evasive excuses such as: these are the accepted prices in the publishing market;[596] only we are capable of ensuring the quality and reliability required in science (a claim that has been refuted by several studies);[597] most of the profit goes towards production costs, and the remaining profit is negligible (naturally, not one of the publishers has ever agreed to release its financial records).[598] Some even blamed the rise in prices on subsidies and discounts granted to institutions and scientists in poorer countries (which are themselves little more than a pretense of generosity).[599] Another ridiculous claim maintained that the publishers offered a variety of packages, and every customer is entitled to choose the package suited to his needs, much like the choice between more and less expensive dishes at a restaurant. But perhaps the most outlandish and infuriating claim was that the articles which appear in the leading publishers' journals are read by a wide audience of customers (scientists and students), and therefore the raised prices are justified. What is more, in response to the claim that the subscription format turns institutions of higher learning into a captive market, the publishers countered that the open-access format had not proven itself to be a less expensive alternative—a bald-faced lie.[600]

In order to alleviate some of the public pressure, the publishers took a symbolic step: they made a small percentage of the articles in their possession available for free, albeit for a brief period and with certain restrictions. Since 2014, *Nature*, for example, has allowed users to read old articles for free in a limited "read-only" format.[601] But as we have stated, these were empty gestures which did not address the heart of the problem.

Just as the commercial publishers began to notice that the trend towards open access in science could be contained, and that it did not necessarily threaten their economic hold on the market for scientific journals, it turned out that a new phenomenon was blossoming on the horizon which brought with it a new challenge: academic sharing platforms. These platforms flourished as a result of the social media craze and as an answer to scientists' urgent need to share information with one another, including published papers. They were made possible in part by legal loopholes which allowed scientists to avoid signing away the exclusive rights demanded by publishers as a condition of publishing one's papers.

In a perhaps unsurprising turn of events, the first glimmers of the online academic sharing phenomenon appeared in the social sciences. The Social Science Research Network (SSRN) was established in 1994 by American economists Michael Jensen and Wayne Marr, and quickly became a major online resource in the humanities and social sciences, particularly in the fields of economics and law. Today, the network makes possible the sharing of papers, including early drafts and updated versions. One of the unique characteristics of the platform is the ranking of writers and papers according to the number of downloads, as well as rankings of schools and faculties. In 2017, SSRN widened its reach to encompass a number of additional academic fields, including biology, chemistry, engineering, medicine, and computer science. Not all of the papers on the platform are available for free;

some are only available for download with the payment of a fee charged by the publishers.

Another outlet for academic sharing with both symbolic and practical importance was Mendeley—not exactly a social media platform but rather a computer program, developed in 2007 by three German PhD students. Mendeley bears a strong resemblance to the social media giants: it allows users to store copies of papers, quotations, and references, and share them with colleagues.

In all likelihood, however, the two sharing platforms founded in 2008 had the most dramatic impact on the rules of engagement in academia. ResearchGate was founded by two computer scientists and a physician. Alongside the sharing of information and research (papers, data, research proposals, patents, research methods, computer programs, and so on), the network offers the option of following colleagues' activities on the site, as well as forums for online debate, search features to locate potential research collaborators, and more.[602] These services are completely free, albeit available only to researchers from recognized scientific institutions. The site is funded by advertising targeted specifically at its audience, in addition to private investments and donations. Its influence on the culture of science has become so important to the scientific community that the *New York Times* defined ResearchGate as a "mash-up" of Facebook, Twitter, and LinkedIn.[603]

Academia.edu was founded by the British entrepreneur Richard Price, with an initial investment of half a million dollars. In contrast to other outlets, Academia.edu started out as a for-profit network and has stayed that way. Users begin by creating a profile, uploading their work, and selecting their areas of interest. This allows them to surf the profiles of researchers in similar fields.[604] As of January 2019, this was the scientific network with the most traffic, boasting 39 million visitors per month and 21 million texts stored on the site.[605]

As expected, the publishing companies did not turn a blind eye to the increasing movement towards accessibility. Instead, they turned to the classic strategy of "if you can't beat 'em, join 'em"—or, in this case, "gobble 'em up." The first to deploy the tactic of controlling one's competitors by buying them was the publisher Springer, which purchased BioMed Central in 2008 (along with its sister publishers, PhysMath Central and Central Chemistry), and turned it into the largest of the open-access presses, with no fewer than 250 scientific journals under its wing.[606] Elsevier adopted this strategy in order to knock the academic-sharing platforms down a peg when it took over Mandeley in 2013 and SSRN in 2016.

These two acquisitions aroused wrath both in the scientific world and outside of it.[607] Some compared the mega-publishers to the bandits of ages past, who staked out strategic passages (straits, rivers, bridges) and extorted steep tolls from unsuspecting wayfarers. David Dobbs of the *New Yorker* explicitly claimed that Elsevier's motivation in the acquisition of Mandeley was "to destroy or co-opt an open-science icon that threatens [Elsevier's] business model."[608] After the sale of SSRN, similar headlines appeared on science websites, including "SSRN has been captured by the enemy of open knowledge" and "SSRN sold to Elsevier: From open access to the worst legacy publisher."[609]

But economic dominance was not enough for the private publishing corporations. In order to combat the academic sharing platforms, they also deployed online policing and threats of legal action. The websites Academia.edu and ResearchGate were forced several times to remove millions of papers that they had previously made accessible to users.[610] The publishing companies set their legal sights on any market entity that attempted to make scientific materials freely accessible. For example, the search engine Library Genesis (LibGen for short), which makes millions of books and papers available to everyone, was sued by Elsevier; it was forced by the court to take down its domain name and essentially cease all activities,[611] although the site has continued to function under an alternate domain name. Even the universities (Harvard, the University of Calgary, the University of California-Irvine, and others) could not withstand Elsevier's aggression, and were forced to remove papers authored by their own faculty members from their websites.[612]

Sadly, not only has the academic establishment, including institutions of higher education and international scientific societies, not mustered all of their power to defend the academic sharing networks and/or support them financially—it has also done nothing to prevent the commercialization of the networks, which has undermined the entire concept of open sharing. More and more services are provided today only as premium services for a fee, even on the academic sharing networks. On Academia.edu, for instance, it costs money even to check the level of engagement received by your own papers. The platform has become so commercialized that the website's administrators even offer a service allowing researchers to purchase recommendations for their papers.[613]

The commercialization of the academic sharing networks has been roundly criticized from all directions.[614] One of the most prominent takedowns of this phenomenon was that of the Israeli professor Guy Geltner, a lecturer in medieval history at the University of Amsterdam. In a post published on his personal homepage on Academia.edu in 2017, Geltner laid out the reasons for his choice to leave the site behind. He listed, among others, the concern that scientists with lower budgets would be unable to take advantage of the site's services, and claimed that research funded by taxpayer money should be open to the general public—without curtailing their access by means of a paywall. The website's social and sharing dimension had been destroyed, he claimed, as evidenced by the fact that even the user traffic had been infected by "a fetish for quantitative data" which replaces communal exchange with a selfish exchange of interests and bolsters the scientific world's dangerous reliance on statistical metrics (we will elaborate on this phenomenon in the following chapters).

Geltner's unusual announcement struck a nerve and inspired widespread and passionate responses on the site, as well as on Twitter, by email, and more. Although Geltner's criticism may have been brave and incisive, there was something naïve about it—Academia.edu was conceived in sin from the beginning, as it was established by commercial interests. It is no wonder, then, that the site took advantage of its website traffic in order to provide the most addictive drug in the scientific world today—ratings—and thereby increase its profits. Imagine the cheap hamburgers sold by fast food chains. On the one hand, they are an easy and accessible source of food for poorer customers—on the other hand, the ketchup and mustard are addictive and hazardous to the customers' health. And since the small hamburger on a bun fails to satisfy them and even makes them thirsty, they are forced to purchase "premium services" such as soda and French fries, and are can often be convinced to pay more for a larger burger.

Geltner's critics, including the site's administrators, claimed that it was impossible to run the site without income. This is, of course, a purely demagogic claim. It is easy to run a site of this kind on the basis of symbolic membership fees for registered users (Geltner suggested that every member pay five dollars per year). Advertising and donations can also go a long way, if the site's intentions are good. As we know, for-profit social media networks such as Facebook and Twitter do not demand payment from their "friends," and there is no reason for scientific sharing networks not to adopt a similar format.

Towards the Triumph of Fairness and Reason

In 2011, Claudio Aspesi, an analyst for a London-based research organization, estimated that the large commercial scientific publishers were on the fast track to a crash. His forecast stemmed from the premise that the model on which they had built their revenues was flawed from the get-go and doomed to fall apart. It was implausible, reasoned Aspesi, that the state would continue to fund research foundations and the salaries of scientists, and at the end of the day also fund the acquisition of the journals in which the results of the research appeared. Based on conversations with leading scientists, librarians, and university administrators, he arrived at the conclusion that the ground was beginning to rumble under the publishers' feet, and that governments would eventually come back to their senses and put an end to the absurdity. It turns out that he was overly optimistic. Not only did the overwhelming criticism of the publishing giants not yield large-scale protests or practical results, but their cartel-style control of the market only grew.

This took place in spite of the fact that the trend towards open access in science was consistently moving forward. In 2018, the publisher PLOS alone produced no fewer than 215 thousand articles (over its seven journals) in an open-access format.[615] Furthermore, if in the beginning most of the open-access journals were concentrated in the life sciences, medicine, and the hard sciences, with time the model was also adopted in the soft sciences. One after another, publishing houses were established which specialize in the production of open-access monographs and journals for the humanities and social sciences—Open Humanities Press, re.press, and the Open Library of Humanities, to name a few.[616]

However, in spite of the general trend, only a quarter of the scientific papers published today are open to the general public from the moment of their publication.[617] Furthermore, while the economic model of open access was indeed able to lessen the costs of publication to a certain extent, it has not been able to solve the funding crisis. In fact, alongside the old model, which squeezed the academic libraries dry, the new model puts the financial pressure on the scientists themselves, and therefore on the foundations and institutions which subsidize their research.[618] It is no wonder that a comprehensive survey published in 2017 found that out of almost 5,300 scientists (most of them from the medical and health sciences), almost 30% answered that they were unable to publish in certain journals because of their inability to pay the publication fees.[619]

The profligate and destructive status quo of the relationship between commercial publishers and academic institutions has continued to stay afloat for several reasons:

- The scientific establishment is conservative by its very nature, and is suspicious of dramatic change, lest it destabilize the system.[620] A number of universities and research institutions (including the National Institutes of Health and the German Research Foundation) exerted a certain amount of pressure on the publishers to lower their prices—peppered with a few threats to cancel their subscriptions—and became tougher in negotiations. On occasion, there have been brief boycotts of the large publishers and lackluster public protests. But the overall impact of these measures has remained insignificant. At the end of the day, the "rebellions" are usually pacified by a quiet local agreement to lower the price of a specific subscription package.[621] Several times, international scientific societies have sharply criticized the publishing oligarchy and called for a solution to the crisis of access, but they too have stayed content to issue milquetoast recommendations along the lines of "should" and "ought to."[622]

- The dependence of scientists on journals—both in order to read the journals and stay updated in their fields, and in order to publish their research and advance professionally—makes it difficult for them to stage a comprehensive, long-term boycott, meaning a general closure of the assembly line of scientific publication for an extensive period of time. At any given moment, many scientists are stuck in the throes of an intensive publication process, and the last thing they want to do is to bring what they have already accomplished to a standstill.
- In order for a boycott of the publishing companies to be effective, all or almost all of the world's institutions and scientific organizations must cooperate. The decentralization of science around the world makes this difficult, as in practice, each scientist, each journal, and each institution operates in isolation from one another. There have been a few righteous men in Sodom who have protested subscription fees and resigned from their positions as the editors of scientific journals owned by the large publishers.[623] For example, in 2015 and 2018, members of the editorial boards of two journals belonging to Elsevier (*Lingua* and *Journal of Infometric*) resigned in order to establish open-access alternatives.[624] However, these were sporadic acts which did not inspire widespread solidarity in the scientific community.
- The current method of publication indirectly benefits the most prestigious academic institutions, because it reinforces their elite status. The publications of their faculty members place them high on the ladder of international quality, which makes it easier for them to receive large budgets. It is true that the prestigious institutions are not pleased with the price hike, but—as we have already noted—none of them has offered to change the rules of the game. And because they set the tone in science, the plebeians are all too ready to agree with them.
- Most scientists are not involved with the financial problems of their employers, and are utterly absorbed in their own struggle for survival. The vast majority do not even know the difference between public ownership and private ownership in publishing and assume that the fees collected by the publishers are necessary.

- Many scientists today use open online platforms for early publishing (known as "pre-print," which we will discuss in the next chapter) which could easily replace the journals and solve the problem of access once and for all. However, most of them are convinced that science without journals in the familiar format doesn't have a chance. For this reason, they tend to contemplate the problem of funding and its possible solutions from a narrow perspective; that is to say, they reduce the debate to a mere question of prices. This is reminiscent of the anti-globalization movement (including separatist factions such as the Catalans, the Basque, and the Scots): people understand that technology slowly erodes time-honored national institutions, but they cannot imagine a world without separate nations.

  Many scientists have built and continue to build their careers according to the old rules. As flawed as they may be, those are still the familiar rules, and scientists have already adjusted to them.[625] This is also the reason that most senior scientists recommend to their young proteges: publish as much as you can, and in traditional platforms, so as not to delay your advancement. Save the struggle for the next generations.[626]
- Alongside the commercial publishers, the academic publishing market also contains publishers which operate under the auspices of scientific societies or institutions of higher education. One might expect that these publishers would be the ones waving the flag of unlimited access, or at least clamoring for lower prices. In reality, only a minority maintain reasonable prices themselves, and the rest have opted into the avaricious for-profit model. Some of the non-commercial journals also hike up their prices in order to compensate for the disorganized management of the societies which run them. This finds its expression in wasteful expenditures such as expensive and unnecessary workshops, conferences, and seminars.
- Governments tend to stay out of the conflict, because of their tendency not to get involved in matters of science, and because of their lack of knowledge in the field of publishing. The American government especially stands out in its reluctance to set new regulations, because the current model collects enough taxes to fill the pockets of the scientific power, and because of the long-held American philosophy that there's no such thing as a free lunch and that every market should stay free of regulations.

That being said, the impediments we have listed above are not enough to prevent the inevitable completion of the accessibility revolution in science. Social processes are by their nature evolutionary and can advance only as fast as society itself, striving upwards from under the hard surface. Like groundwater, they begin to flow deep underground before eventually breaking through and flooding the surface. When exactly will be the turning point? It's hard to know. But the pressure is getting stronger, and it is coming from several different directions:

- The economic crisis of the universities is expected to reach the boiling point, at which time it will no longer be worthwhile for libraries to purchase subscriptions. The scientists are largely moving towards an open-access format anyway, and the students, whose number will continue to shrink, read much less. What they do read, they download directly from the Internet anyway—whether from legitimate sites or pirate databases. Generally speaking, the university library is losing its traditional function as a provider of learning materials and taking on a new role as a hub for studying.
- In the past few years, sensitivity to distributive justice has grown. More and more people have become furious and frustrated when faced with the intolerable gap between the amount of money snatched from them by the government by means of taxes, levies, and other payments, and the ways in which that money is invested (or wasted). The current formula—in which publishers sell taxpayer-funded scientific results at outrageous prices, hold the rights to those results, and prevent the scientists (who are also funded by the public) from distributing the fruits of their labor and creativity as they see fit—will not survive for very long, because it is both inefficient and immoral. It is possible to imagine that criticism of the scientific publishing model will be integrated in the future with general criticism of the scientific world's irresponsible use of public funds.
- As a result of the criticism and the intensifying protest against the restriction of scientific materials, more and more public sources of funding are demanding access to the research that they have carried out and/or funded, not only in closed-access journals but also in open databases. The first to make a demand of this kind, in 2008, was the National Institutes of Health (NIH).[627] Science Europe, a coalition of research foundations from twelve European countries, joined by several foundations from the United States, initiated "Plan S" in 2018. According to Plan S, as of 2020, scientific publications funded by the public must be published in open-access journals or on other open platforms.[628] Requirements such as these will slowly become the norm, and will make it difficult for the private publishing companies to maintain their grasp on the rights to new scientific essays.
- Private foundations are also becoming increasingly aware of their social responsibility and therefore implementing the same approach. As a result,

journals already know in advance that they are receiving the paper for publication under those conditions, and cannot demand that the authors grant them exclusive rights to the paper.[629] At the same time, there is an increasing demand by authors not to surrender the rights to their manuscripts when they submit those manuscripts for publication. Lately, organizations have been established to support scientists from a legal standpoint, for example by means of a legal clause mandating fair publication conditions for journals.[630]

- In the last few years, more and more open-access databases of articles have been established by university consortiums and other scientific entities. For example, there is the SciELO (Scientific Electronic Library Online) initiative—a collaboration between sixteen countries, most of them in Latin America, for the creation of an online open-access library of journals.

  Today, initiatives for free access include not only scientific articles but a wide variety of additional scientific materials. One of these is the Australian database APO (Analysis & Policy), which makes available an enormous and diverse selection of materials on public policy topics: not only papers but technical reports, government documents, work reports, and more. Another example: in 2019, Leiden University in the Netherlands made over three million digital scientific materials—including books, manuscripts, drawings, maps, photos, and pieces of music—available to the public for free on the website Digital Collections.[631]
- Meanwhile, university alliances and scientific organizations around the world have been formed with the collective aim of lowering publication costs and expanding free access—particularly to scientific materials published in the past. Prominent examples of such initiatives are Project DEAL in Germany, the Association of Universities in the Netherlands (VSNU), the Finnish library initiative FinElib, and the Taiwanese electronic resource-sharing program CONCERT. As we have stated earlier, many individual scientists also facilitate access to their papers through academic sharing networks and their own private websites.[632]
- In our interconnected age, it has become harder and harder to seal off vital information behind fortified walls, because the wonders of technology burst open locks and tear down gates, and because many view locks and gates such as these as a violation of the basic rights of the public—in other words, as immoral. Many compare what the site Sci-Hub has done to scientific publishing to what Napster did to the world of albums. Napster was, as one may recall, a pioneer in the field of online music sharing, specifically

via MP3 files. It would be an understatement to say that Napster did not mind its p's and q's with regards to the law, and it lost some of its standing after a protracted legal and public battle. But Napster, which was based on thousands of illegal online "shares" of pieces of music, paved the way for the legal iTunes, which offered access to music at low prices and changed our consumption of music forever.

As we know, basic access to music and films is free of charge today, or at least available at a low and reasonable price. The same process is expected to take place in science in the near future—and in fact has already begun. As of March 2017, approximately 85% of articles in closed-access journals have been made available, primarily by means of the pirate website Sci-Hub.[633] That is to say, science is taking gigantic steps towards the point at which academic libraries will be able to avoid purchasing subscriptions entirely without damaging scientists' research or students' learning. Incidentally, it is easier to use a "Robin Hood method" for increased access to scientific works than it is for musical compositions or films—because, unlike in the entertainment industry, open access in science does not affect the creators' royalties. After all, their royalties are gobbled up anyway by the publishers.[634]

- Access—including pirated access—to scientific materials is consistently increasing, in part as a result of a gradual change in legal perspectives on the matter. A few years ago, the global trend with regard to online publication was to strictly enforce copyrights. By contrast, in the last few years, the legislative and judicial trend has moved in the direction of open access, rather than single-minded enforcement of intellectual property rights. The HathiTrust incident may be an instructive example of the tendency to favor fair use over copyright. HathiTrust is a large-scale sharing database for scientific materials, comprised of articles that have been digitized by archives and local libraries, as well as books that have been digitized as part of Google's accessibility project. The database is the product of a consortium of over sixty research libraries in the United States, Canada, and Europe, and administrated by the Universities of Indiana and Michigan.

In 2011, the American Authors Guild sued HathiTrust for copyright infringement of the authors whose books were made available on the website. A federal court ruled against the suit, and concluded that making books that had already been scanned by Google available on the database could be considered "fair use" under the law.[635]

This tendency towards limiting the extent of copyright law is reinforced, among other factors, by the fact that many private individuals, groups, and corporations take advantage of the existing laws—not in order to defend their rights, but rather to make a fortune under the guise of the law. There are even bad people that employ predatory lawyers for this purpose, whose job is to trap copyright violators online, frighten them, and demand compensation. In many cases, these threats are effective, because self-defense would entail legal complications and staggering costs, and because the subjects of the threats fear that their good names will be damaged by a draining legal battle. In addition, with time, the public has become more and more aware that the topic of online copyright is a complicated ethical matter, and the disagreements which erupt in this field place an unbearable burden on the legal system—whether because of the sheer number of suits or because of the difficulty of settling them.

- The freedom to make scientific materials accessible is closely connected to the growing struggle for freedom of information. Public archives have traditionally been perceived as the property of the government, not the public. For years, the establishment in every country regulated access to the accumulated information in their archives by means of confidentiality laws, fees for use of the archives' resources, and limitations on the location and length of time in which one could study the documents. The number of files which are still restricted to readers around the world is astounding—and even after the legal cooling-off period on these files has come to an end, a variety of executive orders and injunctions often cause the number to grow ever larger.

  Millions of files are closed for political and economic reasons, or simply out of caprice and whim. But the public pressure is mounting—not only because of the push towards transparency and the rights of the collective, but also because more and more private companies offer digitization and access at low rates. The result is an ever-louder demand to replace the old-fashioned legislation and the government's control over these materials, and to improve the arrangements for studying them. The courts have also received more and more petitions to uncensor numerous archived materials. And as awareness of the need for justice in this area grows, so does the public legitimacy of taking the law into one's own hands and liberating censored materials by hook or by crook. An important and symbolic event illustrating this claim took place in Israel in October 2018. Numerous photos bearing witness to the history of Zionism and to Jewish settlement in Israel in the first half of the 20th century were trapped for many years in public archives such as the Israel State Archives, the Jewish National Fund archives, the Central Zionist Archive, the Moshe Sharett Archive, and the

Palmach Archive. Although these archives were already accessible online, the photos were stored in a manner that made free use difficult, and sometimes had limits on their use for reasons of copyright protection. This sorry situation continued until someone at the organization Wikimedia Israel, the operator of the Hebrew Wikipedia and several additional initiatives, became fed up. In 2018, the organization carried out a secret mission: it scanned the archives in question by means of sophisticated tools, then downloaded their photos and meta-data. It also stripped away watermarks and uploaded the historic photos to the Wikimedia sharing site for free use. Twenty-eight thousand photos taken before the establishment of the state suddenly became available to students, researchers, history and photography lovers, and ordinary curious folks.

The CEO of Wikimedia Israel, Michal Lester, described the operation as "a friendly sting," and said in an interview with the Israeli magazine *Calcalist*: "One of our greatest challenges as an organization which works towards free content is to liberate and distribute to the wider world not only knowledge, but also photographs… Those archives contain, among others, photos that are in the public domain and have no copyright. They belong to the public and must be open and accessible. This is one of the things that we have not been able to make happen here in Israel. We absolutely did not violate the copyrights of the organizations."[636]

As expected, responses to the initiative were mixed. The Association of Israeli Archivists was furious, and claimed that this was a violent act that ran contrary to the law. The head of the Central Zionist Archive, in contrast, praised the increased accessibility of the materials, although he expressed disappointment over "the violent invasion of the site." The public responses were, of course, for the most part celebratory.

In effect, copyright in its current form is an old-fashioned right, a remnant of an era in which a small number of people produced content for the ignorant masses. In the digital age, the damage caused by copyright is greater than the benefit it provides—including to the holders of the copyrights, who are also thrust into a thick fog of complications. The maintenance of copyright has become a decree that the public is incapable of obeying. Its enforcement has become an impossible task, and it routinely attracts a hunting party of lawyers hungry for blood and money. A reform of the existing copyright regulations and laws, which will probably come to pass in the near future, would almost certainly contribute to the release of scientific publications from the publishing tycoons. Finally, another small

> but important light at the end of the tunnel: in May 2018, over three thousand researchers in industry and academia, including senior figures in the world of science, boycotted a new journal structured according to the old model—*Nature Machine Intelligence*—which was supposed to make its debut in January 2019. They signed a declaration which claimed that they would not submit papers for publication in this journal (which had been intended primarily to focus on the subject of artificial intelligence) and would neither participate in editing nor peer review.[637] Neil Lawrence, the founder and editor of the rival journal *Machine Learning Research*, which is accessible for free both to readers and authors (and has published almost four thousand articles as of 2018), made clear in an editorial in the *Guardian* that the protest was not only against closed-access journals, but against open-access journals which forced authors to pay a high fee. The protestors would settle for nothing less than zero-cost, open-access journals.[638]
>
> The giant publisher *Springer Nature* did not fail to provide an evasive answer: "At present, we believe that the fairest way of producing highly selective journals like this one and ensuring their long-term sustainability as a resource for the widest possible community is to spread the associated costs among many readers."[639]

By the way, the identity of the protestors is no accident. Computer scientists have always stood out for their self-confidence, their iconoclastic approach free of research conventions or preexisting notions, their technological bent, and their mischievous "hacker" spirit. They were among the initial pioneers to move the center of gravity from the slow-paced, bureaucratic, and "establishment" climate of academic journals to the dynamic conference environment, and among the first to adopt open online platforms for early publishing (pre-print). Their scientific milieu is also more flexible and practical than those of other disciplines, in part because their research deals, most of the time, with solutions to practical real-life problems—from medical diagnosis to digital identification of criminals to the construction of autonomous vehicles. Therefore, it is likely that the artificial intelligence scientists' protest will not be only one in a series, but rather the symbol of a new scientific activism, with a technological momentum.

Our brave new world is a world of connection and collaboration. In the age of Google, Facebook, Twitter, YouTube, Instagram, and Uber, there is no place for insular fragmentation. The problems of access and funding are likely to solve themselves once scientific publishing moves fully from the model of closed-access, niche journals to that of open publication platforms, which bring together the entire scientific community and connect that community to the public at large.

When will this change take place in the realm of scientific publishing? It's hard to know for sure, but the movement towards change has already reached unprecedented strength, as we will show in the next chapter.

5

Archaic Peer Review

The Quality Assurance Crisis

Is Truth Dead?

A feature story in the March 2017 issue of *TIME* dealt with President Donald Trump's compulsive lying.[640] In red block letters against a black background, the journal's headline blazed the question "Is Truth Dead?" This question echoes the similarly designed iconic headline from the magazine's April 1966 issue, 51 years ago: "Is God dead?"[641]

The updated question epitomized a belief which had taken over the progressive elite on the left in both the U.S. and Europe following what was to them the traumatic election of Donald Trump as president, and in light of the surprising (again, to them) resurgence of the New Right.

There is some irony in the fact that it was Trump of all people, with his habit of lying to the public without missing a beat,[642] and who popularized the term "fake news" in public consciousness each time he felt he had been smeared by the media, who won the election. *TIME*'s headline would not have garnered so much attention, however, had it not touched a nerve caused by the increasing anxiety over the place of truth in the 21st century. Many claim that we already live in the post-truth era, a phrase that is not uttered tongue-in-cheek.

Obviously, fake news is not a new phenomenon. History is replete with deceitful news, whether distributed malevolently or by chance. A few such instances have even caused disasters as a result of the public panic and rage they engendered.[643]

But it is digital technology which sets today's "fake news" apart and makes it so prevalent and dangerous. The trouble lies in the rapid and easy diffusion of falsifications through a variety of high-traffic channels (social networks, blogs, news sites, and many more), and via a variety of media (texts, images, videos). Even more significant is the technology that causes fake news to go viral—links and quick-share buttons. Studies have actually found that fake news—including complete fabrications—spreads more quickly and to a wider audience than real news.[644] When a story is made up out of whole cloth, it is usually surprising, negative and scandalous. And people are likely to quickly pass it on.

The incredible spread of fake news leads to significant damage—beginning with the reverberation of conspiracy theories and up to the dissemination of slander at a level that may destroy the victim and his or her family. But what weighs even more heavily is the erosion of public trust in state agencies and sources of information. The fake news phenomenon creates a new reality in which many no longer wholly and calmly believe anyone or anything. The suspicions and concerns were only heightened once it was revealed that sophisticated measurements were going to great lengths to spread lies using complex technological tools. One technique is generating huge numbers of bots—robots taking on fake identities and impersonating real live users.[645] By now, we already know that it's not only hackers playing this dirty game, but commercial companies, political parties, governments, and, naturally, intelligence agencies and militaries as well. In an unfortunate paradox, as we learn more and more about the world through diagnostic tools more advanced and sensitive than ever before, so has the ability to spread untrustworthy information constantly evolved.

Most researchers looking to uncover the roots of the assault on the supremacy of truth focus on ideological factors (postmodernism, which views truth as relative, and in essence replaces the word "truth" with the word "narrative"), psychological factors (the problematic message of the "subjective truth"), political (a sleazy scramble for every vote, of which dissemination of lies is just one weapon) and technological (the ease with which any information can be distributed using just a keyboard and mouse). Many also complain of journalistic corner-cutting in the desperate fight for ratings. But we are now discovering that this pandemic of the fake has made it into the Temple of Truth, and that the control systems of science are faltering.

The Scientific Review Mechanism

Trial by Friends

Scientists encounter a strict review process from the time they start studying for their master's, doctorate, and post-doctorate degrees. From that moment on, this excruciating process will follow them whenever they wish to present or publish their scientific work (papers, books, conference lectures), obtain research funding (from foundations and donors), or move up the academic hierarchy.

In contrast with nonscientific newspapers or magazines, where the decision on what to publish is at the exclusive discretion of the editor-in-chief (and occasionally of a publisher forcing his wishes on the editor), in scientific journalism the method is based on a system of peer review, and decisions are made by an ad-hoc "jury." The manuscript is sent to two or three reviewers who are expected to be professional and objective and who are independent of the journal's editorial staff. Usually, these peers come from the same scientific field or an adjacent field, are not involved in the research at hand, and are considered properly qualified.

Peer review, which provides the author with feedback from independent professionals, directly contributes to the democratization of science, as it prevents the establishment of a separate judicial agency within the scientific world. Every scientist finds himself as both judge and defendant, and no one can know who will make up the tribunal that discusses and rules on his case. This principle also contributes to the nurturing of a scientific code of truth, since at least in principle every study is meant to be judged on its merits, honestly and factually, by a panel of reviewers established for this purpose, without the scientist's academic status and previous achievements (successes or failures) playing a part.

The reading of a manuscript is by definition analytical. Its goal is not only to identify errors and omissions, but also to grant the paper a scientific seal of approval by determining that it is suitable for publication (meets professional standards) or unsuitable (and therefore rejected). This is also why scientific journals are professionally known as "referee journals." In order to maximize objectivity, it is customary to grant scientific referees immunity. Their identity is not known to the authors of the manuscript in advance, and their opinion is also sent anonymously to the authors, unless they have consented or requested to be revealed.

Unfortunately, the peer review system has grown stale over the years, and as we describe below, some of its good intentions create a hell on earth for scientists and science.

Peer review was not a common practice until the mid-20th century—and certainly not in its current framework. The term "peer review" first appeared in scientific literature only in the 1960s, and slowly came into use over the following decade, mostly with regards to proposals submitted to research foundations; the term was less often applied to journal publications.[646] The authority to determine winners and losers (who gets published, that is) was the exclusive realm of editors of scientific journals, not just as an outcome of the authoritarian culture characterizing that period, but also because compared to today scientific activity was limited in its scope. The number of publications was small, and only a handful of journals tended to use external experts to evaluate manuscripts. Even in extraordinary cases such as these, the process was not conducted as conscientiously and as formally as is customary today.[647]

The first scientific journal to use a peer review process was *Medical Essays and Observations*, which was first published in 1731, sponsored by the Royal Society of Edinburgh.[648] Its editor noted in its first issue that the collection of papers published in it were sent to "to those members who are most versed in these matters" for their opinion.[649] He was especially precise, and noted that the journal did not guarantee the accuracy or reliability of the papers, and that the responsibility for their content belonged to the authors alone. This creed has remained in effect until today and is shared by all scientific journals. The message to the scientist is: We might review and critique your manuscript, but the final responsibility for its content is yours only.

This quality control method was adopted in 1752 by the Royal Society of London as well. This was not yet an independent external review, but a sort of professional mechanism known as the Committee on Papers, whose duty it was to examine and evaluate manuscripts prior to publication in *Philosophical Transactions*, the association's journal.[650]

As time went on, as science's focus narrowed, as the demand for empirical meticulousness grew, and as more papers were being sent for publication, journal editors found it more difficult to make professional decisions on their own. The solution was the diversion of a higher proportion of manuscripts to external reviewers.[651] However, final authority remained in the hands of the editor, just as it is today.

In the 1970s, a few renowned scientific journals still operated here and there without the aid of external reviews. At the same time, the term "peer review" developed into an idiom in the United States;[652] within no more than a decade or two, all journals adopted this process, which has become one of the identifying features of modern science.[653] This was made possible, among other reasons, by technological advancements, which made sending manuscripts to experts all over the world easier—first using photocopy machines, then scanners and email, and now with electronic means.

The peer review process has over many years fulfilled, quite successfully, three complementary functions of scientific quality control: evaluating the significance, validity and reliability of the scientific study documented by a paper; selecting the most suitable papers for publication in a specific journal (in terms of topic, format, quality and potential readership interest);[654] and refining the text prior to publication (clarifications, correcting omissions, editing, etc).

Beyond these, the peer review process also fulfills an indirect function: it contributes to solidarity within the international scientific community and a shared commitment to its values of reciprocal aid and inspiration.

Behind the Scenes

Most scientific journals employ a small production, management, and administration team. Scientific aspects are overseen by an editorial staff made up of 10-20 senior scientists, one of whom serves as chairman. But the truth is that in most cases the job of the scientific editorial staff is a mostly symbolic-ceremonial one: to lend venerability and prestige to the journals, and at most to set a general policy. Rarely do they actively participate in day-to-day management—selecting reviewers for manuscripts, ruling on professional disagreements, or actively reviewing or editing sections. Mostly they gather for an annual meeting—usually by long-distance conference call—and receive a summary review of the past year's operations and general guidelines regarding future plans.

Since science is founded on professional guilds, the selection of an editorial staff is usually conducted by closed club rules. In other words, a friend refers a friend, or a friend recommends another friend. The advantage of this method is professional familiarity. The disadvantage is its nepotistic and protectionist nature, which discriminates against women, younger scientists, and scientists from non-English-speaking countries or less prestigious institutions. From a sociological point of view, the method serves as an additional device for cloning the leading scientific clique (some of these devices we have reviewed in previous chapters, and some we will review in the following pages).

A journal's staff is periodically up for election (every three years, on average), and an invitation to serve on it constitutes a professional endorsement and an organizational-scientific status symbol. This helps scientists to develop their network and contributes to their advancement. Mostly, a scientist will receive such an invitation once he or she has already made a name for himself.

The editor-in-chief is the leading figure in every journal. He may be accountable to the scientific board and the publisher, but in most cases is granted wide managerial latitude in a professional capacity—and occasionally also in the financial and branding aspects of the journal. While most editors in the field of general journalism are appointed to the position following years of experience writing, editing and in many cases also producing, this is not so in the world of science: Editors generally arrive at the position from research-related roles, and therefore serve more as professional gatekeepers and less as shapers of the nature and style of the journal. Furthermore, in contrast to an editor in nonscientific journalism, editors of scientific journals almost never initiate the subject of the papers included in its issues—save for the rare feature issue—but rather only select from a pool of manuscripts sent in by scientists. The primary function of a scientific journal's editor is limited to conducting the review process: the initial filtering of manuscripts, the selection of reviewers, and handing down the final ruling after reading the reviewers' opinions.

The process of appointing an editor-in-chief differs between publications. In some cases, the publisher will advertise a vacant position, and a decision is made between various candidates who express their wish to take the job on. In other cases, the appointment is sewn up behind the scenes by the editorial board's strongmen. Senior scientists usually receive preference—researchers with a proven record and a rich resume of papers and publications, with contacts at the journal or in the scientific association behind it, and who have gained a reputation as reviewers, board members, deputy editors, or editors of future issues.[655]

Although the work of an editor-in-chief is grueling and demanding, it is nearly always performed without pay, or for a symbolic wage (that said, a handful of prestigious journals pay their editor-in-chief a significant salary, which can total up to $70,000 a year). Individuals therefore take the position on for motives other than financial. They do so because it guarantees interest and professional satisfaction. It positions them at the forefront of research, exposes them to pioneering studies, and grants them an opportunity to discover and nurture promising talents. Many also view the position as a mission of sorts, especially when the editor-in-chief is also the founder and creator of the journal, and the position realizes his or her vision.

But not everything is pink and fluffy. There are those who come to the position because the title of editor-in-chief flatters their ego and grants them a preferred status among the scientific committee, as this is a powerful and influential position which attracts a certain type of individual, and because the position allows them a sort of hiatus, similar to other termed positions. Senior scientists are attracted to the position out of a feeling that they have exhausted the day-to-day grind of research, and there are those for which editing is a sort of alibi for the fact that they are no longer productive.

It should be noted that prominent journals also appoint deputy editors or associate editors, who assist the editor-in-chief and frequently do most of the work for them. We will discuss this phenomenon in the following pages.

Who Wants to Be a Reviewer?

It is customary to appoint at least two to three reviewers for each manuscript. Because the reviewers must be experts in the manuscript's field and at the same time have no professional contact with the authors, and because reviewing is voluntary and without pay, the job of locating judges is not easy and demands creativity. In practice, studies have shown that peer review of important manuscripts in prominent journals—those on international lists—is conducted by a small and especially active group of scientists.[656] So it is, for example, that American scientists are indeed "only" responsible for approximately one-quarter of scientific papers, but review a third of them.[657] In biomedical research, it has been found that 20% of researchers provided over 70% of reviews, and in certain fields the involvement of that small group made up 95% of reports.[658]

No one has examined the correlation between productive authors and productive reviewers, but these are probably the same people. They are well-known, have a reputation, and are apparently also accompanied by an available team of assistants. It is probable that these referees will reap the benefits when applying for publications in those same journals. This generates a magical loop and contributes to the creation of a closed bubble of privileged individuals, who, as we were told in interviews, employ each other and feed off each other.

One strategy used by editors to identify suitable judges is to look through the bibliography and references of a manuscript up for review.[659] In recent years, dedicated programs have been established to assist editors in identifying qualified reviewers and requesting them to review. A few even send reminders to those tardy in replying. The main flaw is their laconic contact letters, which increase the rate of rejection. Those who reply in the negative are usually asked to recommend other candidates.

The task of reviewing a paper scares off scientists not only because it takes up valuable time, disproportionately to any benefit it may impart, but also due to the weighty responsibility of determining that a paper is not suitable for publication, and due to the unpleasant task of passing judgment, and especially rejecting, a colleague's work. Many are familiar with the feeling of rejection as authors, and are scared off of taking the job of hangman. Furthermore, since the scientific community is known for its free-for-all, gossipy nature, many are fearful that their rejection of a paper will be made known to the authors and lead to personal revenge upon them (especially when those rejected are the ones reviewing their own papers).

But nevertheless, thousands of scientists around the world serve as reviewers at any given moment, and on average prepare eight reports every year.[660] What drives them?

- Most people feel uneasy declining a request for assistance, especially when the request is courteous, and many times over when it is complimentary and reinforces their self-image ("As an expert in the field, we would be honored if you would be willing to review…").

- Young scientists internalize early in their career that reviewing is an important task which constitutes an integral part of their professional obligation. They have been taught that without reviewers there would be no journals and without journals there would be no science, which is why their natural inclination is to respond in the affirmative.
- As previously noted, there is an unwritten understanding that reviewing today will lead to beneficial treatment when you submit a paper tomorrow, while refusing may cause a cold shoulder to be turned towards the next manuscript you send in.
- When the recipient is somewhat familiar with the editor, it is harder still to decline. It is especially uncomfortable to refuse a request from the editor of a journal which has published papers you have authored.
- Contacts never hurt, and agreeing to review might pay off when that journal is looking for a scientific editorial staff or a new editor (two positions which, as we have mentioned, grant you prestige points in the scientific world).
- Each review adds a line to your resume, and in the modern era, in which quantities and measurements are everything, this may help get you promoted. Reviewing does not actually grant you points equal in value to publishing a paper or receiving a grant, but it notes another aspect of productive professional activity and indicates a contribution to the scientific community. A credit as a reviewer is also beneficial when approaching research foundations.[661]
- Reviewing papers leads to encounters with new topics and allows you to get updated on the hottest studies (and sometimes to plagiarize).
- The consent to review occasionally stems from a desire to help the colleague who authored the paper. It's not unusual that this is agreed-on in advance between editor, reviewer, and author (such an ethical discrepancy occurs mostly in journals outside the more prestigious circles.
- Some scientists choose to moonlight as reviewers due to a traumatic experience as a reviewee. A few will abuse authors, similar to an abused child turning into an abusive father. Others will attempt to rectify the injustice caused to them, in a "do unto others" vein.

The March of Anguish

As mentioned, the first stage of the review process is the desk reject, the initial winnowing by the editor-in-chief. A manuscript may be immediately rejected if its topic is considered unsuitable to the nature and spirit of the journal and/or its readers' interest areas, or if its professional level does not reach acceptable standards. There are also considerations that are unrelated to the manuscript, such as the overload of papers on the editor's desk (prestigious journals are inundated with thousands of manuscripts. *Nature* alone receives approximately 10,000 every year).[662]

If the manuscript meets the threshold requirements, it is submitted for external review. Potential reviewers usually receive a paper's title and abstract, so as to evaluate the subject and make sure that it is in their area of expertise. The manuscript will only be sent in full once the candidate has consented to review that paper.

Reviewers are expected to submit a detailed and reasoned opinion which includes a recommendation—whether to publish and under what conditions—as well as notes for improvement. The opinion, recommendation, and notes are meant to apply to the quality of the data, the manner in which the research methodology was used, levels of accuracy in the analysis of the findings, the paper's novelty, its clarity, the manner in which the data is presented and its accessibility, the significance of the innovation included in the study, and the potential for impact on the researched field.[663] In recent years, it is customary to provide reviewers with electronic forms, such as those generated by the ScholarOne software, which makes the process more efficient.[664]

Each reviewer works independently, without any contact with the other reviewers, whose identity he is not meant to know, in order to obtain an independent review. In this regard, scientific reviewers are distinguished from judges and jury in a court of law, who consult and debate each other and may influence each other's opinion. And another difference: the opinions of paper reviewers are considered recommendations, and they have no obligating status along the lines of a judicial court's ruling. The final judgment regarding publication—if and when—is made by the journal's editor-in-chief.

Reviewing reports vary from reviewer to reviewer and from one discipline to another. In the natural science and the exact sciences, short and to-the-point reports are customary. In social sciences and humanities, reports are expected to begin with a summary of the main points of the research, its process, and its findings—perhaps in order to prove that the reviewer has carefully read the manuscript and understood its contents.

Some journals are content with a written opinion only, while others ask reviewers to fill in an additional form with points of strength to be ranked and a final decision: Suitable for Publication, whether with or without corrections, or Unsuitable. Such a form is generally confidential and is not sent to authors.

Many reviewers are wary of definitive statements in the written report, and prefer to note both the advantages and disadvantages of the manuscript. Even when a manuscript is found by a reviewer to be unsuitable for publication on the requested platform, the wording of the rejection will mostly be of the "Well done, I'm sure you will find someone to publish it" variety.

The origins of such customs are in the restrained Anglo-American culture (a restraint that is a combination of the ability to hold one's tongue and sheer hypocrisy), in the objective difficulty of drawing a fine line between a paper suitable for publication and an unsuitable one (the verdict on the manuscript is never a mathematical decision, and is frequently found in a gray area), and the natural fear of offending the author and creating enemies (assuming your identity as a reviewer will eventually be revealed). Therefore, in order to draw out the bottom line regarding quality and novelty of a manuscript, very frequently an editor is required to read between the lines, and more often than not also to informally communicate with reviewers. It should be noted that over recent years, due to the deteriorating quality of papers, more and more reviewers' restraint is failing them and they are moving on to rougher, more direct approaches (we will expand on this).

It is important to emphasize that reviewers of papers are not permitted to transfer the manuscript to others, and are required to maintain complete discretion with regards to its contents and the identity of its authors. Unfortunately, not everyone can resist the temptation.

Once an editor has read the opinions of the external reviewers and formed a decision, it is sent to the authors along with the reviewing reports or parts of them. The four most common final responses are:[665]

- The paper is accepted as is with no revisions—a rare occurence in which the author is not required to make any changes or corrections save for editing corrections.
- The paper is accepted for publication in principle, so long as the author performs minor changes and corrections in accordance with notes from reviewers. The editor then verifies that the requested corrections have indeed been completed, and the revised paper is not sent for additional review.
- The decision is delayed until the author's response is received to notes from reviewers. These are usually major notes, tied to the experimental and technical aspects of the study or its conclusions, and necessitate significant changes. In such cases, the revised paper will be sent to reviewers for a second review, and a few rounds of review-correction-submission are possible.
- The paper is rejected—whether as a result of the reviewers' recommendations or because the author did not make the necessary revisions.

A study published in 2008 found that on average, 20% of manuscripts are rejected immediately by the editor-in-chief, 30% are rejected following peer review, 10% are accepted as is, and approximately 40% of manuscripts are published after revision.[666]

Factors contributing to a paper's acceptance or rejection vary from one discipline to another, from one journal to another, and from editor to editor.[667] The most common reasons for rejection are: a lack of innovation in the manuscript, such that the findings of the study do not add much to existing knowledge; flaws in the manner the study was conducted, such as an improperly worded research question or unsuitable research methods; incomplete or unreliable data; flawed statistical analysis; an unrepresentative sample or one that is not large enough; unprofessional writing (for example, a discussion which repeats findings but does not interpret them); wording which is incoherent or unsuitable to the platform.[668]

The size of the space through which you can squeeze in depends on the nature of the journal, the demand for publication in it, and the temperament of staff and editor. Some editors are satisfied with one negative opinion before rejecting a manuscript. Others reject it only if all reviewers recommend to do so. Many manuscripts are rejected when the notes for improvement require a complete transformation.[669]

When there are differences of opinion, an editor will go in one of three directions: choose a side, contact an additional reviewer, or request that the author respond to the notes so as to hone and clarify various points. Many editors attest to the fact that the most difficult part of their job is not necessarily the differences between various opinions, but rather irritating and petty reviews, and reviewers who latch on to irrelevant items and fish out microscopic errors in order to fail the paper. In this regard, it should be noted that many scientists are attracted to the world of science due to a punctilious nature and an obsession with detail. When they agree to review a paper, these characteristics may turn out to be a hindrance, and even devastating.

Since the process of scientific publication is long, tiring, and unpredictable, the choice of a journal requires the scientist to carefully consider the suitability of the topic to the journal's field, its readership, the customary length of papers, the cost of publication, the journal's accessibility in knowledge database lists, the review system it uses (for instance, number of reviewers), the average duration from submission to publication, and of course the journal's prestige—in that field and in general.[670] There are also personal considerations, from intuition to the researcher's scientific status, the stage of his or her career, his or her experience, his or her self-confidence, the quality of the manuscript and the novelties it contains, and even the identity of the editor-in-chief.[671]

There are online guides intended to assist scientists in selecting a journal based on various cross-sections and needs, such as Journal/Author Name Estimator, Journal Guide, Journal Reviewer and SciRev. Some of these guides are produced by the research departments and libraries of higher education institutions, but commercial corporations, such as Elsevier and Cabells, have already grown wise to the demand and provide advisory services for a fee.

The increased competition between scientists, due to the enormous number of papers, also increases the need to identify the most suitable target. The statistical probabilities of making it to the other side—i.e., the proportion of papers that are accepted for publication in the various journals under these circumstances—becomes a major consideration, and frequently almost the only one.

At this point we should note that rate of acceptance is a problematic measurement, because the method of calculation varies between journals. Some calculate the rate of acceptance out of all manuscripts sent to them, while others only consider manuscripts sent for review, after passing the initial filtering stage. In any case, only a limited number of journals publish their acceptance rates. Many editors do not manage or even keep accurate records, and so can only provide estimates. In many cases, the system does not determine an acceptance rate in advance; rather, it is generated dynamically, based on the supply and demand at that time.[672]

The more general a journal (multidisciplinary and multi-topic), and the more manuscripts it sends to a larger number of reviewers, the lower its acceptance rate. In contrast, the more saturated a professional field is with journals, or if it has fewer scientists, the higher acceptance rates are.[673] Likewise, acceptance rates are lower in journals in the soft sciences as compared to the exact sciences and engineering.[674] A lower acceptance rate –or, alternatively, a higher rejection rate—is not necessarily a result of strict reviewing processes,[675] yet it still serves as a status symbol for the journal in the academic guild—a sort of statement which says, "We only publish the best of the best from among the hordes knocking on our doors." Studies have shown that rejection rates in prestigious journals are indeed higher, and reach up to 80-90%.[676]

In light of the large number of manuscripts and the large gap between the demand for publication and the platforms on offer, acceptance rates are dropping on average with time. To illustrate, between 2013 and 2017, acceptance rates in Elsevier publications dropped by nearly half (from 26.8% to 13.5%).[677] This makes the issue of publication even more charged and stress-inducing. A scientist can gamble on a prestigious journal for his or her paper, so that the reward is high should it be accepted, knowing that on the other hand the chances of acceptance are low, which makes the risk high. In other words, choosing a journal is perhaps a more educated gamble than blackjack, but it's still a gamble. And here lies a growing pollutions in academic culture: while most of the players in the publication casino experience loss and despair more often than not, with the chances low and the sense of inequity high, the arena becomes hostile.

Once the review process has been completed and the paper officially accepted for publication, it is edited, proofed, and designed, as in every publication. The larger journals employ spokespersons and PR departments, and authors are asked to assist in marketing efforts. For groundbreaking studies with the potential for a high level of public interest, the PR mechanism for the institution in which the scientist is employed joins in the fun. The media echo of papers published on scientific platforms (occasionally even before the official publication) is a relatively new phenomenon in science. It is tied to the communication revolution of recent decades, which has increased interest levels in scientific discoveries. Most large newspapers employ science journalists, who make interesting news from the research world accessible to a wider audience.

Criticizing the Critics

From the moment it came on the scene, all kinds of criticisms have been directed at the unique peer review method, but these have been growing in size and in tone in recent years. More and more renowned scientists, including Nobel laureates and editors of leading journals, are explicitly claiming that the method is flawed and requires an update sooner rather than later.[678] In an interview with Sydney Brenner, for example, the Nobel Prize winner for physiology and medicine in 2002, Brenner referred to peer review as "very distorted," "completely corrupt," and "simply a regression to the mean."[679] Even the establishment journal *Nature* admitted that the model had reached a dead end, and unhesitantly published critical editorials with, for *Nature*, sharp headlines such as "Peer Review: Troubled from the Start."[680]

Popular media also devotes articles and opinion pieces to the problems inherent in the longtime method. The *New York Times*, for example, published an expansive interview with Australian physicist and theoretician Michael Nielsen in 2012, which said, among other things, that the current scientific review system is "an ideal system for sharing knowledge" only "if you're stuck with 17th-century technology."[681] The *Guardian* published an editorial two years later which wondered whether we were on the brink of the end of the peer review model.[682]

The criticism is reinforced by the growing sensitivity towards the injustices caused by the system and its inefficiencies. Indeed, empirical studies reveal flaws and deficiencies in terms of the reliability and equality of the traditional process, and the principal complaints are many:[683]

- **Cumbersome and bureaucratic**. While every modern organization strives to simplify and streamline processes, it seems that science is not only stuck in place, but in many aspects is moving backwards. Despite a number of technological advancements, the peer review method is in essence the same antiquated process, similar to other bureaucratic processes in academia which haverefused to remake themselves. In a world of instant messaging, the staff of scientific journals resemble the postal service, sticking with envelopes, stamps, and service counters. Many researchers feel that they are trapped in a loop of submission – review – rejection – revision – additional review – additional revision – additional review which continues until the liberating publication, lather, rinse, repeat. They waste months of their lives on tiring procedures which, more than they benefit them, take up their time and strain their nerves.[684]
- **A crushing load**. Ewan Birney, director and partner at the European Bioinformatics Institute in Hinxton, UK, tweeted that he was debating how to sort through a pile of 2,500 research papers sent to him by candidates for a position. "I get genuinely stuck here," he admitted frankly. "What do I do?" This was perhaps the first time a senior scientist had publicly admitted to the difficulty and absurdity most scientists encounter as they approach a decision between an infinite supply of candidates from various fields—including the process of sorting through papers sent to journals. Birney received a wide range of recommended solutions, mostly trifling, including reading the abstract only or looking at the scientist's profile.[685] These suggestions were obviously pointless.

  Back when there were few scientists and only a handful of journals, there was logic in a "manual" reviewing process and a personnel-heavy manufacturing line. Under these conditions, you might also expect the laborers of science to work voluntarily. Today, with the powerful and rapid traffic in papers, the control mechanism is being crushed under the load. No editor would admit to this publicly, but many are forced to skim and cut corners.[686] In many cases, too many, sorting is done intuitively and is reminiscent of superficial sorting through resumes, which misses a large number of excellent candidates. Robbie Fox, the former editor of the *Lancet*, one of the leading medical journals in the world, used to joke about his method of sorting through manuscripts: he would pile up all the manuscripts sent in and roll the pile down the stairs. The ones who made it all the way to the bottom got to be published.[687] This may have been an exaggeration or a joke, but as we all know, behind every joke there is only some joking.

- **The cucumber is tending to the gardener**. One of the results of the workload on editors' shoulders is the delegation of authority to deputy editors, associate editors, and junior editors, who were often recruited by email and without any meaningful hiring process. Many journals grant them authority to conduct the initial sorting of manuscripts, to select reviewers, and even to make the final decision on publication. Like readers at busy book publishing companies, the significance of this seemingly technical phenomenon is incredible: The publication of a manuscript by experienced scientists, senior and esteemed, is too often decided by scientists much less experienced and senior than they, whose body of publication is many orders of magnitude thinner. Researchers sending their manuscripts with trembling hands to branded journals with the hope of a strictly professional process are not always aware that behind the familiar editor is a junior scientist, often even without a tenured position at an academic institution. Those who do know are frustrated, without any ability to affect change. It's important to emphasize that in principle even young and inexperienced editors can be effective in their work, but ethically speaking, placing the deciding authority in their hands is no less than fraudulent.

  Placing expansive authority in the hands of junior scientists is flawed also because it is easier to pressure researchers at the start of their career. It isn't rare for a young deputy editor to serve against his will as a mole for his advisors or more senior colleagues, in hopes that this will gain him a position or promotion in the future.
- **The slowly spinning wheels of justice**. Reviewers are usually asked to submit their opinion within a few weeks to two or three months, but there is no way to compel them to meet this schedule, seeing as they are not being paid.[688] In truth, the period between the moment the manuscript lands on the desk of the editorial staff until it is published has extended in recent years, and it is not unheard of that the process will take up to several months.[689] So, for example, the mean period of review for *Nature* has grown from 85 days to 150 or more over the past decade, and for *PLOS One* from 37 days to 125.[690] The delays have also grown more severe because editors and reviewers are inclined to demand more changes and revisions than before.[691]

  The attempt to avoid the slowly spinning wheels of justice, which have become the norm and generate pointless frustration and anxiety, has recently brought about a version of rapid publication: authors are requested to submit a manuscript of no more than 2,500-4,500 words, and in return receive an abbreviated review process.[692] But this does not signify any real change, both because most journals have not yet adopted it and because research publications cannot be based on scientific TED papers.

- **The slow pace threatens the first-rights advantage**. Even when reviewers' notes are justified and significant, the long process of publication threatens authors' right of first movers for their scientific work. In order to get a head start on the slow process, many are quick to notify the media of the upcoming innovation, frequently long before the study has concluded and the findings verified in full. Such conduct, which has already been nicknamed "the science of press conferences," violates a basic code according to which papers are not published in public before receiving a professional seal of approval.[693]
- **The archaic process is not keeping up with the modern pace of life**. The publication of the findings of prominent studies, completed with generous funding, is delayed until it no longer keeps up with the dynamic needs of society and science in modern times. The upshot is that those who are meant to stand at the forefront of research and constitute the vanguard marching at the head of the camp, instead lag behind industry and private research institutes. As the Zika virus was spreading in 2015, large publishers of scientific papers announced that they would be willing to disseminate the vital information in their possession without waiting for the official publication of these papers. They took no notice of the pitifulness of their announcement, since with their own words they attested to the slow pace and clumsiness of the scientific publication model currently in place, woefully incompatible with the dynamic times we live in (The same thing happened five years later during the Coronavirus crisses. We will discuss this phenomenon in the summary of the book).

  Even the social sciences have over the years become more monotonous and less relevant, due, among other reasons, to the slow pace of publication in journals, which denies them the ability to keep up with the breakneck pace of modern life. Most new social phenomena are covered in real time by popular media and private research institutes, and all that's left for sociologists, political scientists, and economists is to discuss yesterday's news after it has already been milked dry.
- **The process is detrimental to the joy of creation**. When scientists complete their intellectual creation—and research is at the end of the day a creation

like any other—they are looking for public exposure in the quickest way available. Instead, they find themselves trapped in a long, twisted, and excruciating labyrinth (a survey conducted in 2014 found that 70% of authors of papers that year were frustrated with the duration of the review).[694] And as if to add insult to injury, journals are not inclined to notify authors as to the progress of review processes and the estimated time of completion.

The joy of creation is also weakened when wheels grind slowly. If, by the time a paper is published, you have managed to forget important details of the research and are already up to your knees in your next project, what's the point of working at full speed? Even the editors of *Science* journal have already admitted to the unacceptable chasm between the degree of effort that the typical researcher puts into his or her study and the time it takes to publish it.[695]

- **Papers without immediate feedback**. Most scientific journals do not provide a mechanism for immediate feedback, which therefore prevents the real-time correction of mistakes and text revisions—this in a digital culture and an era of social networks when a text can be edited moments after a flub has been discovered, where such a feature is obvious. But not in science. An article published in *Nature* in 2016 claimed that a tool to allow adding comments to scientific papers is critically self-evident.[696]

  The highly respected *Nature Methods* published in 2019 a study by American and Chinese scientists which allegedly found that a genetic mutation which protects from HIV shortens life expectancy. The paper was widely echoed due both to its innovative finding and its relevance to another affair rocking the world of science at the time: baby cloning in China, where one of the babies carried the mutation. Scientists attempting to recreate the research discovered that it was flawed, but in contrast with the old custom of sending a letter of critique to the journal and awaiting the response of editors and authors, on this occasion the critics raised detailed critiques on instant messaging platforms such as Twitter, blogs, and so forth. The researchers immediately admitted to their mistake, credited all responders, and pulled the paper. This incident sharply and painfully demonstrates the unbearable disparity between the traditional tools of review used in science and the acceptable rules in the "real world."[697]
- **A tribunal that is too small**. Scientific research strives for maximum accuracy, and attempts to achieve this using sensory, measurement, and calculation tools which are constantly evolving. Inexplicably, it is scientific review which continues to base itself on a tool from the ancient world: the personal

impression of a handful of colleagues. Common sense dictates that such decisions, which on occasion may have fateful ramifications, be made by a wide professional community. This may have been impossible in the past, but in the age of the Internet it is wondrously easy to implement, as we will show.

- **Subjective reviewing, with no uniform standards**. Despite the primary significance science lends to the reviewing process, most scientists receive no personal training—not even a short seminar—before being appointed as reviewers.[698] They simply jump into the deep end and go with the flow. Recently, a number of initiatives have been raised to address training for scientific reviews. For example, Publons.com, which we describe in more detail later, has offered a free online training course for writing review reports.[699] But these initiatives never end up taking off, since journals do not condition a reviewing position on proper training, bowing to tradition and the growing difficulty recruiting reviewers.[700]

  Since the art of scientific review is independently picked up on the move, and since every reviewer brings with him an inherent professional worldview as well as his own degree of severity—the approval of a manuscript is analogous to a roulette wheel. Many studies have reported high levels of inconsistency between reviewers, which implies that the ruling depends more on the reviewer than on the quality of the manuscript. One study found that at least six reviewers are required for a decision on a manuscript to be more than completely subjective (and therefore random)—a number unattainable by any journal.[701]

  Studies have shown that a typical reviewer can identify with ease manuscripts on the two extremes of the scale, the very best and the very worst. Editors tell stories of papers that caused outbreaks of laughter (and perhaps even tears) due to their low quality, and alternatively, of brilliant papers that made any external review pointless. One famous example is James Watson's and Francis Crick's famous paper on the discovery of the structure of DNA, published in *Nature* in 1953 without the standard review process (editors found a recommendation from physicist William Lawrence Bragg to be sufficient). The problem is that Gauss's Bell rings loudly here as well. Most manuscripts are somewhere in the middle ground between these two extremes, and therefore stand the same chance of getting accepted as rejected—depending on which reviewer you've stumbled on.[702]

- **High variance in the level of reviewing**. It is impossible to look into the average level of professionalism in reviewing reports, as they are mostly confidential. Nevertheless, from conversations we've had with editors of journals in varied fields and from numerous publications here and there on the subject, one can conclude that the lack of reviewers (especially for the less prestigious journals) demands editors recruit reviewers of a lesser quality as well. Some reviewers carefully read a manuscript and prepare an objective and detailed opinion, including constructive suggestions for improvement. Others, of which there are many, skim and slop their way through a review. Even those who put an effort into the review often prepare a vague report which is difficult to decipher—making their work ultimately superfluous.[703]

Incidentally, the more complex the paper is (for example, a paper based on a large database and which makes use of advanced research methods) or the more interdisciplinary it is, the higher the chances are that the reviewing report will be of lesser quality.

- **Editors have excessive authority**. In an ideal world, a journal editor with such significant deciding authority would be a supreme scientist, fluent in a wide range of research fields connected to the platform with which he or she has been entrusted—including methodological innovations. But in today's wide-reaching research world, such knowledge in one person is impossible (reviewers, deputy editors, and the scientific editorial staff cannot make up for this entirely). Beyond that, since the reviewing process and platform publish reading material, a scientific editor-in-chief should excel in these fields as well, e.g. should quickly decipher complex texts, possess expertise in content editing and language, have psychological sensitivity and a temperament suitable for reviewing, and on some level also understand finance management and public relations.[704] In actuality, only a handful of editors are blessed with a full, or even partial, array of these attributes and skills—because the role of the editor, like most administrative positions in academia, is usually temporary, and because journal editors are not appointed based on their professional suitability to the position, but rather mostly on the basis of a rich canon of publications and contacts.

  Furthermore, the publications producing the leading journals are milking the scientific golden goose as much as possible, and establishing more and more expert journals under the auspices of the prestigious brand. Nature Publishing Group, for example, puts out no fewer than 78 academic journals, 41 of which include the Nature brand in their title, including *Nature Astronomy*, *Nature Cell Biology*, *Nature Medicine*, and others. In the same manner, under the Science brand umbrella, one can find *Science Advances*, *Science Signaling*, *Science Translational Medicine*, *Science Immunology*, *Science Robotics*, and more. The inflation of journals necessitates increased recruitment of personnel, and the result is a less strict selection of scientific editors, who, as noted above, are often young, inexperienced scientists.

- **Scientific success is dependent on marketing**. The system overload forces scientists into the position of spokesperson for their own manuscript. They are forced to learn tricks of the trade which may capture the attention of the editor and reviewers and increase the chances of the manuscript being published. Here as well, cultures and do's-and-don'ts guides have sprouted. They rake in a profit from advice such as how to design an attractive cover and how to avoid common pitfalls.[705] Such a service is instinctively accepted in the world of academia, even though it is based on the incredible absurdity that publication of scientific discoveries is marketing-dependent.
- **Superficial, offensive, and patronizing opinions**. The overload on the system often leads laconic rejection letters to be sent out to authors, which do not provide satisfying explanations as to the considerations of the editorial staff. Journal editors go through the motions with such outrageous wordings as, "The manuscript is unsuitable to the policy of our publication," which recalls automatic answers given by in-demand employers to their Help Wanted ads.[706] But what's worse is that these reviewer opinions are often prepared without an in-depth reading of the manuscript, and sometimes even malevolently, in patronizing and offensive styles which include personal insults to the author. These are known among the scientific guild as Reviewer 2. This phenomenon is apparently so prevalent that it has engendered a Facebook group called "Reviewer 2 Must Be Stopped!" with over 25,000 scientists as members. Even *Science* has reported this incredibly grave phenomenon and has quoted a study in which it was empirically examined. The author surveyed approximately 1,100 scientists from 46 countries and 14 scientific disciplines. Over half of those surveyed, under cover of anonymity, reported that they had received at least one opinion of this sort. The study also found that such offensive comments were fired towards all types of authors, regardless of race, sex, or religion. Naturally, those who tend to react most strongly to these offenses are the less privileged and therefore most vulnerable scientists, i.e., women, non-whites, and those from non-English-speaking countries.[707]
- **Independent reviewers, indeed**? The increasingly severe lack of reviewers, alongside a culture of who-you-know and backroom deals, often leads editors to rely on authors' recommendations regarding those suitable and qualified to review their manuscripts. The unavoidable result is the selection of affiliated or subservient reviewers, in an I-scratch-your-back-you'll-scratch-mine

sort of deal. It should be said that sly editors, out of maliciousness or personal account-settling, use such suggestions in reverse. They avoid sending the manuscript to reviewers from the list of recommendations, instead taking care to send it to scientists from the list of non-recommended, of all people—with the malevolent goal of causing the manuscript's rejection.

The widespread trade in recommended reviewers has been revealed in all its wretchedness following the fraud uncovered in 2012 by the editor-in-chief of the *Journal of Enzyme Inhibition and Medicinal Chemistry*. At the time, he was troubled by the fact that the opinions on a manuscript authored by a South Korean university's researcher of herbal medicines reached him within only 24 hours. After he inquired of the author, the latter admitted that the opinions were fabricated, and that he had even written some under the names of fictitious researchers. He also opened fictitious email accounts for them so that requests to serve as reviewers came directly to him.

This is obviously an extreme incident, but far from the only one. Between 2012 and 2014, a number of scientific journals were forced to remove over 110 papers from their issues once it was exposed that they had been reviewed in sin, coordinated between the author and reviewers. There are probably many more that have not been discovered.[708]

- **With a "little" help of my assistant**. It is not rare for a veteran researcher to consent to reviewing a manuscript only to delegate the work to his research students, like a senior attorney delegating tasks to a junior intern. The open access platform bioRxiv published fascinating findings at the start of 2019 from a survey conducted among approximately 500 students of advanced degrees and postdoctorates in the U.S., Europe, and Asia, mostly from the life sciences. The findings of the survey were prominently quoted in *Nature News*, and showed that half of those surveyed admitted to having written research opinions on behalf of senior researchers whose names were on the report. Although they had simply followed their boss's orders, 80% of them felt that it was improper conduct, mostly on their boss's part. They felt this was a breach of trust and misleading to the authors of manuscripts, and just as egregiously, an abuse of authority and a taking of the credit from those who actually wrote the opinion. Editors privy to these findings defined the act as "extremely unethical" and as a "type of plagiarism." One editor candidly admitted to being aware of the phenomenon, but had no idea how prevalent it was.[709]
- **Revealing authors' identities**. Individuals are naturally biased in their conduct towards others, which is why it is agreed that a lack of familiarity with

the individual who is the subject of the review assists the reviewer in getting close to the truth and handing down justice.[710] Science usually ignores this principle and proposes a reviewing process in which authors do not know who the reviewers are, but reviewers definitely know who the authors are. There are some journals which operate on a double-blind principle, in which the editor of the journal also does not reveal the identity of authors to reviewers, but these are the exceptions in most disciplines.

However, studies show that even when an author's identity is not officially given to reviewers, many of them are able to guess it from the text or the bibliography. This is easy enough in part because many authors would prefer to reveal their identity, using comments such as, "we have previously found/proven,"[711] with the assumption that this will help them to gain acceptance for the manuscript. This relies on a few not-unreasonable explanations: A) It's easier to fail a faceless individual; B) In the professional guild, where everyone knows more or less everybody else, if a reviewer is a friend, he or she will obviously give you a helping hand. If an opponent—he or she may fear failing you; C) Veteran and prominent scientists assume that the reputation they have gained will provide them credit. Mostly, it does; D) One last but not least reason: it is not uncommon for the reviewing process to be no more than a show for the record, after a sympathetic opinion has already been agreed to between author, editor, and reviewer.

The numbers justify the preference by most authors to reveal their identity. A survey among 25 journals under the Nature brand, which allow authors to choose whether to reveal their name or not, found that only one-quarter of papers reviewed according to the double-blind process were eventually accepted for publication. In contrast, among reviews in which reviewers were familiar with the authors, the acceptance rate was 44%.[712]

But revealing the author's name does not benefit everyone. That same study also found that the number of researchers from peripheral countries and institutes prefer the double-blind process—double the rate among leading countries and institutes. And they know why. They simply enjoy less personal contact with leading scientists, reviewers, and journal editors. Unfortunately for them, by noting a preference for a double-blind review, they mark themselves as outsiders from the clique, which makes it easier to reject them.[713]

Studies show that revealing the identity of the author biases the review, for more than just the reasons mentioned above. It turns out there are a number of additional systematic biases: A) In favor of researchers working in the the institution which publishes the journal; B) In favor of researchers whose political and social worldview matches that of the reviewers; C) In favor of researchers whose approach is aligned with the general professional and ideological line acceptable within the discipline.[714]

The political and ideological handicap has turned into such an obstacle that in 2018 a group of scientists from countries around the world decided to found a new journal named the *Journal of Controversial Ideas.* They explained that their journal will allow publications on sensitive topics and controversial issues to be published under a pseudonym, since free intellectual debate on controversial issues has been severely damaged in light of a culture of fear and self-censorship.[715]

- **A one-dimensional and one-way process**. One of the papers concerning the issues of peer review noted sarcastically that very few things cause greater satisfaction than finding an error in a competitor's paper and noting it in a report.[716] And indeed, there is no shortage of petty and vengeful scientists who never pass up an opportunity to settle an account, take out their frustrations, and strike a colleague to delay or even block publication of his or her findings.[717] But the real problem with the method is not the fact that reviewers are basically liberated from any responsibility for their decision, whatever it may be, but rather that authors do not get the opportunity for open dialogue with their critics, to defend their assumptions, methods, findings, and claims. Some journals do actually offer authors the opportunity to appeal a verdict, but few make use of this well (the *Lancet,* for example, employs such a mechanism, but only 5% of authors use it, and only one of every ten appeals is accepted).[718] All the others prefer to avoid a faceoff with reviewers and editors, so as not to burn future bridges. This can also happen when a reviewer demands that his or her paper, or that of a friend, be included in the bibliography, a surprisingly common phenomenon.[719] In such an environment, authors are better off taking the blame for mistakes real and imagined, and thank reviewers from the bottom of their hearts for their instructive notes, even when these are absurd and even harmful (one "How to get your Paper Published" guide recommends authors write two letters: one righteous and rageful, to stow in the drawer but that will blow off steam, and another politically correct and brown-nosing, to be sent to His Honor).[720]

Bowing down to the reviewer's ruling is even more difficult today in light of the blossoming of social networks—where one is allowed and even encouraged to voice free opinions, to disagree with others, and to conduct a dynamic, sharp, and even competitive debate. It also contradicts the values of open intellectualism and prevents the implementation of the principles of freedom of opinion and the joy of debate. Furthermore, when the reviewing process is confidential, outside observers such as colleagues, students, and others cannot follow the disagreements and form an opinion.

This one-way conversation is draconian and flawed for another reason: it's easy to give notes (which are actually instructions) from a position of external reviewer. Many authors find themselves compelled to work on an infinite number of petty corrections and improvements, after expending all their efforts on the study and paper, because a reviewer noted from his comfort zone that one should add X, address Y, and also look into Z. If the process was the reverse—first publish, and then fix and improve—it would become simple, beneficial, and most of all enjoyable. Authors would accept notes as constructive criticism, and would be able to fix them at their will.

- **Foreign considerations**. A conflict of interest is a situation in which a decision-maker has a personal interest which may affect his considerations and create bias. In criminal law, a conflict of interest offense at times may constitute cause for filing charges for breach of trust or even bribery and corruption. In administrative law it may constitute cause for rescinding a previous judicial ruling. Such conflict of interest may also occur between reviewers and colleagues, but unlike courts of law, in scientific culture, authors, in the place of the defendants, do not enjoy the basic right to evaluate whether the judge ruling on their case is free of interest, or even professionally qualified to critique the manuscript.

  The scientific judge, just like a judge in a court of law, should recuse him or herself from the case when there is conflict of interest, or even an inkling of one—for example, when the reviewer and author of the paper are employed by the same institute, when there is a familial or social familiarity between them, or when they are involved in a research collaboration at the time of the review (some journals ask reviewers for full disclosure of their ties with the author over a specified period of time).[721]

  But beyond these self-evident criteria, whose existence necessitate that a judge recuse himself from trying a case, a wide range of conflicts of interests are in a gray area and subject to the subjective interpretation of every reviewer. Paradoxically, peer review is defined as a review by colleagues in the profession, and you try figuring out when exactly the line has been crossed from colleague to friend or enemy. Furthermore, since many scientific disciplines are professional cliques where everyone knows everyone (at least at the senior levels) and frequently also work closely together, it is difficult, if not impossible, to find a reviewer without a trace of conflict of interest. The competitive nature of the profession makes it even more difficult to neutralize this noise, because what is a reviewer to do when given a manuscript funded by the foundation which also happened to fund his or her own research? The temptation to review despite such alleged conflicts of interest grows even larger, perhaps unconsciously, when the author of the manuscript discloses challenging ideas, or when the topic is a controversial political issue which the reviewer is tempted to reject, mostly at the hands of those with extreme worldviews.[722]

It's important to emphasize that there is no way to determine just how much scientific review suffers from conflict of interest. At the same time, one can reasonably assume, as we have verified in our conversations with reviewers and journal editors, that in today's cultural and economic reality conflict of interest has become more and more prevalent in scientific publications. What we find both funny and sad at the same time, is that should the entire method be changed, in other words, if the requirement to peer-review manuscripts before publications were to be done with once and for all, there would be no more opportunities to make thieves.

- **Not part of the clique or the club**. Since most leading journals around the world are reviewed by a small number of scientists (in biomedicine, for example, this number represents approximately 20% of all scientists in the field!)—most are of the same social and professional background,[723] which means that a large proportion of scientists, perhaps even most scientists in the world, have no representation on the scientific tribunal. This can be equated with a Supreme Court whose judges are all cut from the same demographic cloth, and who do not represent the lion's share of the population. What is more, that same judicial clique meets frequently with the rest of the members of the club in social gatherings, and nurtures friendships and mutual understandings.[724]

  But the ticket to the privileged scientists' club has to do with more than just a shared professional background, but also—and some would say mostly—with their linguistic background. Even as a large share of studies, especially in social sciences, education, law, and humanities, deal with distinctly local matters, many are sent to international journals with the hope of being published in English on a respected platform and exposed to the international community, which will also assist them in getting promoted. In short, scientists, along with institutions of higher education, worship the king-maker, and the king-maker, along with all his servants, speaks English until further notice.

It should be noted that many researchers around the globe are not fluent in English, even at a basic level, and cannot always afford to fund high-quality editing, which in many cases is a threshold requirement for publication. The result is that too often, important studies are rejected simply for being poorly worded. This injustice is mostly apparent in the soft sciences, where papers are longer and more difficult to translate.[725]

- **Leaking like a sieve**. In recent years, endless errors, embarrassing and sometimes severe in their consequences, have been uncovered that have made it through the filter of scientific review.[726] The leakage problem has been demonstrated in a series of studies in which intentional errors were planted. One of the most prominent of these was published in a British medical journal: Researchers planted eight crude errors in manuscripts submitted for review by 220 surveyed scientists. The mean reviewer spotted only two errors, and none of them spotted more than five. 16% did not identify even one of the eight crude errors![727]

  Even in the most prestigious journals, who pride themselves on quality publications and an especially strict reviewing process, material flaws and ridiculous errors pass through the filters more than once. It's true that the peer review process is not intended, nor is it able, to spot every error, but at the very least one might expect that the frequency of mistakes—especially the more egregious ones—would be lower.

  One extreme example demonstrating the severity of the issue is the story of physicist Jan Hendrik Schon. A young researcher working in the Bell Labs in New Jersey, Schon published no fewer than 100 papers between 1998 and 2002, nearly entirely on his own. Some of them were even considered groundbreaking conductibility studies. There were even some who saw the prodigy as a deserving candidate for the Nobel prize, until it turned out that his findings were counterfeit. The con was revealed by chance, thanks to an amateurish error: Schon used the same graph in two different studies. He was unceremoniously fired and his title of doctor was permanently revoked.[728]

  Another wide-reaching scandal to make headlines—not only because of its severity but because it proves how benign the peer review process is—is the story of Woo Suk Hwang. Hwang was a Korean biologist who claimed to have created 11 "lines" of human fetal stem cells through cloning. Twice, the fraud made it past the peer review process at *Science*, and was only fully exposed after two papers were published in the journal on the subject.[729]

One can of course point to the fact that both cheaters were eventually caught, but the question still echoes: How does a mechanism that perceives itself as strict and efficient allow such oversights to repeat themselves? It seems the question contains the answer.[730]

- **The Salieris are failing the Mozarts**. Many see the true problem in science not in the publication of poor research. This has always been a part of science and will probably always be. The true problem is that good papers, innovative and prominent, are rejected or delayed. This delay hinders the progress of science and leads to demoralization, specifically among deserving and talented scientists.[731]

There are too many examples to count. We will content ourselves with noting one expansive study which looked into 1,000 papers and medical journals and found that many of those rejected by the three most prestigious journals in the field—*Annals of Internal Medicine*, the *British Medical Journal* and the *Lancet*—and published on another platform eventually became the most cited papers in their field, i.e., the most influential, at least according to scientific convention. What's interesting and especially symbolic in this case is the fact that 12 of the 14 most-cited papers were rejected at the initial phase, and were not even sent for external review. Moreover, the most common reason cited for rejection was lack of novelty.[732]

The homepage of the Nobel Prize committee website contains autobiographies of the laureates in the various fields, including the obstacles placed before them by the scientific establishment on their way to historical discoveries. One of these is George Akerlof, winner of the 2001 Nobel Prize in Economics, whose groundbreaking work on the mechanism at work in the "Market for Lemons," referring to used cars, was rejected upon its initial submission. Two reviewers noted that his findings were trivial, while a third rejected the paper with the opposite claim that it was too innovative. With undeniable contempt he noted that if the paper did indeed describe a true reality, it would appear that the acceptable laws of economics must be revised.[733] Ironically, Akerlof's research did indeed change the laws of economics.

In modern sociology, Mark Granovetter's brilliant paper from 1973, "The Strength of Weak Ties," deserves mention—it became one of the most-cited social sciences papers of all time after being tossed away upon its first submission (Granovetter showed that incidental and weak ties with a large number of people—such as those formed on social networks—are more effective for finding a job or collecting information than those achieved by maintaining tighter relations with the small number of people close to us).[734]

It should be noted that outside of the walls of science, highly experienced editors often err in the identification of masterpieces, especially when these deviate from the known framework. One of the most famous examples is the international bestseller *Harry Potter*. Famously, J.K. Rowling was denied by 12 publishers before finding one willing to put out the first book of the now-legendary book series,[735] and the rest is history (the series broke sales records, made Rowling the richest author in the universe, and obviously the exceptional publisher made some money as well).

Erroneous rejection of landmark papers is not only a result of the inability to identify the innovation. Occasionally it is caused by negligence, conservatism or dogmatism, and sometimes even by jealousy. Although the Talmudic sages teach that "jealousy between writers increases wisdom," when competition is fierce and egos are large, and especially when the creator is more talented than the reviewer, jealousy may be devastating. One of the legendary stories demonstrating this dynamic at work is that of Antonio Salieri, whose jealousy of his friend, Wolfgang Amadeus Mozart, compelled him to secretly try to hinder his progress. Ego, desires, and feelings of inferiority in science are no less and perhaps even more prevalent than those in the arts, which is why it is natural for the process of peer review to allow frustrated and envious individuals to hurt those more talented than them.

Albert Einstein is said to have remarked that "great spirits have always encountered violent opposition from mediocre minds." Fortunately for him and us, some of his groundbreaking papers were published at the start of the 20th century without going through peer review. Should he have been made to go through the accepted method today, he undoubtedly would have found himself dragging himself from one journal to another until the liberating publication. And indeed, Einstein more than once voiced aggressive reservations about the peer review process, and saw it as an illegitimate intervention in scientists' independence.

And from Mozart and Einstein to Galileo Galilei. It is assumed that the Italian genius's travails, his persecution by the church, could not occur in the modern democratic world. As we know, he insisted on vocalizing a scientific truth—that the earth rotates around the sun—although it contradicted the truth as dictated by the church establishment, according to which Earth stood still and was the center of the universe. Even when made to rescind the statement during his trial, after being tortured by the Inquisition, he remained faithful to scientific truth, coining, at least according to popular legend, the immortal saying, "Eppur si muove!"—"And yet it moves!" The

Inquisition has indeed disappeared off the face of the earth and (hardly) anyone disagrees with the notion that the earth revolves around the sun, nor the rest of the revolutionary theories by the father of modern science, but the persecution of those straying off the beaten scientific path is far from gone.

That's what happened, for example, to Australian scientists Barry Marshall and Robin Warren, who went against a solid convention in the world of medicine at the start of the 1980s. They persistently claimed that the *Helicobacter pylori* bacteria was the cause of peptic ulcers, rather than mental stress, spicy food, and excess acidity, as claimed by most of their colleagues. The two became *personae non gratae* in the scientific community and reached the throes of despair, until they decided to ingest an infectious broth containing the dangerous bacteria in order to demonstrate its effect. Marshall was indeed stricken by ulcers, and only then were the findings adopted. Nevertheless, it took 20 more years until the scientific community expressed remorse and awarded Warren and Marshall the Nobel Prize for Medicine in 2005.

And lastly, there is a more current example in which the steps of a groundbreaking genius were restricted for reasons of ego and conservatism, this time a colleague of our own. Upon the announcement of the presentation of the Nobel Prize in Chemistry to Prof. Dan Shechtman for discovering a new and unique structure of quasi-crystals, i.e., those with no symmetrical cycles, many became familiar with his touching story. It turns out that when a young Shechtman first reported his findings, he encountered scornful and hurtful criticism from his colleagues. He was accused of errors in the experiment or interpretation of the results. There were those who claimed that he was simply cheating, no less, and the head of the lab which employed him during a sabbatical from the Technion expelled him from the research team under the claim that he was a disgrace to the team. The *Journal of Applied Physics* rejected Shechtman's manuscript, describing the discovery with the claim that "physicists would not find the paper interesting." But Shechtman did not give up, and succeeded in publishing an abbreviated version in the *Physical Review Letter* journal. Petty and devastating criticisms sprouted then, too. The prominent chemist Linus Pauling, a Nobel laureate in chemistry, ridiculed Shechtman by saying, "There are no quasi-crystals, just quasi-scientists." But in 2011, 27 years after publishing that first paper, Prof. Shechtman was awarded the Nobel Prize for his discovery, and taught all the conservatives and jealous types a lesson.

It's important to note that not everyone has the spunk, Israeli "chutzpah," courage, and persistence exhibited by Prof. Shechtman. Often, maybe even usually, the fear of criticism and the yearning to publish at any cost causes scientists to focus on writing papers that are easy to digest, censoring themselves in advance and holding their tongue in the face of devastating criticism.[736] When the main motivation is not to anger the gods, not only are creativity and imagination—the beating heart of science—lost, but also the courage to leave the beaten path for unconventional research horizons and studies without guaranteed results.[737] Under these circumstances, few researchers also dare to study macro subjects, which already receive less funding; longer-duration studies, which suffer from the same; interdisciplinary studies; and books, the latter of which we will expand on.[738]

To overcome this, at least partially, and to provide a platform for unconventional ideas and studies, a number of journals have been established which publish papers without peer review but with the option for criticism after publication. Two examples are the journal *Philica*, which publishes papers on psychology and calls itself "the instant online journal of everything," and *Medical Hypothesis*, which publishes papers on medicine. But these are exceptions, which do not have the power to change the peer review model.

- **Unreleased frustration.** Every competitive arena has successes and failures, winners and losers, those ahead and those behind, happy and disappointed. Anyone going into a competitive arena such as science should know that those are the rules of the game, and should develop the necessary resilience to brush themselves off and buckle down again every time.

  Regardless, it seems that in scientific culture experiences of rejection and failure are frequent and especially severe for a number of reasons: A) With every manuscript one submits, which happens a few times a year, the competition begins again from the very start. In other words, you haven't even been given the chance to rest on your laurels and the next Sisyphean journey already awaits you. B) The wait for the ruling is lengthy and nerve-racking, not to mention the high uncertainty coefficient and because the relationship between the author and the editorial staff is not face-to-face, but rather through limited email correspondence. C) The common perception that the rules of the game are unfair and that verdicts are arbitrary. As we know, a feeling of injustice is poison to any organization. D) Scientific code demands that authors restrain themselves and maintain proper conduct even when they have experienced a grave injustice (few dare to send angry letters to the editors). It's no wonder that professional conversation platforms are packed with advice on dealing with the high frequency of rejection notices.[739] The rejection experience is so common in science that it was only a matter of time until it engendered some dark humor. So, for example, in order to demonstrate the elementary experience of rejection and to develop awareness and ability to withstand it among herself and her friends, a Michigan University doctoral student sewed a skirt made of 17 rejection letters she had received from conferences, research foundations, and journals (only part of her inventory).[740] E) All the reasons mentioned above are joined by one last reason from recent years: the overcrowding of the path to publication, which reduces the chances of acceptance more and more.

For all these reasons, the mental price grows more costly, and turns the experience of research and publication in science, meant to be uplifting, into an ongoing nightmare.

- **A wasteful process**. It's hard to contradict the claim that feedback benefits the work, and that unfamiliar eyes can see things the author might not. There is also no doubt that the Devil's Advocate method is efficient, if and when reviewers take their position upon themselves with fidelity and gravity, and preferably also solidarity. In this regard, the idea of peer review is true and justified, but the devil is in the details. In actuality, it is difficult to evaluate how much scientific review benefits the final product, since we cannot compare the manuscripts submitted for review to the final manuscript published. Although many scientists attest when surveyed that the review and feedback process improved their papers, sometimes significantly,[741] psychological studies show that those who make it through a bumpy ride successfully tend to idealize their experience. We know, for example, that there is a positive correlation between the difficulty level of an acceptance exam and the allegedly subjective esteem retrospectively attributed to it by those who pass. In short, the fact that many justify the travails of publication does not necessarily mean that the process is efficient and worth the trouble.[742]

  If the goal of the review was mostly to improve the papers, there would be no room to reject so many and to force scientists to drag themselves from one journal to another. In reality, peer review has mostly turned into a weapon in the battles of prestige and finance between journals. A journal priding itself on higher rejection rates attempts to glorify itself in the name of a more refined science. But this is a fake refinement, since no correlation has yet been discovered between the prominence of papers published in a journal and its rejection rates.

Just the idea that a scientist must perform elaborate calculations of acceptance and rejection chances is twisted and does not serve the profession. The findings of a properly conducted scientific study should be published without delay, so that the scientific community and the whole world can reap its fruit immediately. This goes double in the age of the Internet, where everything can be published quickly and with minimal costs, if at all.

The question of the efficacy of the peer review process is clarified in light of the fact that most papers—including those with multiple rejections—are eventually published. A paper rejected by one journal will be welcomed by the second, third, or tenth journal. Furthermore, many papers are rejected under the pretense of low potential for a contribution to science, especially in those highly venerable journals which pretend to publish papers extraordinary in their quality and impact. It is therefore somewhat strange, and perhaps even bizarre, that a mechanism which employs so many people and invests so many resources is steered by reviewers' projections which rarely come true.

As a result of the increased criticism of the review considerations, a number of journals decided to change policies, and are now asking editors and reviewers not to provide an opinion on the potential innovation and impact inherent in the study, but to be content with notes on errors, suggestions for improvement, and an evaluation of whether the manuscript passes the basic threshold of science—i.e., was performed using proper methodology, bases itself on an authentic database, and contributes an additional element not included in previous studies.[743]

In theory, this is a reasonable and welcome change, but it begs the question: if the publication threshold is no higher than the minimum required for proper science, why trouble so many reviewers prior to publication? It should be assumed that a scientist who has learned scientific methods (most scientists use the same methods) and invested time and resources in his or her study will conduct it properly. It is therefore preferable to publish the paper describing the study, open it to post-publication review, and save the preliminary, excruciating, and expensive bureaucracy.

What is amazing in this regard is not only the pointless, bitter disappointments caused to hundreds of thousands of scientists due to an archaic aristocratic tradition, but the wasteful employment of an army of reviewers and editors (a calculation performed by the Enago Academy sharing platform found that between 13-20 billion hours of work were invested in scientific review in 2015).[744] One should remember that each journal recruits its own reviewers and does not reveal their identity, which means that the number of reviews actually required in order to evaluate scientific manuscripts is pointlessly doubled and tripled (according to the number of rejections until publication).

The "Lesser of Two Evils" Trap

The Internet has upgraded information and communication tools, and for the first time in history provides us with: A) a platform with unlimited space; B) a sophisticated, simple, and attractive combination of text, audio and images; C) ongoing updates in real time; D) unlimited accessibility, usually free, from anywhere at any time; E) an interactive platform shared between readers and authors and among readers themselves; F) the transformation of information consumers to producers and reviewers. But this newfound treasure is kept away from scientific publication platforms, which despite all their cosmetic changes remain stuck in the past.

In a survey of attitudes conducted in 2017, scientists from all over the world were asked whether they thought changes were required to the traditional publication method, and if yes, which. Over half of them responded unambiguously that a change was required, and placed peer review second on the urgency scale, with the duration of the process in first place.[745]

But don't be fooled. Most scientists do indeed want to move the cheese, but not to replace it with a new product. The reasons for this are many:

- Scientific research has accustomed scientists to researching facts while offering fewer solutions.[746]
- Science has taken giant steps over the years, and the peer review method still generates a large number of quality, prominent studies. Many therefore prefer to perceive the issues in the peer review mechanism as solvable flaws and not as warning signs of an upcoming disintegration. An editor of a prominent journal wrote to us that she "accepts the opinion that the system is not running smoothly today, but [is] not willing to pour out the misuse of the idea bathwater with one quality-control baby or another."
- A large number of scientific leaders belong to the older generation, which sees the new digital communication methods as strange and is overwhelmed by the various innovations accompanying these methods.
- Many researchers have worked hard throughout their career to publish papers using the old method, and they have no interest in enabling others to enjoy benefits they themselves did not. The general creed, not unique to science: If I worked hard and suffered, you should work hard and suffer too.

- Because the process of gaining acceptance for a manuscript for publication is so competitive, a published paper not only brings satisfaction from the achievement of creating something of value, but also the pride of victory over one's competitors. And since publication is the basis for climbing the academic hierarchy, the last thing winners of the competition want is to be indirectly stripped of their medals and trophies.
- Scientists view themselves as an elite, and as we know, elitism feeds off selectivity. Many scientists cannot imagine themselves in an less fastidious environment.
- Since feedback always improves the final product, scientists are concerned that waiving the peer review process will damage the quality of their papers. This is especially important to insecure scientists, who need prior confirmation before they put something on a public platform.[747]
- Many fear that others will be wary of critiquing papers publicly and under their own identity, as harm might come to them. In their eyes, any format which does not maintain confidentiality and discretion will lead to a less thorough reviewing process.[748]
- A significant portion of scientists are insecure and fear overt criticism. They prefer that their manuscript not be exposed in public in its raw form (similar to many authors who also prefer destroying the "evidence," i.e., drafts of their books before editing). They say to themselves: If somebody attacks my work, I would rather it happen behind closed doors and stowed in a drawer.
- Without a filtering mechanism, the responsibility to determine what is good and reliable falls to the reader. Many people, including those with various degrees of higher education, would rather someone in a position of authority decide for them what is right and what is not. By way of analogy: There is a huge amount of medical information on the Internet, yet most people would still prefer a doctor diagnose their illness.
- In an age in which truth is just an option and the fake is around every corner, there is a concern that science will lose its supremacy, and a relative truth approach will take over the system (your truth versus my truth)—even on definitive factual matters in which there are no alternative truths.
- The process of peer review is ultimately an aggressive mechanism intended to realize desires and interests and to fix statuses and rulers in place—a sort of inquisitorial interrogation established by the Church of Science in order to reinforce their professional deities among believers and "execute" those who deviate from the path. That's why most of the true believers don't support rescinding the tradition.

- And most of all, peer review is a mechanism to nurture self-importance. One should remember that most scientists are average people, far removed from the lofty mythological image the public attributes to titles such as "doctor," "professor," "scientist," and even "academic." Many scientists are indeed tempted to believe that the respectable title before their name on the sign on the door to their office is a standard of quality, but the truth is often much different. Were scientific manuscripts judged based only on the raw quality of their content, many scientists wouldn't care as much for what their mirror reflects back to them. We know this, of course, from other fields: not everyone with stripes on their shoulders or wings on their chest is a great warrior, and not everyone called "Chef" is a culinary authority.

  Peer review creates the appearance of quality and of profoundly strict controls, which many times hides a dearth of content under a ceremonial cover. That is probably why many scientists are willing to pay the completely pointless mental and financial cost required to maintain the system. It also explains why, despite the proven flaws, most scientists still believe the system is inherently good, or at least the lesser of two evils, and all that's required is to hone it and fix it up a little.[749]

This conservative and hesitant approach also dictates the types of improvements made in recent years to the old method:

- **The author selects his reviewers**. Some journals have completely done away with the principle of reviewer confidentiality, and a few of them, as already noted, allow the author to select his own reviewers. The *British Medical Journal*, for example, began revealing reviewers' identities to authors back at the end of the 1990s, while *Biology Direct* developed a model under which authors are asked to choose the reviewers suitable to their paper (and to them) from a list of approximately 200 potential reviewers. Once three reviewers selected by the author have given their consent, the paper is sent to them for review.
- **Portable reviewing reports**. Several journals demonstrate apparent generosity and allow an author whose paper was rejected to send the reviewing reports to other journals once reviewers have given their consent. But more than this model shortens processes and saves costs, it demonstrates the pathetic anachronism of the method, which places you at a dead end. It is somewhat reminiscent of the tradition of recommendation letters for students, a ritual turned annoyance. When every scholarship, research project,

or new job requires a lecturer's recommendation, they become a worthless template—and their recipients view them in the same way (they themselves are no doubt the authors of dozens of meaningless letters of the same type).

Recently, a commercial version of portable reviewing reports has been developed. These are commercial companies offering scientists pre-reviewing services for a fee, i.e. a sort of preliminary quality assurance with the goal of raising the chances of acceptance by journals (prominent among these are Rubriq, Axios Review, and Peerage of Science). Some of them recommend or refer authors to a suitable journal.[750]

Portable peer reviews now come with an additional nuance. Journals are now requiring that scientists submit their manuscripts along with two professional opinions confirming that they meet the journal's threshold conditions. It seems there is no limit to the chutzpah: Not only does the author need to go through a reviewing process preliminary to the one conducted by the journal anyway, he also needs to find reviewers that would be considered qualified to give an opinion by the journal.[751] Naturally, this demand can only be implemented using personal contacts and backroom deals. This is reminiscent of the tradition of rabbinical letters of consent in the ultra-Orthodox Jewish community. No item or service may be marketed or sold in that sector without a signed letter of consent by one of or more of the Torah greats. The more senior and admired the consenting rabbi is in the community, so the validity of the consent grows and therefore also the prestige of the marketing. However, after so many letters of consent, and consents for consents, the backroom deals and manipulations roam free and drive everyone mad. Letters of consent are produced and distributed by all sorts of "machers" circulating the names of the great rabbis in hopes of making some money.

- **The fast lane**. As already noted, in order to overcome the foot-dragging of the peer review process, many types of programs are on offer to bypass the line—for a fee, of course. For example, expedited reviews (with a decision within three weeks) are available for the "paltry" sum of a few hundred dollars. This offer has not actually been popular, but just the fact that it is raised is testimony to the lows of greed and stupidity to which a system meant to be navigated by the smartest and most levelheaded people has sunk. It's no coincidence that one volunteer editor at the journal which established the fast lane resigned in protest, and noted in his resignation letter that it troubles him that separate publication lanes are created—one for those with means, to get ahead of everyone, and the other for the regular scientists, to lag behind[752] (incidentally, one wonders how a researcher feels once his paper is rejected in the fast lane: buying a ticket for first class and then getting thrown off the train—that's definitely too much).

The resigning editor was right, of course. We knows this aggravating method of allowing the rich to get ahead from the highways: instead of replacing crumbling roads with fast railways, governments pave toll roads for those who can afford them. The rest of us can keep sitting in traffic.

- **With a little help for my friends**. Various journals invite scientists to publish with them, in feature issues or generally. In such cases, reviewing tends to be sympathetic and easy, and this is basically a half-kosher deal which allows scientists to guarantee advanced publication of their papers and editors to help out a friend or adorn their platform with some well-known names. Since the scientific community is well aware of this gimmick, it gives less weight to requested papers when these are identified or tagged as such.
- **Preliminary feedback**. A tiny number of journals include new options for feedback—for example, receiving public preliminary reviews on the journal's website (usually for three months), which allow authors to improve their manuscript before going through the official, and confidential, reviewing process.
- **Retroactive feedback**. A small number of journals have integrated tools on their website which allow the publication of comments and feedback after the official publication. On some websites the platform is open to all, including anonymous commenters, while some are only open for authorized commenters.
- **Interaction between reviewers.** One of the most interesting proposals for improving scientific peer review is making the reviewing tribunal more similar to courts of law. Judges are given the option to sit together on the bench (as customary at some institutions when reviewing graduate or doctoral research projects), or at least to read and comment on the other reviewing reports (eLife Journal requires reviewers to reach a unanimous decision).[753] Those in favor say, "Two heads are better than one," while those against it say, "Too many cooks spoil the broth."

  A recently completed experiment conducted by Elsevier found that consultation between reviewers does indeed clear up doubts and may lead to more uniform consensus. This also makes editors' jobs easier.[754] Including the author of the paper in the discussion, just like in a court of law, may improve the process even more, since he will be granted the right to take the witness stand, clarify points, answer questions by the "defense attorneys" and the "prosecutors," and maybe even offer an "alibi" if the need arises.[755] No doubt such a framework makes the reviewing process more democratic, transparent and efficient. Today's technology also allows for remote conferences to be held in which reviewers are not required to reveal their identity. On the other hand, the question arises time and time again: if you're already having an open reviewing discussion, why not have it after the paper is published on a public platform and not as a condition for publication?

- **Computerized reviewing.** Digital solutions are breaking into every area of service in our lives and replacing manual work. It is therefore only a matter of time until applications sprout up in the field of scientific publications in an attempt to replace the old process, or at least make it more efficient.. And indeed, there is already software that manages the correspondence, provides a list of potential reviewers, and generates standard letters of request or thanks. In order to simplify the writing of reviewing reports, templates have been developed to allow reviewers to rank the manuscript using standard measurements and scales, with the software aggregating the final score.

  But this is not a complete solution, since the tradition among journals still requires a written opinion from reviewers, including suggestions for revisions and improvements. There have been attempts lately to develop more advanced programs that will generate a complete review report on their own, but this is yet far away. Who knows, perhaps in the future bots will take over the entire reviewing process, and perhaps even replace scientists along the way.[756]
- **Fair pay for reviewers.** Under the traditional method, not only are reviewers asked to do their work voluntarily (as noted, only a few are paid a symbolic wage),[757] even the credit is taken from them due to the confidentiality principle. Although reviewing manuscripts for journals does indeed frequently earn a line in your resume, most of the time only the name of the journal is noted, without details on the number of papers reviewed and without identifying them.

  Most journals send reviewers letters of thanks and esteem, and give out vouchers for books, subscriptions, or discounts on future publications.[758] But in today's material world even kids are not content with a mere goodie bag.

  To add weight to reviewers' contributions, a number of journals have recently begun attaching reviewing opinions as footnotes to the final paper, subject to the consent of the reviewers and authors of the manuscript. This should also, in theory, increase the transparency of the process and allow beginning scientists to learn how to write a report.[759] Unfortunately, so far studies show that both reviewers and authors are not inclined to attach preliminary opinions to the final publication.[760]

But still, there are those who do allow it. Publons.com was launched in 2012 with one of the goals being the publication of reviewing reports with the consent of journals, authors, and reviewers, on behalf of the scientific community. Contributors could choose different levels of exposure: the name of the journal, publication year, title of the paper, and so on.[761] But as innovative and welcome as these are, such initiatives do not change the rules of the game. Most review reports remain confidential and the status of scientific reviewers has not actually changed.

From time to time, models are proposed for more tangible material compensation. These are founded on the belief that at its foundation the world has become more utilitarian, and people are less willing to invest time and effort with no reward. One study found that half of scientists support financial compensation for reviews. Many of those opposed were not against the idea in principle, but were rather concerned about increased costs of publication.[762]

A handful of journals have already somewhat raised compensation amounts using creative means—for example, by providing translation, editing, and professional consultation services free to reviewers. But at the end of the day, scientific research review is still mostly based on volunteerism, and it does not appear that it will be transformed into a business. Not only because the matter contradicts scientific tradition and perhaps collides with the rules of ethics, but mostly because commercial publishers have no intention of giving up a model based on the goodwill of scientists and providing them with generous profit.

In theory, scientists could be motivated to review with, at the very least, indirect forms of non-material compensation which are easy to implement: making reviews of papers a more important criterion for a scientist's professional reputation. In reality, academia is playing a double game, and a hypocritical one at that: on the one hand, it encourages its members to review and announces the importance of the contribution wherever it can, which is commendable. On the other hand, it limits the criteria for evaluating researchers (for example, during promotion processes) to two alone: publication of papers and raising research funding. In such an environment, it really does not pay off for scientists to put effort into reviews.

- **Dual-stage review.** In an attempt to address the problem of publishing positive results only, while hiding the negative ones, a number of journals have begun employing a dual-stage review process: during the first stage, only research questions and methodology are reviewed, with the full manuscript up for review only in the second stage. It is then that reviewers verify that the researcher has kept the promises he or she made during the first stage.[763]

The unfortunate significance of the dual-stage model is that journals no longer trust the honesty of the scientists they publish, and look for ways to circumvent them—not to mention increasing the load on a system already collapsing.

The Solution Right Under Their Noses

The Pre-print Path

SpotOn is the name of a series of gatherings of researchers, scientific journalists, IT people, and anyone interested in scientific policy. The flagship assembly of the series takes place annually in London, and the main topic on the agenda at the 2016 conference was the future of the peer review model.[764] As expected, the solutions being offered were all very much inside the box—for example, the use of computerized means to identify problems in manuscripts, such as forgeries, plagiarism, and the like. None of the distinguished attendees thought that the system itself should be eliminated, even in light of its overt flaws and in light of the possibilities opened up by modern technology. No one even publicly admitted that all the improvements for journals suggested so far were Band-Aids on a fracture, or cosmetic renovations to a building about to collapse.

It's a bit perplexing that scientists refuse to see the solution right before their eyes: canceling the split, closed, subservient journal format and replacing it with a platform for open publication—with minimal regulation. As described, this platform already exists, in the shape of the preprint—a phenomenon that sprouted under the regulatory supervisory radar of publishers and journals, and is about to change the tradition of scientific papers journals in general and the tradition of scientific review specifically.[765]

This format first appeared in 1991, the brainchild of a group of physicists who established the arXiv network for themselves as an internal communication channel. arXiv opened discussion platforms with an unlimited number of participants, was the first to provide instant messaging, and allowed for discoveries to be announced in public, thus determining the first-mover advantage, and giving them real-time feedback on ideas, drafts, and burgeoning studies. These physicists did continue publishing papers in the traditional format of journals,[766] but arXiv gradually became a more important platform. As time went on, sub-platforms were added which served a variety of scientific fields, such as bioRxiv, engrXiv, PsyArXiv, EarthArXiv, PaleorXiv, NutriXiv and MedRXiv, as well as independent preprint platforms, including OSF Preprints, Zenodo and OpenReview.

By 2017, arXiv was home to over 1 million publications and was inundated by more than 8,000 new manuscripts every month.[767] In 2018, more preprints were uploaded to the bioRxiv website, mostly intended for biologists, than in the four previous years combined. That year, over 1 million manuscripts were downloaded from the website every month. This data demonstrates the extent to which this tool has become an important organ in the scientific publishing body.[768]

As time went on, the differences between papers published in the official journals and those published on preprint platforms diminished. If at the beginning the scientific establishment refrained from citing them in official publications, such citations are now common.[769] Not only that, more and more researchers, especially experienced, veteran ones, choose to preprint only, knowing that this is the quickest and most efficient way to disseminate information to colleagues.

It seems that it was the mathematician Grigori Perelman who blazed this trail challenging the old method, when he chose to publish his famous paper on the Poincaré Conjecture, which for years was considered one of the most important unproven theories in topology, on arXiv only. He explained his decision with a claim so simple and yet so true: that there is no importance to the identity of the platform but only the content—and the content must be accessible to all.[770]

This was an important milestone in the annals of scientific publication, since although the paper was published on a nonreviewable platform, the mathematics community awarded Perelman with its two most prestigious awards: The Fields Medal and the Clay Research Award. Incidentally, just as Perelman refused to go with the herd and publish his important paper the traditional way, he also refused to accept the awards.[771]

In order to complete the revolution, all that's required is to transform the preprint platforms into the final and official destinations for publication. The first blossom has already opened, with a young biology doctoral student named Josh Nicholson, who founded The Winnower in 2014. In a newspaper interview, he related that the inspiration for establishing the platform came to him after he read a book by Richard Smith, his former editor at *BMJ* [the *British Medical Journal*], called "The Trouble with Medical Journals".[772] Unlike traditional journals, publishing on Nicholson's platform is immediate, open to all, with no filtering. It also includes a much larger variety of materials: alongside research papers are research proposals, reviewing reports, book reviews, conference summaries, and letters. Authors can update the text according to feedback, until they decide to "freeze" a final version and purchase a Digital Object Identifier, a string of letters and numerals which is the paper's online address and allows it to be located online.

By April, 2016, more than 1,000 papers were published on The Winnower, fruit of the keyboards of over 4,500 authors around the world,[773] and by November of that year it had already been acquired by Authorea, an online platform for scientific publications. By the way, Authorea brings another important innovation to the world of scientific publications, expected to be implemented in the future on additional publication platforms: a number of templates for various needs, which simplify the independent publication of scientific papers at a professional level and allow interaction between scientists.

Open Platforms for Scientific Discussion

Scientific discussion is gradually breaking through borders not only because of the advent of the preprint networks, but also due to the development and expansion of soft (read: popular) media platforms intended for general academic and scientific topics: scientists' sharing networks, which we discussed in the previous chapter, sections and departments in general journalism, online question and answer engines, websites, blogs, and social networks. Unlike professional journals, which have mostly dealt with the findings of studies, the popular platforms host a multi-varied and dynamic debate, which also includes recommendations and critiques of scientific publications, as well as questions and answers on burning issues, such as employment terms, pensions, ethics, reliability, and more. The participants are also more varied: active and retired scientists, students and research students, scientific journalists, and lovers of knowledge.

Among the most prominent of these are:

- *Quora*—a question-and-answer website written and edited by users on a variety of topics, including different types of scientific issues (the importance of this website will be discussed in the following pages). The website is available in a number of languages.
- *Academia.edu, ResearchGate, ScienceOpen and SSRN*—networks which allow the sharing of manuscripts and publications and the exchange of feedback and opinion.
- *Guardian Academic Anonymous*—a weekly opinion piece published in the prestigious British daily, written anonymously by academics and dealing, often critically, with topics such as student admission, grades, colleague relationships, and employment terms.
- *Times Higher Education*—a British weekly on matters of higher education. Especially noteworthy is the fictitious-satirical column written there since

1979 by Laurie Taylor, an experienced retired lecturer from York University. "The Official Weekly Newsletter of Poppletonian University" tells the tales of an imaginary university while reflecting and ridiculing true academic life. Here as well, the comments are no less important and interesting than the articles.

- *The Chronicle of Higher Education*—the American version of the *Times Higher Education*.
- *The Conversation*—an Australian portal that has already engendered six branches, in the US, Africa, Canada, Indonesia, and Spain. The website publishes news and opinions from tens of thousands of researchers, and is visited by millions of users every month.[774]

At the start of the millennium, with the advent of the blog culture, blogs also began appearing one after the other on matters of science and knowledge. The growing social networks pushed this framework to the margins, and many of the scientific blogs are no more. Today, the larger social networks, such as Facebook, Instagram, LinkedIn, Twitter and Reddit, host many conversational communities of scientists and lecturers. Some of these communities unify academics from the same country or from the same institution, and others connect scientists from the same field.

These platforms are very important for the development of a new academic debate, which is eroding the fossilized tradition of professional journals, since they deliver the message that scientific debate must be open, inclusive, and interactive, and not only revolve around empirical and professional papers, but also around ponderings and challenges, news and criticisms.

The Convention-Shattering Encyclopedia of the Masses

Wikipedia was launched in 2001 as a crowd-sourcing initiative founded by Jimmy Wales and Larry Sanger. Sanger was the one who chose that perfect name, combining the word "wiki," which means "quick" in Hawaiian (although he himself was raised far from the islands, in Alaska), and "encyclopedia." Until it came to be, no one dared imagine that a project based on the wisdom of crowds, volunteerism, and a radically decentralized management structure (including the absence of any professional content and language editors) would within a few years become the most expansive and popular source of information of all time. Yet here we are. At the end of November 2018, Wikipedia had over 49 million entries in all of its languages. As of May, 2019, it is the fifth most-viewed website in the world according to Alexa.[775]

Due to its surprising innovation and its even more surprising success, it was only natural that Wikipedia would earn its share of doubters, questioners, and slanderers.

These came from two directions: academia, which was horrified to discover that its ancient authority over knowledge was being challenged, and professional publishers, who were concerned that their gold mine of encyclopedias and lexicons would become redundant at one blow.

No doubt there is a significant difference between a scientific paper and an entry in an encyclopedia or lexicon, even more so when at issue is an online encyclopedia that relies on the writing and reviewing of the masses. There are those who may raise an eyebrow at the mere comparison, but in our opinion, even without meaning to, Wikipedia has changed our entire perception of how notable information is reviewed, filtered, and made accessible. Many feared that such an important and expansive informational project, without being supervised by experts, would be doomed to failure. In reality, the exact opposite occurred. It's doubtful if at this stage even a handful of scientists could be found to admit it, but in effect Wikipedia's reviewing mechanism is much more efficient than that of the scientific peer review mechanism, and in the future may help in dissipating the scientific establishment's fears that replacing the closed-ended journals with an open platform will lead to inferior quality and reliability among scientific publications.

This deserves explanation:

- **Threshold of expertise**. The main claim raised by critics of Wikipedia was that an encyclopedia written by volunteers lacks a seal of authority and validity, since any child may write and edit an entry, with no way for readers to ascertain his professional background (the entire process is anonymous). And indeed, the idea that a person who has not been officially certified as an expert can write entries seems crazy on the face of it. As we know, most encyclopedias and lexicons—surely those of prominence—are written and edited by the most senior scientists and philosophers. It is therefore no wonder that the change brought about by Wikipedia was perceived as blasphemy or even fraud. The result was that Wikipedia—of the people, of the commoners—was at first considered even more off-limits in academia than journalistic sources, and professors demanded—and some still do—that students avoid it when writing papers.

  This is obviously prejudiced, not to mention ignorant and stupid. The wisdom of crowds—also known by its other names, "collective intelligence" and "hive mind"—has already replaced experts in many fields in our lives. Whether on social networks or websites and apps, anyone can get an answer to any question—not just from one professional, but from a number of experts, experienced individuals, and simply goodhearted people. As consumers, people rely on reviews from the crowd in endless circumstances and matters—from medical consultations to locating professional services, and all the way to recommendations for investments, films, vacations, restaurants, or yogurts.

Many people erroneously view the wisdom of crowds as the opinion of ignoramuses, non-experts, and those who claim to be proficient in something they are not. In essence, however, the wisdom of crowds reinforces the foundations of expertise because it expands the definition of wisdom. Wisdom and knowledge are not the exclusive property of those considered intellectuals and/or who hold a diploma certifying them as experts. Intellectual contributions can come from any source—from a young child yelling out that the emperor wears no clothes, all the way to a senior and widely experienced scientist using the most sophisticated equipment.

Furthermore, since a person creating Wikipedia entries usually does this out of a sense of involvement, interest, and duty, the initial text is usually at a reasonable level and based on a variety of sources (scientific papers are also written, at least their introductions, as an integration of previous sources). Regardless, the entry will grow and improve as knowledgeable people and experts of all fields—professionals and amateurs, educated and autodidacts—sand it down and add floors and colors to it.

The important message Wikipedia brings in this regard is that professionalism should be judged practically, i.e., according to the end result, not external status symbols such as degrees. And moreover: Many "smaller" experts debating among themselves in public are almost always preferable to one "know-it-all" expert whose opinion may not be challenged. Recall that two to three expert reviewers of a scientific paper cannot debate each other, as every reviewing report is submitted separately. Not only is that inefficient, it gives them disproportional power.

- **The wording threshold**. Many were concerned that crowd writing, and on a volunteer basis to boot, would generate incomprehensible texts. In fact, Wikipedia is not usually lower in quality compared to texts from the traditional encyclopedias and lexicons, and at times exceeds them. Its most well-known features are the efficient abstract, the uniform structure, and the clear tone, which make even complex phenomena accessible to a wider public. This is also one of the secrets of its popularity and what separates it from scientific texts, with their clumsiness, mannerisms, and information overload. Wikipedia is able to do so, among other reasons, because the wisdom of crowds is a benefit here as well, and users correct not only factual mistakes but also improper phrasing.

- **The entry threshold.** Criticisms have been voiced of the fact that Wikipedia dedicates entries to minor matters which in theory should not be a part of a serious medium. Minor events and people whose main claim to fame lies in their fame itself are indeed often awarded a level of detail usually reserved for significant historical events or figures with valuable contributions to humanity, such as inventions, works of art, and so on.

  Pedagogically and perhaps even morally (who or what is more important to eternity or the universe, and who "deserves" a more detailed entry) one can understand and sympathize with such criticism, but from any other standpoint it is in fact the higher resolution of detail—including the reverence for folklore traditions, the smaller aspects of life, and the commoners' heroes—which have become one of Wikipedia's greatest strengths and a part of its brand. In fact, Wikipedia has forced science, especially the social sciences and humanities, to shorten their distance from the people, and to understand the sociological and historical significance of popular culture and day-to-day life.

  David Shay, one of the founders of the Hebrew branch of Wikipedia, pointedly addressed the issue of resolution. To those who wonder why smaller entries attain what seems to be a disproportional position in the online encyclopedia, he responded: "it reminds me of the question about what do you like more—Mom or a watermelon?" There is no room for comparison, since they belong to different categories, and they each have their own right to exist on Wikipedia.[776]

- **The objectivity threshold.** Wikipedia has also been criticized for political, gender, racial, and linguistic biases, as well as slander.[777] Opponents claim that the editing platform turns into a wrestling arena, and that debates between editors often veer into the vocal, which keeps women especially away from editing. But this criticism actually demonstrates Wikipedia's prominent advantage in terms of filtering and polishing texts. The tough disagreements indicate intellectual sensitivity, dedication, thoroughness, and a serious willingness to address of the facts and their interpretations. The beauty is that everything—both the brawl and the result—takes place in public, which allows everyone to observe and form an opinion on the interesting debates and make sure that rulings are fair. By the way, there were those who erroneously assumed that Wikipedia allowed unfiltered access behind the scenes, perhaps inviting chaos. In reality, things are different. Even this open initiative has clear principles regarding which entries can be created, updates and improvements proposed, and decisions made. Everything is conducted through democratic vote and compromise and mediation processes between contrasting opinions.[778]

- **The reliability threshold.** The debate on Wikipedia's reliability reached its climax in the middle of the first decade of the current millennium. In December 2005, *Nature* published a paper comparing the level of accuracy between the digital version of the legendary Encyclopedia Britannica to Wikipedia, using a sample of 42 scientific entries.[779] The study's conclusions noted that significant errors on Wikipedia were rare, and that in essence there was no meaningful difference between its level of accuracy and that of Britannica's. The news rocked the foundations.[780] The first issue of Britannica, The encyclopedia with a capital T, appeared in 1768. It employed approximately 4,500 writers and editors in 2005, all renowned and including Nobel laureates, as well as dozens of scientific advisors, all researchers and intellectuals with proven qualifications.[781] And here it turns out that the wisdom of crowds can replace, with great success, the wisdom of the cap-and-gown wearers.

  The pain stung. In response to the *Nature* paper, the editorial staff at Britannica published a raging document under the title "Fatally Flawed." Its authors claimed that the paper was misleading because the method of evaluation was flawed and because the bombshell headline ("Internet Encyclopedias go Head to Head") failed to match the findings in the paper itself (the number of inaccuracies in Wikipedia was 33% higher than those in Britannica).[782] But this defense was akin to fighting a lost war against the windmills of time. Britannica was already losing readership, as part of the continuing deterioration in the status of traditional books. By 1999 it had already been split into a print version and an online version, and in 2012, after 244 glorious years, the editorial staff acquiesced and ceased printing a version of the encyclopedia.

  In an article published in 2006, *TIME* magazine defined Wikipedia as the largest, and perhaps even best, encyclopedia in the world.[783] But those who truly decided the debate were the hundreds of millions of users. The Wikipedia project continues to grow exponentially, while Britannica has remained an important and reliable source of information, but has shrunk to meaningless rates of use. The attack by Britannica's people on the reliability of its dynamic competitor missed one significant fact: unlike traditional encyclopedias and scientific journals, the reliability of Wikipedia entries grows stronger over time. That is the great advantage, and in some ways the unpredictable advantage, of this charming project.

Few now dare to challenge the legitimacy of the online encyclopedia. Academia has also softened its patronizing views towards Wikipedia. Many students use it these days for their studies, and more and more lecturers accept it as a reliable source of information for academic works—and themselves make productive use of it. Many entries have been written by faculty or students as part of academic courses, and there are more than a few Wiki sites complementing academic courses.[784]

A platform for scientific publications obviously has different goals than an encyclopedic platform, but Wikipedia's impressive success—especially with regards to the wisdom of crowds and the validation of reliability on an open platform—can serve as inspiration for the development of a refreshingly new scientific platform, with the proper customizations for the field.

Science 2.0: End of the Reign of Journals

Scientific journals were meant to mark unambiguous boundaries between science and the remaining branches of communication and writing. This was both aloof and patronizing. Today's younger generation doesn't appreciate this separation, or any other concrete division, and tends to break boundaries and generate the widest possible variety of experiences and opportunities. They are also less married to the old, and have a developed sense of customer awareness. Today's teenage rebel doesn't go to the barricades but rather adopts new habits without any need for reasoning. That's how they changed tourism and holiday trends (for example, through couch-surfing and later AirBnB), that's how they are changing shopping trends (by buying online) and that's how we think they will change their behavior (with the use of technology) towards the publication trends in science.

Whether the aging academic establishment wants it or not, the evolutionary process in which scientific communication and control tools are opened up will flourish. That is the deterministic nature of social needs, efficiency, and technological advancement. The revolution which has already begun will be completed by the younger generation of scientists—not only because the traditional mechanism discriminates mostly against them, but because they are of the digital generation, which lives its day-to-day with a more inclusive, open, and transparent conversation.[785]

We therefore expect that in the not-too-distant future a scientific publication format will come together which will include all or part of the following components:

- **Institutionalization of the preprint**. The first stage of the revolution is nearly complete, although most scientists are unaware. The preprint platforms already in existence will, in our opinion, turn into the final (and official) destinations for scientific publication. In fact, all that is required is to convert them from temporary, unofficial publication platforms into final publication platforms (with all that is related to such a move). This is possible and desirable, among other reasons, because the idea of delineating between a draft and the final version has become anachronistic in the age of the Internet.
- **Maximum accessibility**. The platform will be completely open and at no cost for authors and readers, or with merely symbolic costs.
- **Public funding**. Naturally, a scientific publication platform must be managed and maintained, including day-to-day funding, by a public international entity, representing as many countries as possible. This will prevent duplicates and save billions currently flowing to private hands, as well as prevent the huge waste of time and personnel resources taken up by the old journal format.
- **Variety of products**. The new platform will allow a wide variety of publications. Alongside research and review papers, users will be able to upload opinion pieces, research ideas, recommendations, or requests for assistance and funding. The format will also be varied: no longer just text and illustrations, but video and audio as well.
- **At the forefront of technology**. The new platform will provide additional services that will grow in number and sophistication: proofing, simultaneous translation by text or voice, templates for editing and designing content, and more.
- **International network**. There is a general trend of absorption, unification, and standardization in the online world. That's how individual, personal blogs turned into a more limited number of globe-encompassing social networks. Such a phenomenon will probably take place in the field of scientific publication as well. An international scientific network will develop that will allow scientific debate from anywhere in the world. Niche platforms will exist as a complementary service only.
- **Unconditional participation in debates**. Much has been written about the death of the reviewer in literature, film, and art, and there is no reason that the official furrowed-brow review should continue to exist in science alone. Limitations and regulations on the open platforms will only be applied to maintaining respectful and sportsmanlike conduct, and not to content (save for libel or intentional fabrications, of course).

Publications of papers and comments on the papers will be conditioned on the identification of author and reviewer, with electronic methods used where needed. The public identity will force everyone to take responsibility for their words or suffer the consequences. It will also prevent tongue-lashings and account-settling stemming from political, personal, or other backgrounds, because there will always be someone there to expose the conflict of interest of the attacker and defend the attacked.

- **Mass review instead of review by the few**. The new platform will take us from the age of peer review to the age of mass review, where anyone who wants may review a paper; from the Age of the Cover (where you published) to the Age of Content (what you published); and from the Age of Confidentiality to the Age of Transparency. Instead of two to three reviewers, appointed by those with more authority and even more money (publishers and editors), who are asked to submit anonymous reports, there will be an unlimited number of reviewers whose responses are public and their identity known to all.
- **Unlimited upgrades**. Unlike journals, in which the review process concludes upon publication of the paper, the open platform will allow updating and polishing publications with no limit. Instead of a paper being rejected, and in actuality blocked, before being published, it will be open for review once it is in the ether (and if needed, will be revised and updated, and in extreme cases removed from the platform by the website administrators or the authors themselves). It's important to remember that when a large audience actively and continuously participates in the writing, editing, and updating, the feeling of involvement increases, along with everyone's commitment and responsibility to revise and update.
- **Feedback is an integral part of publication**. The open platform will allow every review, positive or negative, to accompany every publication and clarify its advantages and disadvantages, as well as the agreements or disagreements generated around it—the same way a review of a restaurant or a hotel is open to the public and serves it well.

When we described the idea of an open platform replacing the traditional journals to colleagues, the typical response was disdain and even shock. Many agreed that the traditional peer review method suffers from grave issues but described it as the lesser of two evils. The idea of an open scientific platform with minimum intervention and restrictions seemed to them a danger for three reasons: A) The concern that low-quality content will make it onto the scientific platform. With the high-quality and low-quality papers all mixed together, people will theoretically find it difficult to separate the wheat from the chaff and lose interest. B) The concern that the quality of scientific papers will deteriorate, because they will not be getting preliminary feedback from colleagues, which improves the final product. C) The concern that science will lose its reliability and credibility, and will allow all types of charlatans and con men to gain dangerous amplification.

Such risks and concerns should of course not be taken lightly, but it appears that in the new world of publication they are, for a number of reasons, becoming a thing of the past:

- Reciprocal reviews, with the purpose of correcting mistakes and offering improvements, are an efficient and welcome tradition that will naturally continue under any format. Either way, many scientists send their drafts to be reviewed by colleagues before sending the final version to journals. Publication on an open platform not only does not prevent reviewing, but indeed allows scientists to receive ongoing reviews, with no limit on time, place, or quantity, and thus improve and polish their paper in real time. The only thing that is lost is the option to delay or prevent the publication of the manuscript, which is not always done with clear and justified reasons, and without any responsibility on the part of the reviewer. The claim that people will fear making public criticism has been debunked by the multitude of preprint platforms. The social networks have also proved that publicity does not deter people from critiquing when they are confident that they are right. And in any case, anyone who cannot stand behind his criticism is better off keeping his mouth shut. Furthermore, it's entirely obvious that the review culture in science is conditioned, among other things, on a change in the method of evaluation and promotion of scientists. Once it is changed, fewer people will fear making their opinions heard in public.
- Attaching feedback forms, along with the authors' names and professional qualifications, to publications will bestow upon them a seal of approval, since readers will know who stands behind the review. This method is already very successful on the popular question-and-answer platform Quora, which was founded in 2010 by two Facebook employees with the goal of answering questions of every type. Within a decade, Quora has accumulated over 80 million registered users and half a billion visits every month.

  One of Quora's features is that the first answers on the list are from professionals required to identify by name, who in many cases also include a photo. However, there is no restriction on participating in the discussion, with everyone being able to comment. The site only censors spam and makes an effort to identify fake news. Commenters' identities help readers decide how much to consider each answer.

The beauty of this website isn't only the fact that it answers a wide variety of curiosity-inducing questions and publishes valuable information, including references, but also that it demonstrates how the wisdom of crowds and the multitude of varied voices works just as well with difficult and complex issues. Almost every question on Quora receives a vast array of responses for the simple reason that most questions in our world, including scientific questions, don't really have definitive answers.

It's important to emphasize, once again, that the word "crowd" in "crowd wisdom" misleads many by hinting that experts are being replaced by amateurs and self-proclaimed experts. That is not the case. The crowd includes everyone, without exception, including scientists and professionals. Eventually, since everyone has a right and is invited to provide feedback and review, the platform also identifies talented reviewers who are not necessarily from the professional mainstream—talents which would never have been discovered under the old method.

- With regards to reviewers, two are better than one, and one hundred are better than two. The higher and more varied the number of opinions, so the foundation on which truth is established expands. The rights given to two or three scientific commissars—professional as they may be—to respond to a paper and review it is a drop in the ocean compared to an endless supply of independent professionals and laymen, who see fit to respond to a paper seeing light on an open platform.

The traditional peer review model is based on the goodwill of scientists. There is no reason for this principle not to exist on an open platform. There is also nothing wrong with a chemist responding to a physics study, a philosopher to an engineering paper, or a doctor to an article on education. Just the opposite—it only enhances the reviews and, indirectly, the research as well.

In fact, the seeds for implementation of the "crowd review" model for science have already been planted in local initiatives. So, for example, two researchers have established a forum of 100 scientists who were asked to anonymously comment on a manuscript, while also being given the option to comment on the comments. At the same time, that same manuscript was submitted for traditional review by two reviewers. The comparison between the opinions found a distinct advantage in those of the wider forum.[786] At the same time, the crowd in this model was limited in number and included scientists only. In the future, reviewing will naturally be open to anyone interested.

- Perhaps some scientists aren't happy to hear it, but knowledge and wisdom is not their God-given right. The professional potential of crowd review is also larger than the potential of the reviews customary today among closed scientific journals because the open platform invites and respects comments by people outside the scientific elite.[787] That's how what has already been termed "crowd science," "community science," and "citizen science" came about.

It is seemingly hard to imagine the crowd reviewing scientific papers, with language not comprehensible to laymen, but there are thousands of science enthusiasts and self-proclaimed scientists working in the world today, who both wish and are able to respond to the happenings and innovations in their field of interest. If a professor of energy engineering writes about solar receptors, it is not out of the realm of possibility that his paper will be read, and perhaps even responded to, by entrepreneurs, technicians, teachers, homeowners with large roofs, environmentalists, politicians, and the simply curious. Each reader may raise an important comment or an inspiring question. Even a layman's question may help. After all, science's essence is to sharpen and clarify things.

Dozens of projects in medicine, biology, chemistry, physics, mathematics, game theory, Earth sciences, and space exploration already invite the general public to contribute from their wisdom, and thousands do this with pleasure—in these fields and many others—even though they don't hold an official degree. The method works with not-insignificant success even in industry, especially in high-tech, where crowd review is used for performance testing of software, applications and utilities in what is known as "crowd testing."

A demonstration of the great benefit of crowd review in science was provided in 2010, when a paper published on Science Express generated excitement and confusion at the same time. The authors of the paper, a research team headed by astro-biologist Felisa Wolfe, reported finding and growing bacteria able to survive in a poisonous environment and feed on its poison. They even dared claim that their earth-shattering findings would alter the search for other life forms outside of planet Earth. Since the platform was open, the news spread quickly on blogs and social networks, and a lively debate ensued. It led to the debunking of the scientists' claim by an experiment proving their findings could not be reproduced.[788]

In social sciences and humanities, crowd review is especially desirable, since a large percentage of papers in fields such as history, art, law, education, economics, psychology, or public administration interest millions of people. In these sciences it is important and beneficial also to obtain feedback from the participants in the study themselves, or those who know them. The biologist cannot get feedback from the lab mouse and the chemist does not talk to the molecule. But when a scientist publishes, for example, a paper on Mormons, there's no reason members of that community shouldn't be able to read what has been written about them, agree or disagree, add or correct.

- Unlike scientific journals, Wikipedia provides an accessible and efficient mechanism for reporting errors (we discussed the difficulty of locating and correcting errors in scientific publications in depth in the previous chapter). Each such report is immediately addressed and evaluated, which shortens the shelf life of mistakes to a minimum. Mills Kelly, a professor of history at George Mason University in Virginia, developed a course in 2012 dedicated to forgeries of historical information. One of the assignments he gave his students was to plant a fictitious historical incident on Wikipedia. The fraud was discovered within only 26 minutes. In an interview with an Israeli newspaper, Kelly was asked if the quick discovery attested to the efficiency of online mechanisms in identifying attacks on the truth. "Yes," he promptly responded, "I'll give you a completely different example which confirms it. A colleague of mine, who teaches the Civil War, found an error on Wikipedia in an entry regarding one of the events of the war. He decided to correct the error and created a Wikipedia user account, but in the ten minutes it took him to open the account and return to the page, the error had already been corrected."[789] There are also defense mechanisms on Wikipedia to protect from malevolent damage, such as changing the name of an entry, uploading an offensive or irrelevant photo, use of toxic language, slandering, and intentional biases. These defenses are supervised by Wikipedia users with special permissions and by qualified editors. Therefore, there is no reason that similar mechanisms for immediate reporting and correction, currently not available in traditional journals, should not be used on the new scientific platforms.

The new scientific publication model will no doubt have to address the growing dangers of recent years: fake news, online bullying, shaming and media attacks, conspiracy theories, loss of proportion, doubtfulness, and extreme cynicism. There will be no escape from learning how to filter and neutralize them, whether using technological means or whether through legislation and enforcement. There are already national monitoring systems in place in sensitive areas today beyond the borders of science. The FDA, whose approval is a condition for distributing a product not only in the U.S. but in many other countries, is only one example.

In any case, history has already proven that the human race fixes what needs fixing as we go. It's true that in our time the dissemination of lies has become easier than ever, but by the same token it is also easier to uncover lies and liars, and to condemn them and embarrass them publicly.

At the end of the day, a lie has no legs and the truth wins over time. Most people are naturally good, and the truth is only threatened by a wicked few who cannot take down the entire system. Social resources and moral obligation are on the good guys' side. So is technology.

6

The Measurement Madness

The Rating Crisis

Can we grade scientific products? Should we?

"Not everything that counts can be counted, and not everything that can be counted counts." This word of warning, attributed to Albert Einstein, seems in this day and age to be an apocalyptic prophecy come to life. In recent years, we have been producing and consuming more and more indices, scales, and rankings of all shapes and sizes, and comparing everything we can get our hands on: people, organizations, output, performance, qualities, profitability, impact, satisfaction, growth, decline, successes, and failures.

The act of ranking has always answered a deep human need to measure and compare (especially ourselves relative to others), but today's computer technology makes it easier for us to realize this urge. The rating madness is also to a great extent a product of the competitive American culture, which affects our lives in every aspect. It is a culture that often flaunts lists which showcase "the best," "the richest," "the most influential," "the most beautiful," and "the most delicious." It is also responsible for spreading the gospel of entrepreneurial and consumer economics, in which ratings and comparisons play a central role.

Many ratings are based on measurement by instruments, which is accurate and less biased. Others rely on human assessments that are inherently subjective and less accurate. There are also one-off ratings (such as singing competitions that begin and end on a single night), ratings that change and are updated regularly (for example, soccer league standings), and rating that summarize activity over time (for example, the annual rainfall). The act of evaluating and measuring a man-made creation and placing it against other works on a comparative scale requires accepted measurement tools. In modern culture, there are three such practices:

- **Expert panels**. A group of people well-versed in the given subject, who receive a great amount of public trust due to their expertise, experience, and sound judgment. Such panels are common practice, for example, in awards for literary works and cinema: a board staffed by experts receives a public mandate to elect the winners under clear and predetermined criteria.

  This method has three major drawbacks: A) There is usually a limited list of candidates (for example, members of the Motion Picture Academy do not watch all the films produced in the world before awarding the Oscar for Best Foreign Language Film). B) The criteria are narrow and arbitrary (the nominees of beauty pageants are picked based on norms of age, weight, and body type, and so the "judges" cannot crown a woman who does not live up to these norms, even if she is beautiful in their eyes. C) This type of judgment usually relies on qualitative variables such as "intriguing," "convincing," "outdated," "appealing," "boring," "beautiful," and so on, which are dependent on culture, location, and personal taste.
- **Public opinion**. Surveys express the opinion of a wide audience on a variety of phenomena, including assessment and rating of products and creations. The culture of radio and television has generated the concept of "ratings"—a measurement of listening or viewing rates, which places broadcasting channels and their programs on a popularity scale. It is important to note that there is not necessarily a correlation between ratings (which are a numerical measure) and quality. This is because ratings are based on subjective taste, that is, viewing and listening preferences at a given point in time. The social networks which have taken over our lives constitute a subtler measuring tool than ratings, because they provide users with a number of responsive tools: likes and shares of various kinds, which can also be quantified, alongside verbal responses.
- **Retrospective.** The underlying assumption here is that history is the best filter of quality. A piece of work that has been engraved in collective memory and survived for many years is usually quality work. It is true that such an assessment may be tainted by cultural, political, and other biases (including a generation's zeitgeist and the use of public relations), but you cannot fool all the people all the time, and true greatness is self-evident.

Science ranks its works using boards of experts, mainly through peer review and rating measurements. Peer review is supposedly intended to filter out articles that are worthy of publication and improve them, but it indirectly creates ratings, since scientists are also measured by the prestige of the platform. Once a scientific work is published, readers rate its quality: they recommend good articles or books to one another and thus create an accumulative rating. However, this is not the meaningful index de facto. Since everyone has become addicted to statistics, the rating of a scientific work today is determined by a quantitative index: the number of times that the article is cited in subsequent articles.

That science has been researching and mapping itself is not a new phenomenon, as it is accustomed to measurement and oriented towards excellence and competitiveness. This ethos dictates that it is important not only to accomplish the task, but also to be the first and the best. Sometimes it seems that excellence in science is more than a means—it is an end that has gotten a little out of proportion. Not only does the academy measure and compare everything that is measurable and immeasurable in order to assemble scales and crown the outstanding, it is also drowning in pompous ceremonies of honor and glorification. Many lectures at seminars and conferences open with a ceremonial and lengthy presentation of the speaker's titles and achievements. This is also why every academic staff member's resume is a painstakingly written scroll of publications, awards, grants, and accolades. Everything is neatly stacked and numbered down to the last detail.

A combination of factors in recent years has increased the motivation of scientists to measure and rank themselves: the global trend to make information as accessible as possible; the fierce competition between institutions and scholars; and the growing weight that has been assigned to the measuring of output as a condition for funding (as we discussed in a previous chapter).

In addition, accumulated knowledge and experience in the field have also contributed to this growing trend.[790] Measuring scientific output has already become a research discipline in itself—scientometrics—and has given birth to thousands of studies that examine, analyze, and improve rating tools and formulas.[791]

But another important factor has contributed to this development: the databases of indexed scientific publications. That is, registries of indexed articles, which make it much easier to access articles, perform searches within each article, and generate statistics of various kinds.

The founding father of scientific indexing was Eugene Garfield, who founded the Institute for Scientific Information (ISI) in 1960. Four years later, Garfield introduced the first citation index of science articles (the SCI – Science Citation Index), on the basis of which a bibliometric report was produced summarizing the annual activity in scientific publication (JCR – Journal Citation Report). This report, which was initially published as a booklet and later also as a microfiche (the less common brother of the microfilm), included in the first few years only statistical information about the articles published that year, including their citations, categorized by time and fields. Later on, charts of record-holders by the number of citations also appeared in the report. By 2002, the data could be purchased on CD, and since then the repository has been available on the Internet (for a fee). The Science Citation Index, which was later named Web of Science, has expanded and undergone various transitions of ownership. It was purchased in 1992 by the communications and information giant Thomson Reuters, and was purchased in 2016 by Clarivate Analytics.

Today's world of science includes a variety of indexed registries of scientific publications. These differ in terms of volume; in the variety of items and the fields they cover (some also include articles from the general press, books, doctoral dissertations, and articles produced in the frameworks of conferences); in the attributes of the product (mere titles and abstracts, or full texts); in their accessibility (whether access is free or paid for); and in the kind of statistical information that can be retrieved from the publications (number of citations, links, impact indexes, etc.).[792] These are proverbial gold mines, which is why the "sharks of scientific publication" gradually devour the lightweights (the small and more focused indices). Every such swallowing expands and upgrades their large reservoir.

In addition to the well-established Web of Science (which has been expanded and is also called Science Citation Index Expanded), four more major indexes are currently operating: Scopus (launched by Elsevier in 2004); Google Scholar (also launched in 2004); Microsoft Academic Search (launched in 2016 as a search engine for academic literature); and Dimension (launched by Digital Science in 2018, it also offers patents, clinical trials, research proposals, policy papers, and more).[793]

Apart from the general databases, there are field-based databases. The leading ones are CiteSeerX for computer science; PubMed Central for life sciences and biomedicine (produced and updated by the American National Library of Medicine, NLM); ERIC for education; ERIH PLUS for the humanities; PsycInfo for psychology (the digital version of the longstanding database of psychological abstracts which was printed monthly for 80 years. The database is currently maintained and updated by the American Psychological Association, APA).[794]

Along with the international databases, there are also journal repositories at the national level, usually in the local language—for example, the Szold Institute, which deals with publications in education and the social sciences.

There are also advanced software programs on the market that enable the processing of data extracted from the various databases. The most commonly used ones are InCites, which is based on the Web of Science; SciVal, which is based on Scopus; and Publish or Perish, which draws data from Google Scholar.

Researchers and institutions follow the scientific ratings charts closely, driven by curiosity and a desire to translate into numbers their professional value relative to others. But the nature of statistics is that it takes on a life of its own, and eventually transforms from a means to an end. The process that the academy has undergone in the field of self-measurement is one of the strangest stories of our times, and constitutes another element testifying to the state of decadence into which academia has sunk.

Tell Me Where You Published, and I Will Tell You What Kind of Scientist You Are

The Reference Criteria

The notion that one can infer a paper's value by counting the number of times it has been cited was prevalent in science as early as the beginning of the twentieth century,[795] but it took years before the idea to build statistical scales of scientific quality based on the number of citations was born. In 1972, the Institute for Scientific Information published information for the first time on an "impact rating" of scientific journals, and since 1975 it has been published annually.[796]

The assumption of the thinker behind the idea, the aforementioned Eugene Garfield, was that the more important an article is, the more the scientific community would cite it. Because a journal contains several articles, and because the articles are not identical in importance (each one is cited a different number of times), in order to gauge the quality and prestige of a given journal, one must calculate the average number of citations for articles published in its issues within a certain timeframe. Garfield delineated a two-year limit.[797]

Journal impact factor for a particular year was therefore defined as the average of citations to articles published in the same journal in the two years preceding the measured year (the information is based on the SCI article index that was later converted to WoS, as mentioned above). For example: To calculate the impact factor of the journal *Samson* for the year 2018, one needs to sum up the total number of citations of articles published in *Samson*'s issues during 2016-2017. The sum then needs to be divided by the total number of articles published in *Samson* during the two previous years; that is how you get the average. If the number of references in those two years was 1,500 and the number of articles was 50, *Samson*'s impact factor for 2018 would be 30.

The impact factor distribution of journals included in the annual rankings usually ranges from 0 to 50 (with a few exceptions, which can reach up to 200). Due to the structure of the formula (the number of citations divided by the number of articles), the journal with the highest impact rating is not necessarily the most frequently cited journal in the last two years. In 2017, for example, all of the articles published in the *CA* journal (which covers clinical cancer research), which was situated at the top of the list, received a total of 28,839 citations, while the articles published in *Nature*, which only came in 11th, were cited almost 25 times more (710,766). The articles published in *Science* (13th place) were also cited a considerable number of times (645,132).

The most prestigious scientific journals are characterized by a combination of a high IF and a large quantity of citations. This honorable list usually includes the following journals: *JAMA*, *Nature*, *Chemical Reviews*, *Lancet*, *New England Journal of Medicine*, *Journal of Clinical Oncology*, *Cell*, *Chemical Society Reviews*, *Science Circulation*, *Advanced Materials*, and *BMJ*. Publishing in these journals—and especially in *Nature* and *Science*, which have become an almost religious academic myth—is the heart's desire of every scientist. When an article is published in one of them, not only do its authors celebrate, but so do the institution that employs them.

Garfield's vision was humble. He figured that the index would help libraries prioritize the purchase of journals, and help scientists choose the articles best suited to their research and writing. In practice, the use of the index has become more widespread and significant, and has turned into the most important tool in the academic world for measuring performance, achievement, and scientific prestige. Today there are hardly any forums or scientific committees that do not use this index—from promotion and tenure committees in institutions of higher education to think tanks, research councils and various financing bodies, and even companies that rank institutions and countries.

Influence and Quality – Is That So?

Criticisms of the IF index and how it is utilized have appeared since its inception, and have only intensified over the years. In 1997, a professor named Per O. Seglen from the Nordic Institute for Studies in Innovation, Research, and Education [NIFU] in Oslo wrote an article with the straightforward title "Why the impact factor of journals should not be used for evaluating research." The article systematically reviewed the deficiencies of the IF and was cited more than 1,700 times. A year later, Seglen published a series of articles that attacked the objectivity of the index from several other directions.[798] This attack sparked a wave of research and other critical articles, which challenged not only the method but also the very rationale on which it was founded, pointing to the damage it caused to both science and scientists. We will now summarize the main arguments of the critics:[799]

- **Judging by the covers**. Is it possible to give a scientist a qualitative score based on the citations of his articles? In principle, yes. But then one of the following methods would have to be applied: A. Measuring the total citations of a scientist's articles. B. Checking if there is one article, or perhaps more, that was cited a considerable amount (of course it would be necessary to define exactly what counts as considerable). The problem is that the quality of the articles is essentially determined based on the prestige of the platform in which they were published, i.e. its IF. That is, there is an indirect rating based on the citations of the journal in which a paper was published, instead of the citations of the article itself.

  How did this come to be? Why did the cover become so central in academic culture? The answer to this question is sociological rather than statistical. The scientific rating culture was shaped in the spirit of English and American culture, in which a person's social status is based first and foremost on the groups and associations with which he or she is affiliated. For example, the question of what institution you attended is more important than the actual subject you learned—certainly much more than what you actually know (this is also what drives the American obsession with admissions to prestigious universities).

  But there was another reason for this method of ranking. As it is largely difficult to accurately distinguish the qualities of different articles (and of scientists) and because most articles contribute little to the general ocean of knowledge and do not break any new ground (and are thus also cited more or less equally)—emphasis was placed on the venue; that is, the journal and its rating. One can supposedly argue that just as Harvard is selective in its admission of students, so is *Nature* in publishing manuscripts. Therefore, the very act of publishing on such a demanding platform indicates quality. But, as is well-known, strict selection (certainly one that is based on a problematic filtering procedure) does not guarantee quality. Moreover, narrowing the criterion of quality solely to the platform misses out on noteworthy articles and therefore also does an injustice to scientists. And more importantly, it reinforces the crooked norm of judging a book by its cover instead of its content. If we may revisit the previous comparison: Many scientists who did not study at prestigious institutions have become leading scientists in due course.

- **A self-fulfilling expectation**. Some argue that the problem of the IF is only in its far-reaching use and not in the formula itself. That is, if science had stuck to Garfield's original goal—ranking journals—there would not have been a problem. Even Garfield himself expressed disapproval of the irresponsible use of IF for rating articles and, indirectly, also scientists.[800] One might agree that the index is not effective for high resolutions, that is, to distinguish adjacent positions on the scale (for example, between the 30th place and the 35th place), but it can distinguish between quality groups (for example between the upper quarter and the bottom). This argument is problematic for two reasons: 1. In practice, the main use of the IF index is for labeling articles and scientists. 2. The journals that are situated high up on the chart become a coveted goal for scientists, institutions, and funders. Therefore, a self-fulfilling prophecy is formed: The journals with the higher IF ranking receive more submissions, and therefore can choose from a considerably larger pool of options. In addition, these journals are usually the first priority of studies which have a higher potential of being cited.

  On the face of it, there seems to be nothing wrong with the existence of a select and limited group of prestigious journals that publish articles of exceptional quality and innovation. But what is the point in producing a pretense as if the competition for the lead starts from scratch every year when in fact the leading team at most plays a game of musical chairs among themselves? This, while all the others are essentially sitting on the sidelines. Moreover, an exclusive platform is one that should include articles that have already been published in a variety of platforms and received exceptional resonance, i.e., ones with something to show for and not with mere potential (which of course is not always realized).
- **Citations are not necessarily a mark of quality.** The assumption that the number of citations an article receives constitutes a sign of its importance has yet to be proven. No one denies the claim that there is a causal link between the number of citations and quality, and it's clear that more important articles are cited more often, but that is only one indication of quality. Articles are mentioned and cited not necessarily because of their quality, but also if they are more readily available online or in the library—or whether it's *en vogue* to mention them. In many cases, an article is cited only to refer to its general topic or idea and not because of its exceptional quality.

  Most citations are centered in the introductory chapter (the literature review section) of the scientific article, which in many cases is more of a perfunctory and technical procedure. Not all scientists bother to conduct a comprehensive literature review, and they certainly do not perform a careful reading of all of the relevant articles. Many simply re-cite what their predecessors cited. The phenomenon where everyone cites the same age-old source out of habit has found its way into the jargon of researchers in the Israeli Technion and has been nicknamed "Newton-ing": None of today's scientists read Newton's original writings, and everyone cites the one who cited him first (and not necessarily in an accurate manner). The phenomenon has been exacerbated in the age of search engines. These offer the most popular articles, making them yet more popular, and thereby strengthening the dynamics in which an article that has already gained a considerable rating continues to build up an even higher rating.

It is not uncommon for authors to cite the most recent articles, not necessarily the most important ones. There is also a tendency to prioritize citations of articles that appeared in leading journals, assuming these are also the most important ones (this is one of the reasons for the stable hegemony of today's leading journals). Furthermore, it is very common that certain citations are included in articles—especially in the social sciences—for "political" reasons, i.e., to please a referee or an editor. On the other hand, a scientist sometimes has a vested interest (conscious or unconscious) in overlooking or downplaying previous research, so as to be considered an innovator or to avoid having to deal with adversarial studies.

Many may assume that an article is widely cited when it constitutes a scientific breakthrough or presents an innovative theory. In practice, the most frequently cited articles are technical ones, which provide scientists with operating instructions. In October 2014, *Nature* published the list of the 100 most cited articles of all time (according to the Science Citation Index). Making the prestigious cut required a minimum of 12,119 citations, but it turned out that only a part (and quite a minor one at that) of the 100 popular articles actually revealed significant discoveries about the secrets of our existence. Dozens of trailblazing articles, which earned their authors a Nobel Prize, were not included on the list. Most of the articles which made it onto the list surveyed research methods or computer software. For example, the authors of the article that came in 29th were British statisticians who surveyed the imaging technique of a particular visual measuring method. The idea wasn't even original and was presented 14 years earlier, only that their method was more user-friendly.[801]

Coincidentally, the most-cited article in the history of science (more than 305,000 citations by 2014) was published in 1951 and dealt with how to calculate the amount of protein in a solution.[802] Its senior author, biochemist Oliver Lowry, himself expressed amused bewilderment at his article's inflated fame. "Although I really know it is not a great paper," he said in 1977, "I secretly get a kick out of the response."[803] Other scientists maintain that the amount of citations their articles received does not necessarily reflect the articles' quality. For example, in a survey of the most widely cited scientists in the field of biomedical research (during 1996-2011), 16% of respondents stated that their finest published article was not among their ten most-cited articles.[804]

- **Technical and psychological biases**. The IF index was supposed to be influenced only by the quality of the articles' content, but it seems that the technical aspects of the publication also affect the measurement of the index. Articles that simplify complex insights into clear terms are cited more often, even if they don't introduce anything new; reviews that summarize topics are cited more than research papers because they are a gold mine for bibliography;[805] short articles are cited more than long articles (some journals impose severe restrictions on the length of articles, or charge a fee for every page that exceeds the limit);[806] and even the length of an article's name affects the number of times it will be cited (a study found that the shorter the headline, the more likely an article will be cited).[807] A lesser-known journal will get a smaller number of citations, regardless of the quality of the articles published in it.[808] Naturally, articles published in open access journals are also cited more often, as are the journals included in the packages purchased by most university libraries.[809]
- **Journals with the highest IF are not necessarily those in which the most important articles are published**. Ostensibly, journals that produce the highest-quality articles (which garner them a high IF) are the ones who implement the most rigorous selection processes, i.e., pre-select the best articles in advance. One might also expect that these journals would publish most of the prominent and groundbreaking articles due to the meticulous filtering. But as we mentioned in the previous chapter, studies show that this doesn't conform with reality. A research report published in 2016 by the editors of *Frontiers* (one of the major open access publishing platforms) found that there was no correlation between the acceptance rate of articles by a journal and its IF value (the test was performed on 570 journals). That is, there are journals with a low IF and high rejection rates, and there are also journals with a high IF and low rejection rates (it should be noted that various aspects of this study have been criticized, including its sampling process and

degree of generalization; however, the study is still important). *Frontiers* itself is an example of a platform with a relatively low rejection rate (less than 30%) but with a high impact rating (ranked fifth on the list of most-cited publications).[810]

It's important to note that the owners of *Frontiers* are not necessarily such good Samaritans. The relatively low rejection rate that characterizes their journals is likely, and perhaps even mainly, due to the high price they charge the authors for publishing ($2,000-$3,000). That is, there may be some kind of barter going on.

Quite a few (and some might go far as to say that most) of the innovative papers in science are published in niche journals, whose IFs are usually in the medium to low range. In fact, groundbreaking scientists are better off directing their manuscripts to less glamorous platforms because their chances of being rejected there are lower and because they are less conservative. Furthermore, many geniuses turn to second-division journals in advance precisely because they don't need the external status symbol. They know very well what they have in their hand.

- **A non-transparent process**. Another criticism leveled at the IF is that its method of calculation is not transparent. Clarivate Analytics, as well as Thomson Reuters which came before it, keep their cards close to the chest, don't divulge their data, and don't reveal the considerations for the inclusion or exclusion of a journal in the exclusive list.[811] The SCI database, on which the calculation is based, covers only some of the scientific journals published worldwide. And as we have already noted, even if this partial database includes most important journals in the natural sciences and the exact sciences, the situation is entirely different when it comes to social sciences, humanities, law, education, and the arts. In fact, a whole universe of publications with a high scientific value—most of which are not in the English language (but rather in Chinese, French, German, Spanish, Russian, and more)—exists under the radar of IF, in journals that are not indexed in the central databases.[812] Ignoring these not only reflects a linguistic-cultural arrogance, but also does an injustice to important journals, important scientists, important papers, and most of all, important findings.[813]
- **The measurement range is too short**. The time window (two years) wherein citations are counted is too narrow, especially when it comes to groundbreaking research, the importance of which may only become apparent after years. Just like technological innovations and revolutionary ideas, groundbreaking scientific articles also don't always receive proper attention

at the time of their appearance, because they are ahead of their time. On the other hand, studies have already shown that high but short-term ratings do not predict long-term impact, and many works (in science as in art) that gain a brief moment of fame fade and dissolve like comets.[814]

- **The discipline advantage**. The IF Index grants statistical advantages to journals in specific scientific fields. The smaller and more focused the journal, the smaller its potential for being cited, while the index of multidisciplinary journals is particularly high. In dynamic areas such as computer science, economics, biochemistry, and genetics, scientific generations are exceptionally short, and each generation cites its predecessor which came a year or two before—thus providing them with a statistical edge. Medical journals also enjoy high IF values because the lifespan of most articles in this field is short, and they are cited almost exclusively in close proximity to their date of publication. In contrast, in fields such as mathematics, physics, sociology, history, and philosophy, it is customary to cite foundational articles and theories published in the more distant past, and these many citations are not reflected in the index.[815]

  The benefits of certain disciplines are reflected in the ranking charts. For example, while reputed journals in chemistry reach an IF higher than 30, reputed journals in mathematics don't even reach 10, while those which deal with psychology are forced to settle for an IF lower than 1.[816] Moreover, this bias exists even within disciplines. Articles in the fields of biochemistry and molecular biology, for example, are cited five times more than articles in the field of pharmacy.[817] To overcome the problem, standardized impact indices have been developed, in which the ranking is determined relative to journals from the same scientific family (the journals are ranked by cross-sections of a broad research field, more focused research fields, geographical area, or country). The most well-known among these are SCImago and SNIP, which are based on the Scopus repository.

  But the standardized IF doesn't solve the problem either, for several reasons:

  - Not all research fields enjoy such adjusted calculations, and not all journals are included on the list. For example, SCImago's ranking list includes only 21 Israeli journals, while the list recognized by the Israeli Council for Higher Education includes about 200 journals (some of which are important not only on the local but also on the global level, for example in the fields of Middle East studies, Judaism, law, Hebrew literature, and more).

- Interdisciplinary articles fall between the cracks. There is, however, an improved index—Percentile-based Impact Factors (PIFs)—designed to overcome the problem by ranking journals in each discipline by percentiles, and so when a journal is interdisciplinary, it enjoys multiple ratings—a rating for each discipline. But beyond the methodological problems caused by this index (which we will spare the readers), it is very pedantic and complicates the measurement to such an extent that it seems it has solved the problem only for those who enjoy fiddling with numbers.[818]
- A great deal of the committees that use IF as a quality index do not use the standardized index.[819] In many cases, even those who use it don't quite understand the statistical procedure.
- In the humanities, standardizing also doesn't help to get an accurate picture, since most journals in its various fields are not even included in the database that is examined for calculation of the index (to overcome this problem, at least in part, the highly regarded scientific councils and sometimes also academic institutions publish a list of journals that are recognized as scientific publications, and in many cases, they are ranked by expert committees according to three or four levels of quality). Moreover, since the average number of citations for articles in these fields is very low to begin with (in the humanities, it's less than two per article),[820] any citation whatsoever may significantly bump up the standardized IF. This is also why the indexes of small journals, which publish a limited number of articles each year, are characterized by high volatility. It only takes one article with a high (or low) rating to dramatically change a journal's citation average.[821] In order to distinguish between journals whose IF is less than 10, another index was invented—Impact Quotient (IQ), which makes a more sensitive distinction among journals with similar impact ratings—but its use is not widespread. In any case, it is useless to rate journals whose differences are tiny and in fact random (and these are actually the majority of journals).[822]

- **The false pretense of the average**. In order for a journal's IF index to accurately represent the impact of the articles published in it, there should be little variation between the number of times its articles were cited. Studies have shown that in most journals, not only is the variation large, but the distribution of the articles' citations is not in the form of a normal curve, and the average is affected by out-of-the-ordinary articles. This effectively destroys the statistical legitimacy of projecting a journal's IF onto the articles published in it. In fact, there is a low correlation between the journal's IF and the impact (number of citations) of the articles published in it.[823]

A famous article titled "A Short History of SHELX" illustrates the skewing impact of irregular articles on the IF of journals. The author, Prof. George Sheldrick, included a recommendation to refer to the article when defining a crystal structure using SHELX software. Following this recommendation, the article gathered more than 6,600 citations, which bumped up the IF of the *Acta Crystallographica* journal from two in 2008 to 49.9 in 2009—well above *Nature* (31.4 in that year) and *Science* (28.1). The second-most cited article in *Acta Crystallographica* that year garnered only 28 citations.[824]

The great variance in the number of citations is characteristic of even the most prestigious journals.[825] For example, one study found that 90% of *Nature*'s IF relies on citations of only 25% of the articles published in it.[826]

- **The rating is worthless for most journals in the world**. Those who are unfamiliar with the world of scientific publishing may assume that scientists have decided to measure the quality of their publications according to the number of citations because each publication is cited tens and possibly hundreds of times. But as we have already mentioned in the chapter which dealt with the inflation of publications, most scientific articles are mentioned very little, if at all. And what is even more embarrassing is the fact that also the articles which do appear in the rated journals (those in the SCI database) are cited a negligible number of times. And so, from the list published in 2017 which included 12,298 journals, only 239 (1.9%) had an impact factor greater than 10. The leading 5% of the list received only an average of 6-50 citations. In fact, the impact factor of about one-third of the list was less than 1! This means that the articles published in them were cited no more than one time on average.[827]

  By the way, when measuring citations of individual articles, it turns out that of the 60 million articles that appeared in the WoS-SCI database in 2014 (by 2018 the number had already grown to 74 million), only about 5,000 articles received an impressive number of citations (over a thousand). The rest weren't even close to this amount.[828] The median number of citations of articles catalogued in WoS stands only at 1.[829]

  As mentioned, the low to non-existent impact factor phenomenon is prevalent mostly in soft science journals. Most of them don't reach an impact factor of 3, and many lag below 1. In a 2014 study, it was found that 82% of articles in the humanities were not cited at all, as were 32% of social science articles, 27% of natural sciences, and "only" 12% of medicine.[830]

Consequently, it's not surprising that when a lecturer who was expecting a promotion wondered in one of *The Chronicle of Higher Education*'s forums what counts as a good IF in the humanities, the entertaining (yet accurate) answer he received was: "0 quotes is considered 'good.' One quote is considered 'excellent'".[831] The bitter joke is that many institutions insist on requiring that members of these faculties indicate the journal's IF in their CV next to each of their publications.

Since the IF is irrelevant to most journals in the humanities, states and institutions (Israel among them) issue a list of local journals that are recognized to be of high quality, i.e., worthy of inclusion in scientists' resumes and for differential government funding of institutions. The lists often include a quality-based division (first-rate, second-rate, etc.). The criteria in this case are not statistical and are based on the discretion of the committee members appointed to create the scale. But, of course, once the rating is intuitive, countless noises, such as the subjective image of journals or the rankers' familiarity and experience, come into play. So here, too, the motto is that the cover is more important than the actual content of the article.

- **The subjective interpretation of the numbers' meaning.** Most and perhaps all of those who have examined the rating indices, most notably the IF, have discussed the questions of statistical formulas and methodologies. But for some reason, the issue of how these indices are used in practice (in promotions and budget committees)—a question whose answer is observational (sociological)—has yet to have been tested. People assume that committee members understand the underlying methodological and statistical rationale of the indices. In practice, many of them, perhaps even most of them, have no clue what the differences are between the indexes, as well as their limitations and biases (from an unrepresentative sample we gathered of faculty members, including deans, who attended discussions about job applications, promotions, or grant allocation, it seemed that most of them exhibited an incredibly shallow understanding of the different indices).

  But what's even worse is that even when a committee member receives information on the rankings of each of the articles appearing on a candidate's CV, he has no tools to assess the significance of the number relative to other articles, other journals, and other scientists. Furthermore, even if we suppose for a moment that IF is a reliable and accurate index that statistically ranks the quality of a particular article, the committee member is still required to consider the overall impact of the entire body of articles of a given candidate. But for this task, there are neither tools nor official standards. In fact, even

> when the numbers are weighted, it is still unclear what they have to say about a specific scientist relative to others. Does it mean that one is excellent and the other just plain good? Does it mean that this one deserves a promotion and the other does not? And if so, why? After all, everyone writes articles that undergo scientific evaluation. Rather absurdly, from all the cornucopia of ratings and comparisons, what remains in the end is an intuitive and subjective impression, i.e., one based on a general sense.
>
> To facilitate the interpretation of the numerical rankings, the rating scale was split into four levels: the top 25% which received the highest rating were defined as Q1, and the lowest-ranking 25% were defined as Q4. However, this division is also artificial and not too helpful. This is because in practice, in most disciplines, if not all, the average differences between the quarters are not very substantial, and the interpretation given by members of committees for this schematic and in fact arbitrary division is still subjective. The problem is that this interpretation not only ranks scientists in some meaningless league but determines people's fates, as it is used for a binary decision (hired/not hired or promoted/not promoted).
>
> Moreover, the distribution into degrees of quality sends a bad message: Even if you went through the publication procedure in a peer-reviewed journal which is included on the list, you can still be ranked as a mediocre scientist. And what's even more inane and awful is the dismissive message sent to the magazines who didn't make the cut of the top quarter: you're not up to snuff, so you are not counted for the purpose of determining the quality of scientists.

Paradoxically, if we accept the equation of citations = quality on which the impact factor relies, the terrible conclusion is that most scientific articles published to date (which have been cited only a few times, if any) are worthless and embody a big pile of nothing. In fact, in this crooked reality, most scientists and most journals are no more than extras in a theater production, whose role mainly boils down to emphasizing the presence of a smaller number of stars.

Given that the IF rating is relevant only (if at all) to an infinitesimal and negligible proportion of all scientific journals, it is somewhat strange that science continues to put it on a pedestal. Even if one settles for the goals set by Garfield for the index he created—that is, to help researchers and libraries pick the journals and articles that are right for them from the wide assortment available—even then, this index is worthless today. As you well know, search engines perform this job quickly and efficiently by every possible standard.

But above all: The whole notion of marking quality through periodically published rankings is anachronistic and irrelevant in the digital age. If one wishes to highlight articles that deserve special attention, it's best to concentrate them at a well-known address. For example, there are sites on the Internet that gather interesting and recently published articles or posts for surfers. A hint that the idea may catch on in the future in the realm of science as well can be found in a relatively new journal, the *Journal of Digital Humanities*, which provides its readers with important content that has recently appeared in the humanities literature. Another example is the forum MathOverflow, which serves as a platform for sharing important content in and by the math community,[832] and the journal *F1000Prime*, which publishes scientists' recommendations of thought-provoking articles in the fields of biology and medicine.

Everything for a Good Place on the Charts

Measuring achievements is important for progress, but when the quantitative metrics become a goal in and of themselves, the result can be devastating. There are many examples of organizations whose worship of the gods of statistics not only failed to improve their performance, but even worsened it. This happened, for example, to the Israeli police, which at the time required its police officers to fill a certain "report quota" and even rewarded those who performed this task with a mark of "outstanding achievement." The underlying assumption was that the measurement would encourage competition between the units and improve their performance. The result was the opposite: an increase in false reports and a redirection of resources to locations which yielded additional reports rather than places of actual importance. After many complaints about police behavior were received, the measurement was canceled.

But it turns out that science doesn't learn from the experience of others—and in fact, not even from its own research. Over the years, the scientific publishing market has become a wild jungle, in which a high rating justifies almost every means, including manipulations and in extreme cases even deceptions.[833] In the previous chapter, we reviewed the dirty game played by scientists, and here we will review that of journals (and sometimes of the publishers who produce them).

Each of the journals has a vested interest in improving its position in the IF index, not only to gain prestige (which also translates to money), but in many cases simply to survive, as a low rating can be equal to a death sentence. Here are some of the most notable IF manipulations conducted by journals, as reported by various studies:

- **Easier admission for potentially high-rating articles.** The editors' motivation to publish articles that will reap numerous citations makes some of them reckless with regard to publishing sensational studies, even before these have undergone a thorough credibility check, and spreading the news via the general press.[834] Because names also "sell," well-known scholars are also given priority in publishing (through agile and sympathetic peer reviewing).[835]

Review articles (known to be citation generators) are also given artificial priority and are often incorporated into issues of journals without a justifiable professional reason— merely to raise the potential of citations. For the sake of illustration, the prestigious journal *Clinical Pathology* published 230 research articles and only five review articles in 1989. Twenty years later, there were only 184 research articles published—and 38 review articles (nearly eight times as many).[836]

Thomson Reuters caught the drift and began to include only research articles in its measurement of articles. But the cat-and-mouse games go on: just as school administrators send the weaker students home when comparative exams are conducted, so journal editors transform articles with a low citation potential into an uncountable category (so that they won't damage the average). For example, by omitting the abstract or bibliography, which converts a "citable" scientific article into an uncountable article.[837]

- **Publishing promising articles at the beginning of the year.** Since the impact index is calculated at the end of each calendar year, articles that are published at the beginning have more time to gather citations.[838]
- **Self-citing**. In the past, editors exploited the opening article of the journal (the editorial) or the "letters to the editor" section to plant citations to articles which they themselves had published. An extreme case that indicates the general trend is that of the journal *IJNSNS* (International Journal of Nonlinear Sciences and Numerical Simulation), wherein the editor and two other editorial staff contributed nearly 30% of the total citations to articles published in this journal in certain years. This trick placed IJNSNS at the top of the applied mathematics journals category.[839]

  The phenomenon of self-citation became so common (and had already received its own Wikipedia page), that a need arose to develop software to recognize artificial citations.[840] Thomson Reuters made use of such software and began publishing a standardized IF, cleared of self-citations. Much to their embarrassment and ridicule, the clean ranking did, in fact, change the positions of several well-known journals in the table.[841]
- "**Forced citing**." This is a manipulation in which editors suggest that authors cite articles published in the journal during the past two years or reviewers recommend citing their own articles. In most cases, this is a seemingly

innocent recommendation, but those whose articles are in the process of review readily take the hint.[842] In a survey published in 2012, 20% of scientists reported receiving such recommendations. 80% of them deemed the recommendation to be unethical, yet most of them complied in order to improve the chances of publishing their articles.[843] In a 2019 online survey held among 4,300 *Nature* readers, about two-thirds reported that they felt pressured by reviewers to cite their articles, even though the said citation was superfluous with regard to improving the manuscript.[844] This constitutes another example of the moral corruption that the measurement culture brings with it.

- **Citation cartels**. If we are already dealing with the subject of corruption, we might as well specify another custom designed to raise the IF level. Much like "review mine and I'll review yours" and "publish mine and I'll publish yours," it is also customary today among editors that "I'll cite yours and you'll cite mine." That is, publishers publish review articles with many references to articles that have been published in a certain journal, and the editor of the aforementioned journal returns the favor. Several journals which were caught red-handed practicing cartel-like behavior have already been expelled from the count and deprived of the right to be included in the IF indexes.[845]

Phony Protests and Reservations

In 2006, three scientists from Singapore published an article entitled "The journal impact factor: too much of an impact?" The authors reviewed the research literature published until then on the subject, and concluded that the use of IF should be more cautious and limited.[846] Although the article was not published in one of the leading journals, it proved an important impetus for the development of a critical discourse on the growing use of this problematic index. Some of the critics used harsh expressions, such as "The impact factor is a pointless waste of time, energy, and money and a powerful driver of perverse behaviors in people who should know better. It should be killed off, and the sooner the better."[847] Over time, leading scientists and senior editors joined the critics. For example, in 2008, the editor of *Nature* published (not in his journal, of course) an article called "Escape from the Impact Factor." His recommendation was to develop an alternative benchmark.[848]

Two years later, *Nature* initiated a series of surveys and interviews aimed at examining the extent to which statistic indexes are used in scientific culture.[849] The findings showed an interesting but unsurprising gap between senior management and administration in institutions of higher education and members of the academic faculty. While most of the faculty members were dissatisfied with the academic system's frequent use of statistical metrics in order to make personnel-related decisions (recruitment, granting tenure and promotions), most managers argued that these metrics played a marginal role in their decisions, and expressed satisfaction with the institution's decision-making process.

But if you by any chance thought that reluctance about the overuse of quantitative indices would cause the academic herd to open its eyes and cease its use of IF immediately—you would obviously be wrong. When faculty were asked in the survey to offer a reliable criterion for evaluating the quality of science (from a list of criteria they were offered), they put "publishing in high-impact journals" in first place. Even the study's authors acknowledged that there was a strange gap between the faculty's criticism and their effective conclusion. The interviewees themselves did not see the contradiction and settled for a recommendation to use statistical indices more clearly, and with more consistency and transparency.[850]

Over time, criticism and protest against the IF have shifted to seemingly more practical lines. More and more academic institutions and organizations (including some with great influence and prestige) have issued warnings concerning the use of the index for evaluating articles and scientists. These include the British and Australian councils for the funding of higher education (the REF and ERA, respectively), the European Association of Science Editors (EASE), the American National Science Foundation (NSF) and the German Research Foundation (DFG).[851] Particularly prominent was the 2013 "DORA Declaration" (Declaration On Research Assessment) which was signed by dozens of editors, thousands of scientists, and hundreds of academic institutions, scientific associations, and journals around the world.[852] The declaration enumerated some of the main drawbacks of the IF, and several recommendations were provided. The main one was to avoid using the index when making decisions on matters of funding research, appointing scientists, and promotions. Another issue that was emphasized was the need to measure the quality of each study on its own—according to its content and not according to the platform on which it was published.[853]

2016 may be remembered as the year in which the criticism raised against the excessive use of IF was kicked up a notch. During this year, *Nature* published a series of critical articles leveled against the IF. One of these, whose title was "Time to remodel the journal impact factor," claimed that relying on metrics in general, and on the IF in particular, when measuring the performance of scientists, was misleading and dangerous. The desperate need to publish in a journal with a high IF, asserted the article, creates unnecessary pressures and disappointments, and in fact undermines science.[854]

In the same year, 11 editors of leading journals (among them *Science*, *Nature*, and *PLOS*) initiated an examination which found that 75% of the articles published in their journals were cited fewer times than the journal's average—the same average that defines the height of their IF. The conclusion was clear: the index does not rank articles at all. Although this was nothing new (as we have already explained), the fact that this time the criticism stemmed from such prominent publishers and was somewhat of a self-observation in the mirror made it an important milestone.[855] "Thomson Reuters," the producer of the index at the time, had to capitulate and admit that the critics were right and that articles, and even more so scientists, should not be judged using this index. Of course, it nonetheless refused to admit that there was no actual value to the index it was producing.

John Bohannon, one of the most prominent science journalists, echoed the significance of these findings in an article published in *Science* under the unequivocal title "Hate journal impact factors? New study gives you one more reason."[856] The general press, various blogs, and social networks featured articles with equally firm and blatant headlines, such as "The Disaster of the Impact Factor." Even a modest rebellion (and a very unusual one at that) sprang up for a moment: an editorial that appeared simultaneously in eight journals of the American Microbiology Association announced the removal of the IF score from the journals and website of the Association and its discontinuance for the purposes of advertising and marketing.[857]

But as is typical of scientific culture, no matter how much the dogs barked at the train, it kept chugging onward and even increased its speed. Criticism always stops short of doing anything, and the twisted convention continues to reign. Indeed, in 2019 an article was published which examined the extent of the use of IF in the United States and Canada for determining tenure, promotion, and so on. It found that close to 40% of research universities still use the index and see it as a reliable tool for determining scientific quality and reputation (it's safe to assume that most of those who do not use the IF use other statistical indexes), and despite all the warning signs, only 13% of the index's users thought that caution should be exercised in using it.[858]

The Spotlight is Pointed at the Scientists

Another Kind of Statistical Madness

Over time, many attempts have been made to overcome the biases and failures of the IF formula, using a variety of statistical tools,[859] and improved indexes have been suggested (the most well-known are Journal Rank Indicator, IPP, SCImago Score, Article Influence Score, and Eigenfactor) which addressed various problems: for example, the period in which the number of citations was measured was increased (three and sometimes five years instead of two); the citations were standardized according to the prestige of the citing journal (a citation by a more prestigious journal gets a higher score); the measurement was normalized according to various variables (total articles, total citations, type of discipline, and more); and Elsevier offered an alternative IF (CiteScore) based on the large Scopus database that it owns.[860]

But all of the various normalizations, standardizations, and improvements failed to solve the fundamental problems of the IF, and usually spawned new limitations and problems. Also, distinct and more targeted rankings, such as those from journals in specific disciplines (mentioned above) or from local journals (in France, Germany, Italy, Brazil, Colombia, India, Scandinavian countries, and more) remained marginalized. As noted, the IF index continues to be widely used among most committees that are required to evaluate the quality of scientists, and the sad result is that journals determine the fates of academic careers,[861] and the publishers (especially the larger ones) hold sway over the world of science, with all the ethical, professional, and economic implications that brings.[862]

Nevertheless, one alternative did grow in the statistical garden beds, and in contrast to others, even succeeded in giving the IF a run for its money. At a certain point, numbers and measurement buffs saw the light and concluded that it would be better to rank scientists in a more direct manner. And because the measurement of a researcher's professional quality should be based on an overall examination of his or her publication portfolio, it is important to produce an index that weighs the totality of publications and not each item individually. Thus the Hirsch Index (h-index for short) was born, which took the world of science by storm.

The man behind the idea and the developer of the index, the physicist Jorge Hirsch of the University of California, San Diego, published it in 2005 in the esteemed journal *PNAS* (Proceedings of the National Academy of Sciences of the United States of America); after *Nature* and *Science* reported on the innovation, it received a stamp of approval and rapidly became widespread.[863] Its underlying rationale is that the quality of a scientist is derived from the combination of the amount of articles he or she published and the number of times those articles were cited. The average citations of all articles published by the scientist cannot be considered a good indicator, as it may hide great variance and be affected by unusual highs and lows (articles that weren't cited once, or a single and exceptional article that was cited a particularly large number of times). In order to measure strictly the amount of a scientist's best articles, Hirsch proposed the following formula: All articles published by the researcher will be listed in descending order according to the number of times they were cited, and the counting will stop where the article's serial number is greater than the number of times it was cited. The sum of the articles counted up to this point will constitute the scientist's quality rating.

To understand the logic of the formula one must imagine the downward curve of the number of citations. At some point, a "tail" of articles, sometimes longer, sometimes shorter, forms in each of these curves, where the incline nears the horizontal axis. This section is "cut," leaving us only with the more significant articles in the basket of publications. For example, Dr. Johnny Johnson's index would be 31, if 31 of his publications each garnered at least 31 citations. The rest of his publications, which received a smaller number of citations, wouldn't count. That is, if Dr. Johnny Johnson published a total of 50 articles, he might "lose out" on 19 articles, which wouldn't be counted for his rating, but on the other hand, these 19 would not damage his citations average.[864] In other words, the emphasis in the Hirsch index is not just on the number of articles and the citations of a given scientist, but also on the consistency in quality of his or her publications.

More Indices, More Problems

What seemed at first glance to be a fairer and more elegant index turned out to be no less problematic than its predecessor. The criticisms came from several angles:

- **The index does not distinguish between good scientists and trailblazers**. Who is the more important scientist—the scientist who consistently maintains a standard of excellence and repeatedly publishes good articles which are cited a considerable number of times, or the one who publishes groundbreaking research, but turns out to be a one-hit wonder and sinks into mediocrity soon after? The answer to this question is tricky: There is no doubt that the h-index points to the former, while the Nobel Committee selects the latter.

  In this respect, the h-index misses out on quite a few talented scientists who have excelled, even in an exceptional manner, but have not maintained consistency. Hirsch himself emphasized that the index he created should not be used as a single measure for the evaluation of scientists, because it is mainly effective in locating scientists whose profile is common and less for pinpointing scientists who diverge from the norm.[865] Indeed, the h-index of quite a few prominent scientists, including Nobel laureates, is not high.

Their breakthrough (often occurring in their youth) has provided them with a reputation, but their other research has been considerably less important (and less-cited). Accordingly, a study published in 2016 which examined the h-index of 25 Nobel laureates in physiology and medicine over the last ten years found that their h-values ranged across a broad spectrum, from 24 to 139.[866]

A specific example is Prof. Harry Kroto, the Nobel laureate in chemistry for 1996, who in 2011 was ranked 264th in the h-index of chemists. The relatively low rating was because his Nobel prize was granted based on a groundbreaking article from 1985, and the articles he has published since then have not aroused great interest.[867] An even more striking example that illustrates the dilemma (which is more important: consistency or innovation?) is Piotr Chomczy ski, inventor of the RNA extraction technique (a molecule that plays a vital role in translating genetic information) from biological samples. The article that published this technique (in 1987), which has proven to be of immeasurable value in all RNA-related work, has earned over 65,000 citations (an immense number), and yet, Chomczy ski's h-index has only reached a fairly modest 23. This is because over 90% of the times his articles were cited were due to the article which earned him the prestigious award. That is, on the one hand, he developed a technique that changed the world of research, and on the other hand, it was a one-time flash of brilliance. So how and on what basis should he be categorized as a scientist? Again, of course, everything comes down to the question of definition. What's clear is that the h-index causes an injustice to scientists of Kroto's and Chomczy ski's kind.

While it is true that there is a high correlation between upper-echelon scientists (Fields Mathematics Medalists, Nobel Prize laureates, members of the American National Academy of Sciences, etc.) and a high h-index,[868] it is unclear what is the egg and what is the chicken. That is, it is impossible to tell if the high index is due to the consistent quality of their articles (even after winning), or if the reputation they attained due to the award was the factor that also yielded them many citations further down the road. Thomson Reuters prided itself on the fact that the h-index, calculated based on its repository, was used as a fairly accurate tool for predicting the next Nobel Prize laureate. It simply forgot to mention two reservations: First, these are scientists who are known for their groundbreaking publications, and it is easy for the award committee to locate them. And secondly, the selection committees rely, among other things, on the h-index when choosing winners. In other words, the awards and the index are mutually interdependent.[869]

- **Much ado about a little or a little about much**. It's hard and unreasonable to expect that a scientist who revolutionized a field with one study will continue to revolutionize throughout the rest of his or her career, unless he or she is Newton or Einstein. To a certain extent, there is even a contradiction between the number of publications and their quality, as a great deal of effort goes into producing significant research, a fact that usually takes its toll on the number of studies a scientist can generate.
- **Database dependency**. The Hirsch Index is usually calculated based on one of the top three leading scientific databases: Web of Science, Scopus, and Google Scholar. Because each repository contains a different number of publications (due to licensing, copyrights, and preferences), a scientist's h-index is determined by the repository on which the calculation was based. In fact, he or she may well have three different h-indices.[870] The different rankings prevent standardization and emphasize the subjectivity of the measurement, as well as the practical difficulty of comparing scientists. This is supposedly a mere technical and minor problem, but since there are large differences between the type and number of items found in large repositories, these may create substantial gaps in the h-index values that the scientist receives in each database. This is also the reason for the heated disagreements between statisticians as to which of the databases is more reliable and accurate for producing indexes. For example, claims have been made against Google Scholar for including publications that are irrelevant to academic research and therefore do not deserve to be included in a scientific database. In contrast, claims have been made against WoS on the basis that it lacks many important items. It is clear that this dispute contains within it the more fundamental question as to what should be included in a scientific publication repository—for instance, whether to include a journal that is seldom-cited, and what is the threshold.[871]
- **The impact of the time factor.** The h-index gives an edge to veteran scientists who have been able to publish more papers than their young counterparts.[872] Furthermore, the index examines a scientist's quality throughout his or her career while ignoring productivity differences at various periods of time.[873] In other words, if a scientist becomes complacent after receiving tenure or a certain promotion, his h-index will not detect the drop and will remain unaffected until his retirement.
- **Discipline and language bias.** The h-index discriminates particularly against the soft sciences, not only because their citation potential is lower,[874] but also because the databases on which the index is calculated don't take into

consideration the types of publications more common in these sciences, such as books, book chapters, working papers, reports, and especially non-English language materials. It's no wonder that only a few of the world's top 200 scientists in the h-index (greater than 100 and based on the Google Scholar database) are from the fields of humanities and social sciences. On the contrary, there is a clear over-representation of scientists in biochemistry and medicine.[875] Hirsch acknowledged the language bias, noting that he himself often used translations of important articles which do not appear in the databases, and therefore don't get cited as much as they should and are not calculated in the index.[876]

- **The index is indifferent to the degree of co-writers' contributions.** As we have already noted, most articles today are written by several partners whose relative contribution is not the same. The varying degrees of contribution are not reflected in the h-index, because some databases give an identical credit to each of the authors and others do not index all of the partners. Furthermore, it is not uncommon that an author's name and position in the order of authors is unrelated to the extent of his or her contribution to the research. On the other hand, an article written by a single author should impart him or her some bonus in the statistical calculation. In practice, he or she gets the same credit as someone who published an article with an additional ten, dozens, or even hundreds of partners.
- **Artificial and manipulative citing.** As with IF, the h-index was quickly polluted with manipulations and deceptions, most notably the common tricks of reciprocal citing and self-citing.[877] Recently, software has been developed that allows to calculate an H free of self-citing. But here too there is a problem, because in many cases self-citing is not manipulative but necessary—for example, in a case where the author of an article refers to his previous research, which has constituted an underpinning for the present study. The figures show that about 20% of the citations that appear in articles reference previous work written by the authors.[878]
- **Negative citation adds ratings**. Both the IF and the h-index are based on the number of citations, and are completely blind as to the nature and context of the citations. Paradoxically, quite a few articles have accumulated an impressive statistic of citations due to the negative criticism that has been leveled against them. That is, they have received high ratings for their flaws and weaknesses and not for their virtues,[879] much like criminals who have become celebrities and media darlings in recent years due to their despicable deeds.

- **A narrow impact**. Another criticism that applies to the IF index, the h-index, and their different variations concerns a more fundamental aspect which is not often discussed in science: the echo chamber of reinforcement and influence. The academy's arrogance and seclusion lead it to rely primarily on citations within the professional milieu, ignoring the voices of other platforms (for example, social media), which are sometimes equally important. In the soft sciences, the importance of non-scientific platforms is particularly great; after all, what is the point of a historical finding, for example, if it does not affect the collective memory of society? What is the point of educational research, if teachers in the field are not exposed to it and learn from it? What is the point of a finding about discrimination or oppression, if it does not spark political discourse that may lead to change?

  In 2013, an article was published in *The Chronicle of Higher Education* entitled "Choosing Real-World Impact Over Impact Factor." The writer, Sam Wineburg, a professor of education and history at Stanford University, described a project he initiated with his students. They designed history programs for five high schools in San Francisco. The programs were so successful that Wineburg was asked to make them available online to all the teachers in the city. Within a year, 200,000 downloads of study materials from the site were recorded. Weinberg understood that this project gave real meaning to his work, and honestly acknowledged that it probably outweighed the impact of the combined number of academic articles he had published over the years in journals. "I am not suggesting," he wrote, "that every academic follow my accidental journey and take to the Web with digital wares. What I am suggesting is that it's time for those of us in the academy to stop confusing the field of education with a set of limited-circulation journals. We can no longer afford to tell ourselves that our work is done once we've corrected our galleys and submitted our final reports. We have important things to say but have forgotten how—and to whom—to say them. [...] But let's not fool ourselves. Confusing impact factor with real-world impact may enhance our annual reviews, but—in the long term—may lead to our own extinction."[880]

  And yet, if one accepts the assumption that science should give back to the society that finances it, and should promote it and improve its well-being, then it is appropriate to measure the overall impact of scientific articles according to the widest range possible.[881] The narrow statistical measurement mainly disadvantages the most involved and caring scientists, whose h-index is low but whose social impact index is enormous. There are thousands of examples of researchers whose books and articles aroused a lively public discourse and were repeatedly cited in local media platforms, sometimes even international platforms, but whose number of citations in the scientific bubble was sparse and sometimes negligible. There are already existing tools that track citations in news sites, social media, and blogs (ImpactStory, Altmetric, Plum Analytics),[882] but the academy ignores them when it comes to ranking the researchers.

And what is no less shameful: When citations become the "holy grail" of science (in the same way as "likes" on Facebook) the researchers become statistics-oriented, and the funding of science is enslaved for narrow and selfish purposes.

Continuing to Market a Defective Product

Over the years, no fewer than 50 upgraded versions of the h-index have been developed in an attempt to circumvent its biases and disadvantages.[883] For example, the g-index attributes higher weight to citation-rich articles;[884] the m-index weighs the author's scientific career length (since his or her first publication);[885] the m-quotient weighs the scientist's years of activity in a different manner; the iN measures the number of publications that have been cited at least N times; the AW gives weight to the period between each article; the contemporary h-index gives greater weight to recent articles published by the scientist; the multi-authored h-index takes into account the number of publishers in an article;[886] and the a-index also presents the average of times the articles were cited.[887] There were even bibliometric companies that developed improved h-indexes which neutralized the self-citing factor.[888] In addition to all these, engines for creating a scientist's professional profile (the most popular one being Google Scholar) have been developed, which combine the sum of all the times the articles were cited, along with other variables.

All of these improvements may have mended the holes in the fence, but they created new problems or complicated the calculation. In any case, all of the various and strange improvements illustrate just how defective the original tool is. This can be compared to an electrical product which is sold on the market, but in order to make it work the buyer must purchase more and more accessories and adapters, beware of potential faults, and decipher innumerable complex operating instructions (that also don't guarantee proper operation). It has gotten to be so complex and troublesome that many institutions have returned to the raw initial index, and simply ask the scientist to specify the number of times a publication was cited in one database or another, without any standardization. This request can be dismaying, as it forces scientists to reveal the fact that quite a few items in their list of publications were cited very little or not at all.

Not coincidentally, most of the discussions around the indices have appeared until today in journals that belong to the field of measurement and calculation in science. The focal point in these circles is the tools (an interesting subject in and of itself), and not the actual need for them (which is nonexistent).

In late 2012, the journal *World Chemistry*, published by the British Royal Society of Chemistry, decided to stop publishing its list of the 500 most productive chemists (with an h-index higher than 55). The official explanation pointed to technical difficulties, but the decision undoubtedly stemmed from the criticism that scientists' rankings were based on a quantitative, and therefore one-dimensional, index. But yet again, it was just another howl in the wind which did not change the common use of the h-index in the academy one bit.[889]

Moreover, the measurement madness does not end with the IF and H-indices. The plagues of quanti-lepsy, grade-itis, list-emia, Excel-osis, and ranking-itis continue to spread and drown science in numbers, just like Goethe's classic story about the magician's apprentice that cast a spell on the broom so it could carry water to the tub in his place, and forgot the magic words that would make it stop. More and more indexes and rankings spring up like mushrooms, according to segmentations and sub-segmentations, distinctions and sub-distinctions. Books, conferences, and other products of science are also ordered according to scales, and major research funds have become addicted to their own benchmarks, which compare and rank the grant winners (Relative Citation Ratio, iCite, etc.).

Which is the Best University?

The American League

One of the phenomenal successes of English-speaking countries has undoubtedly been their development of a modern education system, which combines ancient aristocratic elements with democratic openness. The British model of "Oxbridge"—the two oldest and most prestigious academic institutions, whose graduates occupy leading positions in the public and private sectors—was imitated by Americans in the Ivy League. The name originated from the ivy plants which climbed the old buildings of the eight most venerable and prestigious universities on the East Coast—Harvard, Princeton, Yale, Brown, Columbia, Pennsylvania, Cornell, and Dartmouth—which were founded for the most part when Britain was still the empire on which the sun never set (another conjecture attributes the name to the first four on this list: the number four in Roman numerals—IV—is pronounced as Ivy).[890] The American campuses were deliberately built in the image of the ancient Oxford and Cambridge buildings, whose tradition aristocratic American society sought to preserve. Over time, more universities joined the exclusive list and became internationally known educational and scientific name brands, most notably UCLA, UC-Berkeley, New York, Chicago, Johns Hopkins, Stanford, and the Massachusetts Institute of Technology (MIT).

As American society became more open and more socially mobile, the demand for higher education increased, as did the number and diversity of universities and colleges. The United States was always perceived as the land of unlimited possibilities—and the academic degree as the key to the golden gate. The combination of rising demand and a developed consumer culture fueled the need for tools that would assist young people to choose an appropriate institution, employers to choose appropriate graduates, and institutions to market themselves. And so the institutions' ranking was born.

The list published in 1910 by James McKeen Cattell, the psychologist and mythological editor of *Science*, was named "American Men of Science," and is considered to be the first formal academic ranking.[891] Cattell collected biographies of one thousand prominent scientists across the country and examined where they acquired their academic education and where they were hired as researchers and professors after graduating. The universities were ranked based on the number of scientists on the one-thousand list who had taught or studied in them. The top four in the chart were Harvard, Chicago, Columbia, and Yale.[892]

Since then, and especially from the 1950s onwards, grading methods have grown and improved. Along with various ratings of institutions, more specific ratings ordered by majors, degrees, and programs of study began to appear. The range of rankers also expanded over time—from lecturers and administrators, to peer experts, to students and graduates—and so were the weighted and weighed variables of quality: percentage of accepted students and graduates, degree of alumni integration in science and the job market, profile of administrative and academic staff, diversity of courses, library resources, tuition fees, scholarships, dormitories, campus social life, a welcoming approach to ethnic minorities and LGBT students, the number and proportion of overseas-students, etc.

In 1957, the *Chicago Tribune* published the first official ranking of American institutions that provided an undergraduate degree. It aroused great interest and signaled the development of a norm that has become an integral part of American academic and scientific culture.

26 years passed, and in 1983 the U.S. World & News Report company published the annual guide to the best American colleges. It excelled in providing comprehensive information written in a clear language, and has since become the Bible of high school graduates. The success bred many more guides aimed at choosing

a study institution—first in print, then in digital format. The most prominent ones today are the ratings of *Money Magazine*, *Forbes*, and *Princeton Review*, as well as those of the Carnegie Foundation for the Advancement of Teaching and the Association of American Universities (AAU). The website RateMyProfessors is another popular source of information, as is the Center for Measuring University Performance at the University of Massachusetts, which publishes an annual report on the leading research universities in the United States.

In 2016, more than two thousand institutions were ranked in the United States through 136,000 surveys. The various rankers, for all their various motives, used 62 criteria that covered a variety of topics.

The Shanghai Surprise

In the early 1980s, the institution-rating mania began to spread beyond the U.S., marking the accelerated globalization of the academy. By 2003, rankings of higher education institutions had already been published in 24 countries, including countries with well-established economies and education systems such as the United Kingdom, Canada, Germany, Italy, the Netherlands, Japan and France, and rapidly developing countries such as India, China, Chile, Brazil, Poland, Hungary, Lithuania, and Mexico. Since then, rankings have appeared in other countries as well, such as Slovakia, Ireland, Pakistan, Romania, Ukraine, Latvia, Sweden, Turkey, Colombia, Denmark, Kazakhstan, Macedonia, Spain, and Albania.[893]

This was the teaser for the international ranking tsunami. It came from a seemingly unexpected direction, but perhaps not so surprising given that the Chinese economy began to grow during these years at a dizzying rate, paving the Asian superpower's way to a leading global status.

In 1998, on the centennial of the University of Beijing, Jiang Zemin, then the President of China, formulated his vision for the near future of the Chinese academy: several universities on a top global level. In order to realize this vision, the current level of China's top universities had to be compared to those in other countries. The task was assigned to a team of scientists from Jiao Tong University in Shanghai. They produced a list that ranked the world's leading institutions according to several criteria, and found that China's top universities deserved to be ranked in the 200-300 group. The list was published in 2003; although it was originally intended for domestic Chinese needs, it sparked great interest across the globe and became a global brand named Academic Rankings of World Universities (ARWU), colloquially known as the Shanghai Ranking.[894]

A speech delivered in 2004 by the Chancellor of the University of Oxford, which occupied one of the highest places on the chart at the time (and hasn't moved down since), garnered the new ranking a dignified and academic seal of approval. Among other things, he said: “The methodology looks fairly solid […] it looks like a pretty good stab at a fair comparison.”[895] Only a year later, the *Economist* published an article that crowned the Shanghai Ranking as the world’s most popular annual ranking.[896]

But the new ranking gained further momentum not only due to its institutional legitimacy and supportive media coverage, but also as a result of a number of sociological factors:

- Because the U.S. economy and academia were (and to a large extent, still are) role models, it is natural that countries would be interested in their position relative to that of the Americans—the top dogs on the charts.
- Their very inclusion in the new ranking, not to mention climbing up the ladder, constituted a boost of self-confidence for the peripheral countries of Eastern Europe, Southeast Asia, and South America. The message was: We want and are able to measure our academic achievements not only relative to our past, but also to other countries, including the most successful ones.
- In 1994, the 24 leading public research universities in the United Kingdom established the Russell Group, essentially challenging the Oxbridge duopoly. The move reflected a worldwide social mobility process of shattering the glass ceiling, which the Shanghai Rating represented and accelerated (symbolically and practically).
- The new ranking included metrics and calculation methods that had not been previously used until then, and manifested the evolution and increasing importance of bibliometric science.
- The Chinese are equally as ambitious and fond of ranking as the Americans, so it was only natural that they would try their hand at producing an innovative international list that would provide them with a prominent status in this field as well. Incidentally, over time, their fondness of indexes has led them to bizarre places. For example, in 2018, they launched a “social rating” which measures the citizens of the country according to their economic situation, their purchases, their friends, and their degree of compliance to the law. The grade is meant to be part of the personal ID card and, as such, influences eligibility for various state services.[897]
- Governments around the world have seen the Shanghai Ranking as an analytical tool that allows them to find strengths and weaknesses in the national higher education system.[898] And so, the low ranking of French, Indian, and Japanese universities, throughout several years, has sparked a

public debate in these countries and led to reforms in academia and new legislation.[899]

Since 2009, the Shanghai World Ranking has been published by Shanghai Consultancy Ranking, an independent company that is not (at least formally) subordinate to any educational institution or government agency. Each year, the company publishes a global list of the top 500 institutions, out of more than 1,800 institutions that undergo review. The first 100 are ranked in descending order; the consecutive 100 are divided into two groups (101-150, 151-200), and from there the ranking proceeds by steps of 100 (that is, the institution is situated in a certain 100-cluster, but there is no ranking within that cluster). In recent years, a ranking of 500 second-tier universities was added; it, too, measures only in steps of 100, from the 501-600 grouping to the 901-1,000 grouping.[900]

The ranking is based (as of 2019) on six metrics, defined as criteria of quality:[901]

- The number of alumni who won the Nobel Prize or the Fields Medal (10%) and the number of faculty members who won the Nobel Prize or Fields Medal (20%)—a total of 30%.
- The number of faculty members whose research that year was published in the leading journals of *Nature* and *Science* – 20%
- The number of faculty members whose research was widely cited that year in 21 [specific] fields – 20%
- The sum of publications by faculty members who were indexed that year in the SCI Expanded and the Social Sciences Citation Index – 20%
- Performance per faculty member (the number of publications relative to the number of full-time faculty members employed in the institution) – 10%

Experts at the Crown's Service

Two years after the Shanghai Ranking appeared, a popular British periodical named *Times Higher Education* (THE) published its own international ranking (QS-Times Higher Education World University Rankings). The ranking listed the world's 200 best universities (most of them from 20 leading countries), with the consulting firm of Quacquarelli Symonds (QS), which specializes in education and career, providing the database, methodology, and data processing.[902] Four years later, in 2009, the partnership dissolved. Ever since, the THE has published the Times Index (Times Higher Education World University Rankings) in partnership with the publisher Elsevier, and QS has published a competing ranking (QS World

University Rankings) under its auspices, based on the large repository of Web of Science.

Similarly to the Shanghai Ranking, the Times and QS Rankings (each examining more than 1,000 institutions) are based on bibliometric indexes, some identical to those of Shanghai and some unique (for example, the number of students relative to the number of faculty members). However, in contrast to the Shanghai Ranking, the British rankings also use qualitative methods of opinion surveys among faculty and students; examine the quality of teaching; examine the impact of the institution on the employment of its graduates; and measure the proportion of foreign faculty and students (in order to rank the institution's international appeal and orientation).[903]

With time, more and more players joined the international market, providing rankings on various scales, and as of 2019 there are more than 20 more rankings in addition to the ones mentioned above (the prominent ones are: A3 Top 500 Global Universities; the Center for World University Rankings (CWUR); Global University Ranking; the High Impact Universities Research Performance Index; Leiden Ranking; Professional Ranking of World Universities; Reuters World's Top 100 Innovative Universities; Round University Ranking; University Ranking by Academic Performance; Che Rankings; Eduniversal; Newsweek; Round University Ranking; SCImago Institutions Rankings; Wuhan University; and the Webometrics Ranking of World Universities). One of these, Webometrics Ranking (The Webometrics Ranking of World Universities), is a Spanish initiative launched in 2004 which deviates from the common norm by ranking academic institutions based on the strength of their home page presence. The Spanish concept is based on the assumption that online presence (number of sub-pages, the wealth of information, downloads, citations, etc.) faithfully reflects the diverse activities that take place in the institution. The ranking fever has spawned another ranking called UniRanks, which is based on the compiling of several indices that examine the online popularity and presence of institutions of higher education (the algorithm hasn't been revealed). The ranking includes about 14,000 institutions in 200 countries around the world and is operated by an international association named IREG Observatory on Academic Ranking and Excellence.[904]

Even at national levels, the ranking inflation is on the rise. There are currently internal rankings of academic institutions published in 30 countries, and in some countries there is more than one: 11 in India, 7 in Japan, 5 in Russia, 4 in China. More than 60 rankings are published in the United States today, and the criteria often become specific to the point of absurdity—for example, a ranking of the most beautiful campuses, the happiest or healthiest students, and even the happiest freshmen. There is also a scale that ranks the 50 most LGBT-friendly institutions. And if that were not enough, dozens of websites provide online comparisons of universities based on juxtapositions of practical information, such as tuition fees or the degree of aid to international students.

Despite the endless selection of rankings on offer, ultimately those that are held in high regard today in the academic world are the three key rankings: Shanghai, Times and QS. Many institutions of higher education, as well as faculties and departments, flaunt these rankings (when they can take pride in them), often in a "wannabe" style. Governments also use these rankings in allocating resources, and in some countries also in subsidizing overseas study and recognizing degrees awarded in out-of-state institutions.[905] These are also the most-reviewed rankings in media and scientific literature. The publication date of the annual ranking has long become a media ritual, sparking a mandatory round of discussions concerning the state of higher education.

A Formula Filled with Flaws, Mistakes, and Misdirections

From their inception, international rankings of higher education institutions have been heavily criticized. In 2009, for example, an article was published under the title "Should You Believe in the Shanghai Ranking?" The question was a rhetorical one. The article looked at the methodology on which the index was based and found that it had severe problems.[906] An article in the same vein, directed against the QS Ranking, appeared in 2012 with the title "Opening the Black Box of QS World University Rankings." Its conclusions were identical.[907] The more that the probing expanded and deepened, the more problems concerning the reliability and validity of international ratings were exposed. At the same time, criticism of rankings conducted by American institutions were raised.[908] The main flaws in the institutions' rankings (predominantly the international ones) enumerated by critics (and to which we have added a few of our own) are:

- **Too few criteria of quality.** Beyond the disagreements regarding the degree of relevance of each of the metrics on which these rankings are based, there is a broad consensus that the ranking relies on too few indices. That is, weight is attributed to only a small, even very small, portion of campus activities. Some have argued that the rankings do not measure quality, but simply what can be measured, and even that needs to be taken with a grain of salt.

- **The arbitrariness of the indices and their weight.** The fact that each of the companies that produce the rankings relies on different metrics and attributes different weights to each of them indicates their arbitrariness and subjectivity. Many assume that the selection of certain indices and not others was based on purely professional considerations. No doubt such logic was present, but alongside it, consciously or unconsciously, cultural, economic, and political biases, some peculiar, were also at play. For example, it is puzzling why it was so important for the Chinese to designate two separate metrics (for graduates and faculty) with a high weight (30% altogether) for Nobel laureates and Fields medalists. After all, this is a tiny minority within the scientific community, and in many cases, their success does not reflect the quality of their institution of study or employment. The use of this index also marginalizes institutions where social sciences, humanities, the arts, and law are the dominant fields.[909]

  Moreover, the decision to attribute such a substantial weight (20%!) to publication in only two leading journals (*Nature* and *Science*) raises question marks, not only because of the biases and myths associated with the prestigious journals, which we described above, but also because it begets a self-fulfilling prophecy. That is, everyone tries to publish in these journals because of the high score attributed to them in the international rankings (some institutions give out various bonuses for publication in both). The explanation for the choice of these metrics is probably culture-driven. Similarly to Americans, the Chinese tend to admire super-brands and superheroes and are certain that genius is the result of some kind of pedagogical formula. Moreover, they are not appreciative of social science and the humanities because of the critical nature of these fields, and instead prefer engineers and lab scientists.

  Anyone looking for an amusing anecdote of the arbitrariness that underlies the selection of indexes for the purpose of ranking can find it in the following story. One of the key rankings of British academic institutions is published by the *Guardian*. In 2019, many were surprised to find that in the ranking published that year, the Scottish University of St. Andrews snagged second place, ahead of glorious Oxford. The very same year, St. Andrews failed to make it into the first two hundred spots of the Shanghai Ranking, with 29 British universities, including Scottish ones, placed ahead of it. In the Times' international index, where Oxford was ranked first, St. Andrews came only in 165th place (and 24th among British universities). Another unexpectedly high-ranking (fourth place) university in The Guardian's ranking was the University of Loughborough. In the Shanghai Ranking, this unassuming English university wasn't even able to make it to the first 500. In the Times' ranking, it was located in the 401-500 grouping.

The embarrassing gap was probably due to the socialist orientation of the *Guardian*, which rewards institutions for the advancement of disadvantaged populations (about half of the students at St. Andrews came from lower socioeconomic backgrounds). Some claimed the gap stemmed from the high rate of job placement among St. Andrews' graduates and the high level of teaching that characterized the establishment (an index that isn't granted similar weight in international rankings).[910] It is important to clarify: The *Guardian* has undoubtedly chosen good and worthy criteria, just as it is clear that the University of St. Andrews deserved a high ranking due to its social achievements. However, the positional gaps testify that the ranking is ultimately dependent on the taste and priorities of the ranking body.

- **The ranking companies' ulterior motives**. The various weights and metrics are also affected by commercial considerations hidden from the public eye. In 2018, a rise of 16 places in the Shanghai Ranking to the esteemed 77th place was recorded by Haifa's Technion-Israel Institute of Technology. At the end of that year, Prof. Peretz Lavie, then-president of the Technion, was interviewed, and among other things was asked about the academy's ranking culture. "This ranking is absurd, it's simply ludicrous," Lavie said. "The ranking sends the whole system into a frenzy. It's a matter of public relations. The media blows it up—and governments are observing it. [...] The top two British rankings—QS and the London-based Times' Ranking—take into account the number of foreign students and faculty in the university and the quantitative ratio between faculty and students. Do you know why? Because they make a living from providing consultation to universities on how to recruit students and faculty. Two years ago, I was invited to Singapore by the Times of London, to give a lecture and attend a lunch with their editors. Part of the Times' grade is comprised of popularity, where we were positioned in the 300th place, while in the research indices we were in the 70th place. I asked them: 'How do you explain this? Maybe you're only asking about popularity in Iran? Tell me where you ask and who do you ask.' Silence ensued. I told them: 'You are a commercial business that utilizes rankings to sell faculty and students to universities, and you're even getting a commission for it.' In the Far East, the rankings are practically a religion. For us, one year is a testament to the failure of the academy—and a year later, they're talking about its phenomenal success."[911]

- **Swaying the judges**. A particularly lethal criticism was leveled against the British companies' use of external experts. The main argument was that no information was provided concerning how these experts from around the world were selected, and therefore their suitability and competence were unclear. But what is even more grave is the presumption that a scientist, as seasoned and experienced as he or she may be, could review another institution where he or she has not studied nor worked—more so when it comes to scientific disciplines in which he or she is not an expert. As is well-known, an academic institution is such a large, multifaceted, and multidisciplinary organization that it's hard to imagine that even its own faculty members could summarize it in a one-liner or astutely compare it to other institutions. How, for example, can one opine on the level of teaching in an institution that employs hundreds of professors whose quality is uneven and the greater part of whom are temporary workers who come and go? Studies in this context prove the obvious: that there is a great disparity not only between faculties and departments but also among scientists in the same department, and generalizations about the institution have no value at all.[912]

  Furthermore, a ranking which is based on personal opinions necessarily reflects stereotypes, conventions, hearsay, and preferences, and is influenced by the halo effect—that is, it is biased in favor of long-standing, well-known, and well-renowned universities,[913] and also in favor of the leading countries. The ranking companies have called this method of ranking "peer reviewing," but it seems likely that the comparison is misplaced.
- **Playing dirty.** As is commonly known, wherever there are rankings, and especially when the matter of position becomes too important, a culture of corner-cutting and manipulation begins to emerge. Indeed, in recent years there have been growing reports in American media concerning artificial data inflation in order to achieve a higher rating—for example, inflating the number of applicants (to improve the selectivity index) or the performance of graduates (to raise the employment index).[914] It is more difficult to track this kind of manipulation in the international rankings because the companies do not disclose their databases or methodology, and because the local media focuses on examining the institutions and organizations that are operating within their own particular state. However, in chats around the water cooler, stories of inflated or partial data intended to improve rankings are increasing in number. In many cases, the manipulation is done indirectly, for example by lowering the admission criteria for overseas students in order to improve the internationality index.

When the goal of rising up the rankings becomes paramount, it is accompanied by the growth of methods designed to surpass competitors and create shortcuts. An entertaining, or perhaps sad, example is of two Saudi universities, King Saud University and King Abdulaziz University, which within a short timespan leapt from the bottom of the Shanghai Ranking to the world's top two hundred universities. Embarrassingly enough, it turned out that the Saudis simply purchased the upgrade: they offered Western scientists high-paying jobs in exchange for adding the Saudi institution to their articles' affiliation. All that was required of the sought-after scientists was to stay in Saudi Arabia for a few weeks during the summer semester, and during the rest of the year to mentor research students remotely while maintaining their permanent positions.[915]

- **Baseless Attempts at an Accurate Scale**. The fact that international rankings are published annually may create the impression that rising or falling down the scale reflects an improvement or deterioration in the quality of the institution. In practice, these are usually random fluctuations, following the winning of research grants, the publication of one significant discovery, a bunch of articles that were simultaneously published in prestigious journals, and so on. If the measurements were truly indicative only of quality, one would expect that the position of the institutions would remain more or less stable. Such stability does in fact characterize the leaders of the charts, the prestigious and wealthy institutions. However, later down the lists there is more substantial turnover from year to year.

  And in any case, the ranking is not an actual ranking, because as we wrote, only the first hundred institutions in the Shanghai Ranking are actually ranked one by one. All the others are grouped in clusters of fifty or a hundred, in an alphabetical order that warps the scale. The Weizmann Institute, for example, is placed at the edge of the cluster only because its name begins with the letter W, while its actual ranking is considerably higher.
- **Use of defective bibliometric indices.** The rating companies attribute enormous weight to quantitative metrics (like the IF), which have long been proven to be flawed—thus multiplying the bias: firstly, by using invalid metric and secondly, by using it for rating.[916]
- **Comparing apples and oranges**. The very idea of examining academic institutions from different countries and different continents on the same scale is fundamentally wrong because it does not take into account the environment in which each institution operates: the economic state of the country (it is not coincidental that a country's currency strength correlates with the

ranking of its academic institutions),[917] the level of equality among its citizens, the affordability of education for the general younger population, the degree of competition for resources, the rate of government support for institutions and students, the language (or languages) spoken, the country's openness to the wider world, the status of higher education on the local value scale, etc. In Japan, for the sake of illustration, the rate of master's and PhD students is very low, since the primary goal of undergraduates is to integrate into the economic market, especially into industry, where the advantage of advanced degrees is limited. In Italy, the motivation for PhD studies is not high, because attaining a university position is often dependent on a protectionist mechanism which borders on nepotism.[918]

Of course, one could argue that the measurement examines results rather than causes and means, but one could equally retort that the rankings provide only a partial impression of excellence and do not address one of the most important variables of success—the realization of potential. For example, one could say that Harvard deserves to be ranked highly, since a significant proportion of its alumni are hired to serve in senior positions. But one could equally posit that Harvard deserves a low ranking (and a poor reputation) because its contribution to social mobility and the development of education across broad parts of the public is minuscule and perhaps even negative. Harvard could also be ranked highly on the basis of the total publications and scientific inventions it has generated, but one could equally give a high rating (and applaud) a peripheral university whose number of inventions and publications are larger relative to its budget and staff.

- **The small size disadvantage.** The size gaps between institutions are not taken into account in the ranking process. The University of Buenos Aires, for example, is attended by more than 300,000 students every year, while at the ENS (École Normale Supérieure), a graduate school in Paris, study only two thousand students. The institution's capacity and dimensions, for example, affect the number of laboratories and libraries, the variety of disciplines and lecturers, and the funding potential through donations and tuition.[919]
- **A world ranking that ignores most of the world**. The international rankings include less than ten percent of all higher education institutions in the world. Therefore, using the term "world ranking" is disproportionate at best and false at worst. About half of the institutions listed in the first one hundred places are American institutions. European institutions (mainly from the United Kingdom, France, Italy, Germany, Switzerland, and some of the Scandinavian countries) manage to work their way into the list now

and then. All of the other continents lag far behind. That is, not only do the rankings fortify the strong, enrich the rich, and convey a condescending message, they also disseminate and reproduce the American moral outlook, that the one who matters in the competition is the one who wins the medal—and the rest can settle for applauding the winner.[920]

The rankings enshrine the unequal global academic structure also because they reinforce the situation in which the road to success passes almost exclusively through money.[921] Science is reminiscent of international soccer leagues in that sense: most of the most talented players are concentrated in a small number of affluent groups, with everyone else struggling for their lives.

- **A narrow and one-dimensional perception of academic output**. The ranking companies, like the rest of the institutions that take part in the game, the international scientific organizations, and governments, justify the widespread use of rankings on the grounds that they encourage healthy global competition and promote transparency, which facilitates public criticism. In practice, not only have these goals not been achieved, but in many cases, they have accomplished the exact opposite. Naturally, each country prioritizes research and education differently. Developing countries generally prefer to invest more in applied science (which is not necessarily published in major academic platforms), with an emphasis on engineering and improving living standards. They also prefer to focus on making education more accessible to broad populations than on nurturing a narrow cadre of intellectuals and scientists. Well-off countries, on the other hand, assign greater importance to the preservation of artistic and cultural heritage—an important goal that does not yield a high score in most rankings. In other words, international ranking indices do not take into account local priorities, and not only do they force academic institutions to prioritize excellence in metrics defined by the lords of the rankings over excellence in indices that will contribute to their country, they also penalize those who take care of their own and label them as unsatisfactory institutions.

The Times' Ranking did in fact recently (2019) attempt to add an index that quantifies the social contribution of institutions, for example in the field of improving sustainability and reducing poverty (the ranking was aided by existing UN criteria). However, because the criteria required for the measure are too general and vague, it seems that this is mainly a marketing gimmick. Either way, the new ranking is detached from the traditional ranking of institutions, which is still considered to be the main status symbol.[922]

Rankings are also one-dimensional with regard to the field of scientific output, as they ignore important forms of output such as course development, writing books, and contributing chapters to anthologies. The Times Index corrected some of this distortion when it weighed over half a million books and chapters in its 2016-7 index. But that's too little. In fact, to this day no formula has been found that could weigh the additional effort required from a scientist to invest in writing books in comparison to writing articles—which receive the highest score in the ranking.

This one-dimensional approach fosters homogeneity and hinders innovation and trailblazing. When everyone strives to be the same kind of academic institution, it stifles the development of refreshing alternatives to the old model. There is in fact no incentive for institutions today to pave a unique path for themselves, as they may tumble down the rankings, heaven forbid.

The very idea of encouraging a person or organization to compare themselves and constantly measure themselves primarily relative to others is a noxious idea, both from an intellectual and moral perspective. People and organizations should first and foremost strive to improve themselves relative to their own potential. The rankings diminish and even cancel completely this noble goal, and enslave the institutions to extreme competitiveness.

- **Meaningless numbers.** The ranking manufacturers tell us that the rankings are designed to make our choices easier, but the long list of numbers doesn't mean much to whoever peruses them, whether it be a student, the father of a student, or a university professor.

  For example, the "University of Tokyo" entry on Wikipedia provides a long list of global, regional, and national rankings—indicating that this is a long-standing, highly prolific university. But in each ranking, the university is situated at a different place on the scale, and in practice it is impossible to know what distinguishes it from other universities (that also boast flattering rankings). The university's position on the ranking scales is also meaningless because it does not tell users whether a university has improved or deteriorated relative to previous years.

  In 2011, the University of Tokyo was ranked in the esteemed second place on a ranking that examines the number of alumni currently holding the post of CEO in one of the world's 500 largest companies.[923] It sure looks impressive, but what exactly does that say about the institution and why is it important? And how should it influence someone's decision to study or teach at the University of Tokyo? None of the readers of this information know or find out what earned the University of Tokyo second place: whether because it is picky about choosing its students or because of its first-class economics and/or business programs (or perhaps psychology or public relations). And perhaps it stems from the fact that it is located in the capital of Japan, where the headquarters of hundreds of large industrial companies are located. One could just as well rank the University of Tokyo according to the number of alumni who displayed their work in museum exhibitions, or who became school administrators, senior military officers, or parliament members. If one doesn't know—and one usually doesn't—what's behind the numbers, the rankings are meaningless.

- **The choosing-an-institution-by-its-rating hoax.** One of the stated goals of the institution rankings is to enable young people to choose the institution that best suits them.[924] It is doubtful that this statement is well-founded, as:
  - The weight assigned to the teaching indices in the rankings (especially the leading international rankings) is small relative to the weight given to research. The Times Ranking allocates 30% to these indices, the QS Ranking 20%, and Shanghai Ranking does not include any teaching indices (that is, it attributes zero weight).
  - A large part of the institutions that excel primarily in teaching are not ranked high on national lists, and most of them do not make it to the international rankings. Time and time again, the polls reveal that research universities make it to the international rankings, but when it comes down to teaching, students rank community colleges higher.[925]
  - Even when a ranking takes into account teaching indices, their empirical validity is questionable. Many of the criteria are based on teaching surveys conducted among students, which do not measure the effectiveness of teaching, but mainly the students' satisfaction—and also this only to a limited degree. Moreover, these surveys cannot be used as a comparative tool because they are not similarly drafted in all institutions, don't contain the same questions, and often aren't even handed out by the institution.

    The entire concept of giving an overall grade on the level of teaching is wholly unfounded because, as we have already noted, the differences in level and style between different lecturers may be very large in the same institution and even in the same department, and because it is evident that a physics course is not the same as a philosophy course. Furthermore, some indices measure the achievements of the outstanding students and ignore one of the primary goals of teaching—advancing the weak and disenfranchised.

- As unbelievable as it may sound, no comprehensive international research has yet to examine the way young people and their families utilize rankings practically, and what they are learning from them about institutions. Local studies found that the choice of an academic institution is based mainly on recommendations from family and friends, as well as informational websites.[926]

  But it is still possible, even without extensive research, to estimate that the considerations are much broader than the mere ranking of the institutions, and over the years have become more practical. In fact, there is no more a "best academic institution" but rather a "best academic institution for you"—and everyone has their own personal preferences and needs: field of study, chances of admission, tuition fees, scholarships, living expenses, sports activities, employment options, recreational possibilities, and even the ratio of the cost of the degree to the percentage of graduates and salary level after a decade of employment. This information is not included in university rankings but rather in countless sites and guides, which have identified the need and provide valuable information—for example: Student.com; Educaedu; StudyPortals; The Insider's Guide to the Colleges; CollegeTimes; PUSH (university guide); What Degree? Which University?; and College Scorecard. Even QS attempted to diversify its metrics and recently added the "best cities for students" ranking, indirectly admitting that young people today have much more practical considerations when choosing an academic institution.[927]

  Incidentally, the situation is also similar for advanced degrees: The choice is based much more on practical variables than on the ranking of the institutions, mainly the department's specialization and a suitable thesis mentor, as well as work and internship options during one's studies.

  The practical consideration has become particularly important in recent years, partly because of a change in the students' profile and their expectations from their studies. Masses of young people are flocking to institutions of higher education whose main consideration is no longer the most prestigious university. Many of them seek the establishment whose educational requirements are the least demanding in order to graduate with a good grade and with minimum effort. In other words, quite a few young people read the rankings from the bottom up, preferring not to attend a top-tier university because its requirements will be high, the competition tough, and the tuition high. Moreover, as the prestigious universities also face financial difficulties, they have become less picky. As a result, students who have earned a bachelor's degree from an institution that is unacclaimed but generous in grading are admitted to a master's degree in prestigious institutions, which indirectly "whitewashes" the lesser standing of the bachelor's degree. Even if you don't have a bachelor's degree from Oxford or Harvard, you could still find it easier to do a master's degree in any of them. If you also take into account the fact that a college degree's value has generally declined in the eyes of many employers, who require specific on-the-job training, it's no wonder many prefer a laidback degree over a prestigious one (more on this in a separate chapter).

The ranking of institutions is in fact a key consideration only for the top ten percent of high school graduates in the leading scientific countries. Even in the United States, it serves mostly those who struggle to choose between elite institutions—who constitute no more than four percent of undergraduate students.[928] Even among students looking for an academic institution abroad, international rankings do not necessarily constitute a major consideration—certainly not the only one. Many students from Asian countries, for example, often choose to study in order to prepare an immigration infrastructure for themselves and their families. Consequently, their main consideration when choosing an academic institution is its location.

The rankings are also less relevant because many young people and their families formulate their decision through "academic shopping" conducted during "open house days." These marketing days are usually held in proximity to the opening of registration for the next school year, and the hosts are faculty members who are asked to advertise themselves and the institution. In 2018, an article was published on the website *The Conversation* under the following headline: "Forget university rankings, open days are the biggest factor in student choice." Young people, it said, love this format not only because it is based on a personal touch, but also because one of their key considerations in choosing an institution is the campus's atmosphere.[929]

But the open-house tradition is unlikely to last for long. In the digital age, virtual learning markets are evolving, providing a similar service—and in some cases, a more elaborate and richer one at that. Such "markets" include, for example, CollegeWeekLive; The Student Room; and the JISC Information Environment Service Registry.

- In today's reality, an institution should invest in public relations rather than in ratings, because what really matters to the "customers" is not the indexing of academic articles, but Google's algorithm, which provides a fuller picture of the institution from a variety of sources, including positive and negative opinions. Generally speaking, the world is gradually embracing a more transparent and matter-of-fact style of judgment. While it is true that brands still play a significant role in all areas of the consumerist society, in the age of the Internet, people are trained to judge each offer in a highly practical manner (how much something is worth to me and what are the alternatives)—especially if the matter at hand is an investment whose cost is high and whose impact is substantial.

  Today's younger generation does not need merchants' recommendations, and prefers to hear authentic first-hand reporting—that is, from those who have tried the product for themselves or gone through the experience, preferably while documenting it with photos and videos. It is a collaborative generation that purchases products and services after consulting with friends from wide and diverse circles. This is how they figure out how to move around from point to point, how they choose a restaurant, how they decide where to live, and how they decide what and where to study.

  In general, in the age of information and digitization, there is a growing tendency to convert expert-based ranking to crowd-based ranking based on consumers' wisdom—not an exterior committee, not judges nor mechanical measurements according to uniform criteria invented by geniuses in Shanghai or Boston, but an aggregate opinion, with different emphases and a level of detail that allows anyone interested to form an opinion on the quality of the product and its suitability to one's needs.
- It is somewhat tragic that science devotes so many resources and attention to comparing institutions, as the digital tsunami of online learning is already huffing and puffing down their necks. The academy supposedly assists young people in choosing the best place for them to study (although most don't use these rankings), while it's clear that the old model of teaching—wherein the institution, department, class, and professor are the anchors—is becoming obsolete. In the United States, rankings have already begun to include universities that are based on online learning, but this too is pathetic. In the near future, no one will care about where you studied and with whom, but only about what you know.

Flavor Enhancers for Spoiled Food

The deadly criticism of rankings could not come to pass without rocking the boat. The most prominent response was a series of reports (in 2005, 2007, 2009, 2011, and 2013) published by UNESCO—United Nations Educational, Scientific and Cultural Organization. The reports summarized international research and conferences on rankings of academic institutions and provided a platform for critics.[930] A conference conducted in 2011 in Buenos Aires, attended by academics and presidents of institutions from across Latin America and the Caribbean, was concluded with a joint statement that enumerated the methodological flaws and the negative effects rankings had on institutions. The OECD and the World Bank also dealt with these issues, forcing the ranking companies to respond. As expected, their response consisted mainly of self-righteous evasions:

- They half-heartedly admitted that the ranking was not entirely objective and that they did not purport to provide a "perfect rating."
- They claimed that most of the scientists and heads of institutions supported these ratings, which is most regrettably true.
- They recommended using rankings carefully (an elegant way to recommend "having cake and eating it too") and that each institution and country use rankings in the way that is appropriate for them (again, an elegant way to say "get off our backs").
- They blamed the biases on deficiencies out of their control. The designers of the Shanghai Ranking, for example, argued that the humanities and the arts were not included in the ranking due to technical issues in finding objective and reliable international information and due to their interdisciplinary nature.
- They promised to enhance and refine the ranking, which basically means that no matter how much criticism they receive, they plan to keep going full speed ahead.[931]

To appease the critics and reduce the pressure, several adjustments and improvements were made. Among other things, the sample size was enlarged, and different standardizations were made according to the discipline, the size of the institution, and the number and type of faculties. Simultaneously, a number of sub-indices were added, such as the number of international collaborations.[932] To provide as many institutions as possible (including the middle-of-the-road institutions) with a reason for pride, rankings of narrower cross-sections were added to the market—some by the mainstream companies and others by new companies. These ranked institutions by their seniority, by geography, by demographics, by disciplines, by the quality of the curricula, and by the job placement rate of their alumni.[933] A university that ranked in the 700th place in the Shanghai World Ranking can now brag about its sociology department located in the 100th place, and a university ranked in the world ranking in the 200th place can flaunt its tenth place in the Asia-Pacific region. Vague rankings such as "socio-economic impact" have also been cooked up in order to comfort those who were left behind and provide them with crumbs of reputation.

Incidentally, in order to allow more universities to win a hallmark of excellence, QS's captains adopted the idea of a star-based system, like the one customary in hotels and the Michelin Guide. In practice, this was mainly another means of squeezing the institutions dry and collecting a fee under the pretense of coaching: paid consultation for colleges and universities on how to improve their rankings.

But all these were nothing more than flavor enhancements to food that had already been spoiled at the time of its cooking. Even the establishment of "sub-leagues" and the distribution of crumbs to the "poor" did not solve the fundamental problems. The new rankings have faults similar to those of the old ones and are often based on completely unfounded comparisons. For example, when an economics department in the Netherlands is compared to an economics department in Ireland, the comparison does not take into account the areas of specialization within each department, the resources, the salaries, the workload, and so forth.

The Trap of the Governmental Budgeting Model

In 2014, the European University Association [EUA] published a report on the subject of rankings of institutions of higher education. The report strongly criticized the institutions for their proclivity to ignore the limitations and flaws of rankings, and for having been captivated by their misleading allure. The recommendations section suggested examining alternative, more significant criteria for the purpose of comparing institutions (only none were specified).[934] In the same year, an international forum of experts, including scientists in the fields of scientometrics and social science as well as the presidents of research centers, convened in Leiden, Netherlands. They discussed the measurement and ranking culture which had overrun science, and drafted the Leiden Manifesto. The Manifesto was published in 2015 in *Nature* and included ten principles for the optimal use of indexes and rankings. In this case, too, the recommendations were conciliatory and clichéd: to combine quantitative assessment with experts' assessments, to ensure transparency, to judge scientists according to their overall research achievements—yadda, yadda, yadda.[935]

In 2015, the European Parliament also joined the two-voice choir: voice A being stern criticism and voice B hackneyed recommendations, the kind that suggest taking into account the limitations of the rankings and the underpinning economic considerations of the companies that produce them, and to use rankings with a grain of salt.[936]

The result is clear: Despite the criticisms, protests, warnings, directives for careful use, and the call to produce an alternative—with the exception of a few American and Canadian colleges that have dared to boycott rankings, most institutions continue to toe the line and obey the new "laws of nature."[937]

Apart from the conservatism of the academic establishment and the inclination of the popular media to provide data without a thorough examination of how the sausage is made, there was another significant reason for the addiction to rankings: the Gordian knot between them and the funding of the institutions. Most of the world's governments fund institutions of higher education using three channels—first, national research foundations which allocate budgets for specific research; second, an annual budget for each institution, according to its number of students and faculty members areas of expertise, location, and so on.; and third, performance-based budgeting, based solely on quantifiable "output."

Financing based on output, which is becoming more common in countries across the globe, aims to achieve several goals: A. Strengthen supervision and therefore also the influence of the government on academic institutions. B. Encourage economic efficiency and organizational responsibility. C. Stimulate competition between institutions in order to improve scientific achievements (this is why the World Bank and additional international economic institutions recommend that governments to allocate budgets for higher education based on outputs).

Determining the output indices and deciding on the differential apportionment of budgets is usually entrusted to the national scientific councils (REF in the United Kingdom, AERE in France, HQAA in Greece, ERA in Australia, ANVUR in Italy, PBC in Israel, and so on), whose independence varies from state to state. The calculation formulas and weights also vary. But alongside the differences between countries, there are also common characteristics:

- The score is determined on the basis of research and teaching achievements, with a clear preference for research achievements.
- The research indices typically include winning competitive grants; the number of publications, the number of times they were cited, and the platforms in which they were published; inventions and patents; investment in R&D; and the rate of PhD graduates (who are considered to be the next generation

of scientists). In many cases, the scientific council sets standards of output excellence (in the United Kingdom, they take the form of stars) and takes them into consideration accordingly.

- Teaching indexes include the number of undergraduate students, the proportion of graduate students, the ratio of students to academic staff, efficiency and productivity coefficients such as the time it takes to graduate, student satisfaction surveys, and the development of innovative curricula.
- In recent years, social indexes have been added to the quality rating of institutions in several countries, such as gender equality (among students and faculty) and ethnic diversity.
- In the national budgeting model, as with the international rankings, the weight of each institution's achievements is determined by statistical metrics, and in some countries (such as the United Kingdom, France, and Italy) also by expert committees that conduct qualitative judgments concerning achievements that are difficult to quantify (e.g. quality of teaching, contribution to society, and the like)
- The conditions of the competition are not equal across the board. Simply put, most of the budget usually goes to major research universities and not to small colleges.

In accordance with tradition, the output-based budgeting model has also received plenty of criticism. Some are similar to those leveled against the indexes and rankings, such as the marginalization of teaching relative to research, of the soft sciences relative to the hard, and of small and new institutions relative to their larger and older competitors. However, there have also been more specific criticisms:

- The budgeting model turns higher education institutions into hostages held by a small number of senior academic officials, typically retired professors or ones nearing retirement, who serve as members of the national scientific councils. In most countries, institutions and faculty were not included in the process of determining the quality criteria. In most countries, the reasons for determining the indices and weights were also not provided. In many cases, the formulas are vague and hardly comprehensible to mathematicians, statisticians, and economists. One of the senior figures of Israeli academia, who was a senior member of the committee that designed the Israeli budgeting model, admitted to us that he himself was not well-versed in the convoluted method of calculation (in Israel, for example, only in 2012 did the PBC release a document that tried to explain the Israeli model to faculty members, a model on the basis of which the system has been operating for many years and which has undergone substantial changes in the meantime. But this document, too, made things less clear and more ambiguous).[938]

- The efficacy coefficient in the government budgeting model causes a drop in the academic level, because it forces departments to award degrees at all costs in order to meet the undergraduate and graduate quotas.
- The budgeting model is one of the main, if not the main, causes of quality impairment in scientific research, because it crudely links money to publication, and in fact enslaves institutions and faculty to economic indices. In 2013, Randy Schekman, the Nobel laureate for Physiology or Medicine that year, announced that his lab would cease to submit research articles to *Nature*, *Science*, and *Cell*, in order to signal to the scientific community that the pressure to publish in prestigious journals (in order to receive a larger budget from the state) encouraged researchers to cut corners and promote trendy science fields instead of engaging in meaningful research. Schekman did not shy away from noting that the extreme example of this is Chinese academia, which provides huge sums of money for publication in the prominent journals.[939] A 2017 study published in *Nature* revealed that the bonus received by Chinese researchers for publishing in *Nature* or *Science* could reach up to $165,000. The record was broken in June of that year when the Sichuan Agricultural University awarded a two-million-dollar prize to a team of researchers who published an article in the prestigious journal *Cell*. Although the money was largely invested in research labs, every team member received $74,000. It is worth noting that the average annual salary of a professor at a Chinese university is $8,600.[940]

  The criticism that the budgeting model has intensified the ills of the measurement culture in academia has been building momentum in recent years. In 2016, the EU published a comprehensive report on the issue of output-based financing across the continent's countries.[941] The authors of the report noted that when government funding constitutes the oxygen of public institutions of higher education, the output-based budgeting model becomes a kind of Damocles' sword hanging above their heads. It attaches a price tag to every paper that a faculty member manages to publish, and downgrades scientific output to a cynical calculation of monetary value (according to the Israeli PBC, an article's financial value in 2016 was worth about NIS 130,000, roughly $37,000, to the institution's budget).[942] Incidentally, the authors of the report also noted that no country has performed a cost-benefit analysis.
- The enslavement to rankings which is exacerbated by the budgeting model confines and pushes scientists deeper into the academic bubble,

and prevents them from taking on an active and productive role in society. In 2018, a report was published in the Israeli media which indicated that seven of the country's education departments had worked their way into the Shanghai Ranking of education (which includes only 500 institutions). The University of Haifa, which was ranked only in the 601-700 grouping in the general index that year, was ranked in the 101-150 grouping in this index—higher than other education departments. However, in close proximity to the "flattering" publication, the website *Ynet* published an emblematic article about a teacher who decided to abandon teaching, like many others and for the same reasons—namely his despair at the failed education system, which leaves no hope for talented and committed teachers. He told of violent and rude students, of threatening and disrespectful parents, and of principals who pressure teachers to spruce up grades in order to fake success and please the mayor. "I came into the education system with a sense of mission, wanting to make a difference," he wrote. "Now I am, most regrettably, leaving."[943]

Thus, while the Israeli education system is collapsing, when the threshold for admission to education departments is one of the lowest in the academy, when the data draws a bleak picture of the level of knowledge and moral sensitivity among young people in Israel—education departments in universities celebrate their standing in the international rankings. It's hard not to be reminded of the old joke about the boy who came home with a report card jam-packed with dismal grades, with one striking A+ in music among them. Out of all the grades, the father slapped the boy for this one in particular. "With such grades," shouted the father, "you still have the nerve to sing?"

The crisis of the education system in Israel, and in many countries around the world, has many causes. One thing is hard to disagree with: The first ones who were supposed to stop the drift, propose alternatives, and come to the rescue were the faculties, schools, and departments of education. But their faculty members are knee-deep in impact indexes and statistical rankings, which primarily advance their CVs, their academic rank, and the budget of the institution that employs them; and advance to a pitiful degree, if at all, the state of education in the country that pays their salaries.

The Statistical Tables Have Turned

The ranking obsession, which has a devastating effect on the way scientists and institutions are judged, advanced, and financed, is expected to reach a boiling point, which will open the eyes both of the rankers and those being ranked. This is due to several reasons:

- Governments and other funding bodies will soon realize that the impact factor indexes accepted in science today are superficial and cause an enormous waste of public funds. The first signs of a change in attitude have already emerged. In the United Kingdom, for example, the Research Excellence Framework announced in 2012 that it would cease using the impact factor ranking in its evaluation of research proposals, and that its decisions would be based solely on the expected future quality of the research produced.[944]

  It can be agreed that the distribution of the public coffers for scientific research and higher education is a complex matter, that each formula will have its pros and cons, and that the pressures are inevitable. And yet the disadvantages of output-based financing and the cumulative damages of this model lead to a situation where there is no choice but to recalculate. At the moment, scientists and academic higher-ups have far too much power to determine scientific budgeting. The budget comes from the public pocket, and therefore should be decided based on more general societal needs—which must be defined by the public and its representatives, not only by the scientists themselves.
- Every day sprouts a new comparative index, with new restrictions, new reservations and standardizations. The forest is getting so crowded that people are starting to get lost in it. The external observer might be rendered speechless from reading the resumes of today's scientists. Not only do they include myriad lines detailing every fragment of achievement and minuscule output (all of which, it goes without saying, have to be weighed somehow; only the devil knows how), but each item is accompanied by a line of indexes which is sometimes longer and more vague than the actual title of the publication. And when there are that many tools and indexes, it's hard to formulate a bottom line: which journal is more influential, who is the more talented scientist, and what is the higher-quality institution. If every scientist, journal, or institution could choose for themselves the index that best complements them, and especially the ranking worth displaying, the indices and rankings would lose their value.
- The statistics opioid validates and reproduces the undisputed control of the

barons of science, namely the major publishers, journals, and prestigious universities. They all bow to the method that benefits the most privileged, because they are blind to the distortions, because they have no will or ability to rebel, and because they settle for crumbs of ranking that provide them with pretend badges of honor and success. When the old model of journals collapses—and it's already wobbling hard (as we explained in the previous chapter)—and the fruits of science are presented on open platforms, the current, downright primitive and manipulative ranking schemes will evaporate. They will be replaced by more sophisticated and democratic methods of monitoring. Everything will be done with a high level of detail that will decentralize the status symbols and refine the scales of quality. This way, we could, for example, tell which article was particularly popular during a specific week, who was cited and by whom, which authors aroused interest and why, what was the scientific hot-button issue during the past month, or who was translated into foreign languages that year. We can see the first signs of change in the scientific sharing platforms, which, as we have already written, tend to produce and publish information based on digital signatures such as downloads, shares, and views.

- No one denies the importance of measurement and sometimes also its effectiveness. The question is one of context and dosage. In his excellent book *The Tyranny of Metrics*,[945] Jerry Muller describes the rooted myths associated with measurements and rankings, especially in American culture. Because belief in numbers has become a kind of religion, people ignore evidence that proves that the method is not always effective. Several false underlying assumptions stand at the basis of the obsession with numbers—for example, that quantitative metrics are the only way to achieve organizational goals and ensure accountability; that they are the best means of motivating employees and measuring their quality; that numerical measurement is always preferable to human assessment (based on experience, intelligence, and common sense); and that standardization of data is the right key for comparing institutions.

  In many cases, the measurement creates an illusion of progress and problem-solving, and the numbers are nothing more than self-deception. According to Muller, the "metric fixation" causes a great deal of damage: it narrows the scope of goals, measures only what can be counted and not necessarily what matters, encourages focusing on short-term objectives, places a burden on the organization, enslaves it to money, and prompts tricks and cons that pollute the work environment. But above all, when employees are enslaved to charts and are only rewarded based on statistical achievements, it begets economic fascism—"a tyranny of Excel files." In this kind of ecosystem, people become machines and the community loses its soul. The life expectancy of nationalist fascism was and always will be short because it is destructive to the individual and to society. The economic fascism of counting and ranking won't last for long either, for the exact same reason.

- With the founding of the European Union, its partners decided to increase investment in science, in order to reduce the "Atlantic gap." The aim was to position Europe as a leader of scientific excellence and thus bolster economic success, and the method was to imitate American academic culture. But in a study published in 2017 in the journal *Scientometrics*,[946] it turned out that despite the large investments, the gap did not close: American universities continue to publish more, and the publications of their researchers are cited more often. The lag of the Europeans in the output race has many reasons (for example, their slow adaptation to the digital revolution). However, it seems as though the main reason is their difficulty in relinquishing their relaxed work habits and align with the American culture of workaholism. This is probably why those who were able to narrow the gap with the Americans are the Asian tigers, some of whom have already surpassed the Europeans. For them, a "round-the-clock workday" is an unquestionable norm, for cultural, economic, and political reasons.

  Once Europeans realize that it is better to put up a higher dam against American influence and that it is advisable to return to a more balanced and sane culture, academia worldwide will once again split into subcultures with different work emphases. It is not improbable that disillusionment will come even before the split occurs, as it is hard to believe that so many scientists, trained to use their common sense, will continue to deny reality. They are expected to come to their senses at some point and realize that the culture of rankings is merely a thorn in their, and science's, side. Maybe then the protests and rebellions which have already appeared on the horizon (until now, mostly against disproportionate use) will expand and intensify.

In a multi-participant virtual discussion conducted via the e-mail network of Israeli faculty members on the issue of output measurement, the mathematician Prof. Oded Goldreich of the Weizmann Institute of Science opined: "The almost immediate result of using quantitative content-indifferent indices is a devaluation in the importance attributed to the activity itself and a concentration on improving the index's value. In the atmosphere that is created, publications become the goal, and research becomes a means of achieving it."[947]

His peer from the Weizmann Institute, biochemist Prof. Ada Yonath, a 2009 Nobel laureate, wrote: "I don't understand why we, as researchers, agree to be part of this game. After all, the information regarding the indexes is available to everyone. Soon (and perhaps even now) professional committees will become redundant. Skilled bureaucrats will prepare charts for us, attach the relevant numbers, and decide. Numerical quantification results in purely numerical evaluation, without consideration to the complexity of the research, its originality, and its scientific courage—factors which very often slow down the ability to publish. Therefore, we must come to our senses, shake off the overreliance on quantification, and create a content-based system as soon as possible. And on a final note, some confidential information: If I had been "quantified" at the time (or today), I wouldn't have been able to get past even one promotion committee."[948]

7

To a Lesser Degree

The Crisis of Higher Education

Cracks in the Myth

When parents get together, they have an age-old custom to proudly recount the achievements of their adult offspring. Almost invariably, there is bound to be mention of the academic degrees and the high grades earned by their daughter, son, grandson, or granddaughter. Yet, although an academic degree is still widely perceived as the ultimate proof of excellence and success, the cracks in the myth are growing ever wider. In the surveys of graduates that appear from time to time, many of those polled state that they do not regret studying at an institution of higher education—but in the same breath they mention the huge chasm between their initial expectations and the actual payoff of their degree. For example, in a survey conducted in Britain in 2014 by the insurance company Aviva, one-third of the graduates rated their higher education as having resulted in "poor" or "very poor" compensation when weighed against the financial investment required. Half of them maintained that they would have reached exactly the same level of professional achievement even without a degree.[949]

Another survey, published in 2017 by the think tank New America, found that most Americans see the pursuit of academic studies as an essential stage of life, but at the same time, they do not think that the system of higher education helps students to succeed. Particularly interesting and significant are the differences in perception between various generations, as evidenced by the results of the survey. While a small minority, only 13%, of the millennials (born in the 1980s and 1990s) believed that the current academic system functions properly, almost a third of the Baby Boomers (born in the first two decades after World War II) and 40% of the "Silent Generation" (born in the period between the two world wars) remained convinced of the benefits of academia. The overwhelming majority (almost two-thirds) of those polled thought that the heads of institutions of higher education today put the interests of their institutions before the interests of their students.[950]

Disappointment in the added value of the degree is especially prevalent among first-generation college graduates (students whose parents never earned an academic degree, and sometimes not even a high school diploma). It is precisely these graduates who tend to be dazzled by the glamour of higher education, and it is they who are most likely to succumb to the deceptive marketing of its institutions. Reality then hits them smack in the face, leaving many feeling cheated.

Depreciation of the Degree

Degree Inflation

The college admissions process is not identical for all countries and institutions, but there are similarities in the basic conditions and prerequisites:[951]

- A high school diploma or equivalent certificate marking the completion of high school.
- A standard screening exam, which examines logical, mathematical, spatial, and verbal thinking (in both native and foreign languages). In Israel and in other countries this is known as the Psychometric Entrance Test; in the United States there are the ACT, and SAT; in Japan, JLPT; in the United Kingdom, GCE; in Australia, ATAR; in France, Baccalauréat; in China, Gaokao; in Germany, Abitur; and in Brazil, Vestibular. The tests are generally carried out by a government-certified body or by a number of institutions which collaborate with one another (sometimes the collaboration is international).[952] The goal of acceptance to college or university has given rise to an extensive industry of courses and consultants that prepare young people for these entrance exams—for a respectable fee.
- Students who wish to be accepted to study-abroad programs are usually required to pass an exam designed to test proficiency in the language in which studies are conducted (IELTS in Australia and the UK). In the United States, there is a test of general and linguistic knowledge (TOEFL).

- Additional screening tools, such as personal essays, interviews, and in some subjects, specific aptitude tests, such as basic drawing skills for architecture or mathematical knowledge for engineering.
- Letters of recommendation, professional or social experience (e.g. volunteering in the community), and sometimes a police certificate.
- Because academic studies require at least a certain degree of specialization, the candidate is usually required to mark a number of desirable fields of study on the application form and order them by his or her desired priority. (Although this is less common in the United States, where students tend to wait until their first or second year of college to declare a major, it is standard practice in most countries.) This decision is not an easy one, as it marks a new direction in one's life—and as we know, most of life's important choices also express the things we didn't choose and probably never will. Moreover, although hypothetically it is always possible to have second thoughts (including during one's studies), from a practical standpoint, switching departments or institutions involves the loss of time and money.
- Most young people apply to more than one institution in order to check out several options and increase their chances of being accepted. The height of the bar for acceptance is determined by the demand for the institution and for specific departments, and sometimes even by government mandates. Especially high entrance requirements are the norm for in-demand subject areas with a high level of responsibility (such as medicine, law, psychology, and engineering) and for prestigious and selective institutions. In countries where an academic degree is perceived as a nearly exclusive key to success in life, such as Japan, South Korea, and China, a tense atmosphere prevails in the streets on the days of the government entrance exams, and drives more than a few students to hysteria.

An extensive and profitable industry of online counselors, advisors, and mediators offers help to potential students in making the fateful decision which keeps them—and their parents—awake at night. "Shopping" tours of various campuses, on which the students are mostly accompanied by their parents, were once mainly characteristic of American culture, but today this is common practice all over the world—in part because the number of institutions and departments on offer has grown. The trend of "open houses" has also become accepted in many countries.

Many books, films, and television series have documented the period of weighing one's options, the application, and the wait for the relief of the acceptance letter. In particular, they depict the myth of the teenager from a tough socioeconomic background (or with some other "problem") who, despite all odds, realizes the academic dream through the power of persistence, talent, and hard work.

The high value of an academic degree is primarily derived from its use as a tool for differentiation—a "social signal," in the language of the economists.[953] This differentiation is based on the early screening to get into college, the ability to cope with the exhausting challenge of elite academic studies, and the outcome of long-term learning: the acquisition of knowledge and skills on a high level.

In the past, higher learning was within reach of a small demographic sliver of the population: the well-off. The status of "academic" was so unusual in the social landscape that some campuses created social clubs (fraternities and sororities), complete with identification and initiation rituals. Many of these societies accompanied their alumni throughout their lives and provided a support and placement network, especially for coveted positions. But today, studies show that this phenomenon is gradually becoming extinct for a simple reason: an academic degree has not been a rare status symbol for some time now.[954]

In an article published by the British *Telegraph* under the blunt title "University Was Never Meant to Be for Everybody," the journalist Julia Hartley Brewer wrote that in her parents' generation, only 10% of the young people were sent to learn at universities. This meant that college graduates were more talented than the rest. Today, claimed Brewer, half of every graduating class has a diploma in hand, and no one can tell the difference between the halves.[955]

Three factors brought about the flood of college graduates and, as a result, the lessened value of a degree as a tool of social differentiation:

- **The rise in general demand**. As we noted in the first chapter, the rise in the standard of living, the increased number of high school graduates, and the heightened expectations of demographic strata that had taken themselves out of the race in the past (whether because they did not believe that it was possible, or because they did not have the money to realize the dream) have all transformed higher learning into a natural track for many young people from diverse backgrounds.
- **Preferential selection.** Since the attainment of higher learning is perceived as a key to closing social gaps, and since the equality of rights and opportunities has become a more dominant value in recent years—most countries and institutions have "affirmative action" programs for groups which are disadvantaged in terms of gender, place of residence, family background, financial ability, and so on.

- **Lowering the bar for acceptance.** It's getting harder and harder for academic institutions to stay afloat, and the ever-rising competition is pushing them to make the bar for acceptance lower and lower. The more the institution is dependent on tuition fees, the more it has tended to ease up on acceptance requirements (the phenomenon is less pronounced in countries where higher education is available for free or for a merely symbolic sum). The percentage of rejected applications to prestigious institutions in the United States is over 90% today; Stanford University received no fewer than forty-two thousand applications for the class of 2018—an all-time record—out of which only 5% were accepted. In contrast, the acceptance rate of most public colleges hovers around 50%.[956]

  There are plenty of institutions in the world at the moment about which it is said that the only requirement for acceptance is a birth certificate. But what used to be a marginal phenomenon can now be found at the very heart of academia. Even in advanced degrees, there have been creeping decreases in the conditions for entry. For example, the writing of a thesis (dissertation) within the framework of a master's degree, which was once a basic requirement for acceptance to doctorate programs, is now no longer necessary in many departments. Academic institutions offer a "way around" and a shortcut, which allows even students who finished a master's degree without writing a thesis to be accepted to doctoral programs. In Israel, this is referred to as a "thesis equivalent;" it means the submission of an abbreviated thesis which will later become a chapter of the student's dissertation.

  A particularly warm and encouraging welcome is stretched out to foreign students as a result of the hefty tuition the universities charge them. And because acceptance to master's and doctoral degree programs is conditional on the consent of the student's thesis advisor, it is not uncommon that pressure is exerted on faculty members to accept "promising" candidates, even if their academic record is not exactly stellar. In private institutions, where tuition has gone through the roof, the financial temptation—for example, wealthy parents who are able to, and perhaps even promise to, donate to the institution—leads to abundant cutting of corners. The dean of acceptance at the University of Wisconsin admitted in 2013: "We're only human. There are candidates who glister more than others."[957]

  And where money is a deciding factor, corruption is sure to follow—that is to say, bribery. Studies have found that in China, Vietnam, and Nigeria, these bribes have become a national plague.[958] The former Deputy Prime Minister of Russia estimated the scale of academic bribery in his country at

> between $2 and $5 million per year. In Russia and in Georgia, a reform to the admissions process was proposed in order to combat this plague; these nations settled on nationwide entrance exams under government supervision, which may have improved the situation somewhat, but did not put an end to the education crisis.[959]
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> But if you thought that the problem was restricted to wavering democracies—think again. "Gray markets," aimed at the sale of degrees to employees of certain organizations at end-of-season prices and hushed-up discounts, are not so rare in the West. In many cases, this is not an official dispensation, but rather the whim of the commander or the boss, which translates to a lenient approach[960] In Israel, for example, in the last few years, special programs have been opened on the basis of winking agreements between institutions of higher education and security, medical, and other organizations. The organizations pay a respectable sum towards tuition, and their employees receive staggering concessions in their acceptance requirements, academic expectations, and grades.[961]
>
> This lowering of the bar not only weakens the social differentiation ability of an academic degree, but collapses its entire image. And no less serious: it irritates the talented and hardworking students who worked hard in high school in order to pass the admissions process, and it makes life difficult for the professors. When students with unsuitable academic backgrounds sit in class, the professors are forced to slow down the pace and waste too much time on discourse at a low level.
>
> In fact, the preferential acceptance of the weaker student is a mixed blessing—because the grade which he receives at a discount, and which does not match his real performance, is liable to cause him to form an erroneous self-image and unrealistic career expectations. Many of these students, who were accepted to their studies and/or are finishing them by virtue of the professors' "generosity," find themselves facing a rude awakening when they are forced to take professional certification exams in law, psychology, medicine, accounting, and so on, and fail time after time. Suddenly, they realize that they have no way of working in the field they studied.

When 40% of young people between the ages of twenty-four and thirty-five in the OECD countries, and 50% of the same age range in the United States, hold an academic degree,[962] the idea of using an academic diploma as a primary qualification for employment is already almost passé. In effect, the diploma is the last remnant of a world in which people were pigeonholed mostly according to the impression they made—in other words, their status symbols. It is no wonder that the industry of pre-employment testing has grown. Today, this industry includes thousands of placement companies, which use an endless variety of assessments to select the most appropriate candidates for the unique requirements of every position.[963]

Since the academic degree has become so common, headhunters in the employment market now seek hints between the lines of the resume in order to understand the potential of the candidate, and are no longer satisfied with the official diploma. In many situations, employers prefer to recruit workers who go against the grain—who have an unusual resume, such as graduates in philosophy or foreign languages; have unusual hobbies; or have made independent choices, such as working abroad, autodidacticism, or significant volunteer experience.[964] Moreover, as academic degrees have become a kind of template and as competition in the world of business has transformed into a sophisticated mind-game, more employers tend to select candidates on the basis of personal traits such as emotional intelligence, curiosity, resilience, empathy, integrity, ability to adjust to changes, independent learning, problem-solving, cooperation, and interpersonal communication.[965] Studies have already proved that psychological assessments predict future career performance better than mass status symbols.[966]

In a world in which it is possible to build complex personal and achievement profiles for everyone using digital mechanisms, the day is coming closer when the academic degree will entirely cease to be a necessary tool for screening.

Today, many people are already asking themselves, and many more will ask themselves and their governments in the future: if a degree is only an initial stage in the screening process, not even a guarantee of employment, what is the point of subsidizing higher education with massive budgets? Better to establish targeted assessment and screening methods, accompanied by appropriate training that would require a shorter period of time than the three to four years required for an academic degree.

An Expired Entrance Pass

Studies may show that an inverse correlation still exists between unemployment rate and years of study (in 2017, the average unemployment in OECD countries was 4.1% for college graduates and 10.8% for high school graduates or lower),[967] but the primary reason for this is the fact that an academic degree is a basic condition of acceptance for many positions, especially in the fossilized public sector. A study published in 2018 by the United States Department of Labor revealed an interesting fact: the higher the level of academic degree—beginning with high school, up to partial higher education, and all the way to a doctoral degree—the lower the unemployment rate. But (and this is an important "but"), the lowest rate of unemployment was measured among holders of non-academic professional certification, such as certified electricians, dental hygienists, personal trainers, or mechanics—and their unemployment rate was identical to that of doctoral degree-holders.[968]

Some people maintain that this picture of unemployment among academic degree-holders does not accurately reflect the reality on the ground, because unemployment is defined as a state in which someone is seeking a job and does not find one. Many young people today do not fall under the umbrella of the official statistic at all, because they are simply no longer seeking work, and therefore are called "jobless" rather than "unemployed." Only after their studies do many of them woefully discover that their resumes, which include a prestigious academic degree, do not impress their employers.[969] The experience of chronic rejection—sometimes after job interviews and often without any explanation—is frustrating and discouraging. It turns many young people pessimistic, bitter, and insecure, and leads them to lose faith in the country which encouraged them to study and invest in their schoolwork.

The institutions of higher education continue with business as usual, whistling the mantra, "If you study, you will find work"—which primarily serves their own interests. But more and more media outlets these days are reporting college and university graduates' difficulty in finding jobs, and the public is becoming more and more aware that the reality of employment has changed.[970]

The most relevant data on the subject of unemployment among graduates depicts the correlation between the field studied and the field in which the graduate is employed. And the picture is disheartening: an increasing percentage of college and university graduates today do not work in the profession they studied—a phenomenon known as "underemployment."[971] Thus, in 2012, over 40% of waiters in the United States held bachelor's degrees, along with 22% of customer service workers, 18% of telemarketers, and 16.5% of bartenders.[972] All in all, in 2014, 30% of American college-educated workers between the ages of twenty-two and sixty-five held jobs that do not require a college degree.[973] In 2016, one out of every six customer service providers at tech support call centers in the United Kingdom held an academic degree, and one out of every four flight attendants.[974] In the OECD countries, the average percentage of workers employed in a profession unrelated to the subject they studied was 40% in 2019 (in Israel, 36%).[975]

More frustrating is the fact that many graduates reveal too late that, in many professions, an academic degree is entirely unnecessary. They feel duped twice over: not only did their degree not grant them a head start in the job market, it even wasted precious years in which they could have earned money (rather than spending exorbitant sums), racked up experience, and even made progress in their career.

Not only that, in many cases the academic degree even hurts their chances of realizing their own professional ambitions, because it assigns the degree-holder the status of "overqualified." Many employers flinch at hiring college-educated employees because they are nervous that these workers will develop unrealistic expectations of the position and its salary, and it will be hard to assign them basic tasks.[976]

Diminishing Returns

The cost-benefit analysis of higher education is not new in the public conversation. It is particularly characteristic of American culture, both because Americans compulsively talk about money, and because the costs of higher education in the United States can reach staggering heights. In recent years, the debate on the topic has become more prominent in media coverage outside the United States—both because of the rising student debts of students in other countries and because of new questions that are popping up around the worth of academic study.

The heads of colleges and universities are nervous that the broad consensus about the intrinsic benefit of this age-old tradition will be thrown off-balance; therefore, they hold tight to studies which prove, or so it seems, that an academic degree is still a worthwhile investment. The correlations are indeed still positive. So, for example, in a comparison between people in the same age range with and without a college degree, it was found that the college-educated subjects were healthier, happier, tended to get divorced less, were less often accused of crimes, and—above all—earned more.[977]

But the explanation for this correlation is not quite so simple. First of all, what appears to be a result is sometimes in fact a cause. That is to say, it is possible that the income level of non-college-educated subjects is lower not because they did not attain tools for success in an academic setting, but for other reasons: stigmatization and discrimination (for example, of immigrants), lack of self-confidence, low self-esteem (for example, brought on by difficulty in school as a child), economic hardship (which does not allow for flexibility in employment), lack of connections, and so on.

Secondly, because the most lucrative professions on the income ladder (say, engineering) are also professions for which an academic degree is an entrance criterion, it is only natural that they hoist the average income of degree-holders upwards. And indeed, when we examine the differences in income between college-educated and non-college-educated workers distributed by profession and field of study, it turns out that when the field is less selective and less concentrated, the returns in income are lower.

Thirdly, in both the private and public arenas, the accepted salary for employees is dependent on social consensus and/or market consensus, according to which college-educated employees are *a priori* deserving of higher salaries than their non-college-educated equivalents.

Fourthly, institutions of higher learning screen candidates for their study programs, and it is only natural that students who managed to ace the achievement-based screening process will also do a fine job at work, regardless of the education they received. An illustration: Harvard University has generated more millionaires than any other university. It would be both easy and obvious to attribute this "accomplishment" to the quality of the degree and the abundance of knowledge which Harvard conveys to its students. However, it makes more sense to connect this fact to the advantages conferred by the title "Harvard alumnus" in the job market—that is to say, the image. Furthermore, Harvard alumni almost certainly would have succeeded in the job search anyway, because many of them come from wealthy and well-connected families, and because they arrive in the job market armed with self-confidence, as well as high cognitive and emotional abilities which came with them from home.

The writer and entrepreneur James Altucher published an article on his blog entitled "10 Reasons Parents Should Not Send Their Kids to College." "Since [in] our generation (post-baby boomer) basically everyone goes to college except people who absolutely failed high school, then of course it makes sense that achievement-minded people make more money than individuals who are not achievement-oriented," he wrote. "A better statistical study, which nobody has done, is [to] take 2000 people who got accepted to Harvard 20 years ago, and randomly force 1000 of them to not go to college. Then, at the end of 20 years, to see who made more money. My guess is that the 1000 who didn't go to Harvard would've made more money. They would've been thrown out of the nest to learn how to fly that much earlier, and a 5-year head start would've made [an] enormous difference."[978] Altucher wasn't the only one to catch on: a study published by the think tank Pew in 2017 under the title "Pursuing the American Dream" made ripples when it found that, when it came to becoming wealthy, the chances of a young person from a well-off home who had not gone to college were actually 2.5 times higher than those of a young person from a less-wealthy family who had attained a college degree[979]. In short, it's best to be healthy, wealthy, and wise, and often those things go together.

As we have stated, various surveys and reports, even the most updated, prove that there is some correlation between the level of one's education and the height of one's salary—in other words, that higher education increases earning potential.[980] At the same time, however, there are increasing signs that the average marginal (incremental) return of a degree grows smaller the more common academic degrees become. In countries where academic degrees are still relatively rare, such as many African countries, the differences in income between college graduates and those without a degree can reach dozens of percentage points. That said, in nations where a large percentage of workers hold degrees, such as Scandinavian nations, the gap can be summed up in a handful of percentage points, if it even exists at all.[981]

The study by the U.S. Department of Labor mentioned above highlighted another interesting factoid. Median earnings indeed rise with every degree earned, but there are a few significant exceptions that call the rule into question: holders of non-academic certification are once again in first place (as they were with unemployment rate), with median earnings higher even than PhDs, the highest possible academic degree. The gap between non-academic certification and master's degrees is even higher, at 30%.[982] Another study found that between the years of 2006 and 2014, the gap between the median earnings of 25-to-34-year-old college alumni in the United States and the median earnings of those who made do with a high school education had shrunk by 11% among men and 20% among women.[983]

In fact, in countries where tuition is high and student loans expensive, not only does an academic degree not make a significant number of students wealthier, it even impoverishes them, because it sends them out into the real world with heavy debts weighing on their shoulders and condemns them to long years of economic difficulty. Sadly, academic degrees no longer even provide protection from poverty. A study conducted in the United States in 2016 found that approximately a quarter of minimum-wage workers held an academic degree.[984]

Not Ready for the Job Market

Academia proposes two primary paths towards professional training. The first is direct and concentrated training in subjects such as medicine, engineering, law, and psychology, which mandates periods of apprenticeship and hands-on experience (residency). The second is general training, which lays a foundation of knowledge and thinking skills, and is intended to serve graduates well in a variety of professions.

With the exception of several prestigious institutions, which facilitate connections between employers and graduates—with the help of alumni associations, among other means—most institutions of higher learning do not offer job placement services and do not support their graduates in the job search. That said, the growing demand for skilled graduates who have acquired not only theory but practical experience has inspired academic institutions to devote more attention to the subject. You see this phenomenon all over academia. There is the initial marketing of the institution and its courses, which goes heavy on motifs of "success in life."

There is the extra support given to the departments and courses which supposedly grant an advantage in the job market. There is the employment of seasoned experts from the field as guest lecturers and the incorporation of "learning tours" of potential workplaces. Career services offices are opened, and placement days and job fairs arranged with potential employers on campus.

However, despite all efforts and initiatives, in practice academia is generally disconnected from the job market, and the gap between the content of a college education and the needs of the market is only growing. Most institutions of higher education are not independent entities which operate according to the laws of supply and demand. They are dependent on external support, and for this reason they are vulnerable to political influences and pressures from the hands that hold the purse strings. Time and time again, departments and faculties are established and programs of study founded on a whim of the president, the rector, a dominant professor, a political mover and shaker, or a deep-pocketed donor. Many decisions in this context are made by ivory-tower committees which are unfamiliar with the job market.[985] Communication studies programs are a good example: at the same time that a mass revolution is taking place in the outside world, and millions of professionals in media and production are losing their daily bread, more communication studies departments are opening and the existing departments expanding.

In many fields, studies concentrate on theory, and the content is too general, vague, cut off from the real world, and, in many cases, anachronistic. Most of the computer engineers with whom we spoke for the purposes of this book claimed that many of the courses required for an academic degree in their field are irrelevant to what they actually do. We heard the same claim from lawyers, architects, police officers, and educators.

The chasm between what is taught in academia and what is needed in the field is so vast that students can already sense it during their studies. In a satisfaction survey conducted in 2018 by the National Union of Israeli Students, two-thirds of those polled (eight thousand students from all the institutions of higher education in Israel) responded that they did not feel that their studies were preparing them for work. This fact explains why the highest satisfaction rating went to the Ruppin Academic Center—a relatively small college with a distinctly practical bent. The large research universities trailed far behind, bringing up the rear of the list.[986]

This disconnect from the real world, along with the lack of practical training, can be ascribed to a number of factors:

- The pressure exerted on scientists to publish papers leaves them no time to stay updated on the innovations taking place in the wider circles of their area of study and entraps them in a narrow scientific bubble.[987]

- The integration of experts from the field, who have accumulated professional experience and reputation, into the teaching faculty is relatively slow and hesitant, due to academic conservatism, ego, and a shortage of available funds.
- Scientific research in academia is much slower than industry research, and does not demand immediate and applied results.
- Academia has also fallen behind the times in the online discourse. In an age where messages are instant, online updates, shares, and the wisdom of the masses are the name of the game. The world of science, in which every scientist works on his own or with a small group of research collaborators and publishes in slow, closed outlets, is always lagging behind. Even when it does manage to generate new ideas, academia is late in reporting them.
- For-profit companies are not quick to share the findings of their research with competitors, including academic researchers.

One of the remarkable and disappointing facts in this context is that even in management professions, academia teaches outdated content and skills. In 2018, an article was published in the venerable economic journal *Forbes* entitled: "Why Today's Business Schools Teach Yesterday's Expertise." The introductory sentences asserted that "for the most part, today's business schools are busy teaching and researching 20th-century management principles and, in effect, leading the parade towards yesterday".[988]

Employers' frustration at the level of training with which college graduates arrive has forced workplaces to fill in the gaps themselves. One of the employers whom we interviewed, the owner of a leading for-profit company in Israel, wrote us: "I have experienced a significant decline in the quality of graduates over the past fifteen years. Recent graduates come to us without the basic ability to integrate into a real-world workplace. They are equipped with old-fashioned theories, their professional understanding is less than zero, and they can only replicate what they see, without any independent thinking. My two best workers did not learn a single day in academia—and that says it all."

With Narrow Horizons

Many claim that the primary goal of academia is not to supply professional training, but rather "to open one's mind" and to acquire "general knowledge." But is this really the payoff that the academy's customers expect? Studies show that the decisive majority of young people who knock at the doors of colleges and universities see an academic degree primarily as an entrance ticket to the job market and less as a necessary tool for the broadening of their horizons.[989]

But even if their priorities are skewed and they are not taking into account the latent long-term benefit of their studies, the question must still be asked—does academia sufficiently fulfill its function as a provider of foundational knowledge?

"General education" can be defined as an intellectual deposit built up in the brain of the student over the course of his studies. The human brain can be compared to an underground tunnel and studies to rainwater which make their way inside. The droplets are absorbed by the soil and leave behind a calcium deposit; slowly, these deposits build up a stunning landscape of stalactites and stalagmites. Practically speaking, general education harbors the potential for five kinds of deposits: A) Thinking and expression skills—creativity, analysis, drawing conclusions, writing, reading, proper phrasing, oratory, summarization, clarification, explication, critique, solutions to complex problems, reconciling apparent contradictions, and so on; B) Study skills—ability to search for information, active listening and concentration, time management, diligence, emotional resilience, openness to new ideas, and so on; C) Increased curiosity and love of learning; D) General knowledge about the world—history, geography, psychology, society, nature, and so on; E) Useful or practical knowledge for daily life—technical, bureaucratic, legal, medical, and so on.

In the past few years, the growing controversy around the benefit of an academic degree has given rise to several studies and publications which present an embarrassing and even depressing picture of the pedagogical effectiveness of the American system of higher education.[990] Two prominent books along these lines are *Academically Adrift: Limited Learning on College Campuses* by Richard Arum and Josipa Roksa (2011)[991] and *The Case Against Education: Why the Education System is a Waste of Time and Money* by Bryan Caplan (2018).[992] The fact that these books describe the decadence of higher learning in the world's leading academic and scientific power is a clue that the situation in most other nations around the world is no better and may even be worse. True, there are a number of logical failures and methodological problems in the research and claims often conveyed about the low level of graduates of the American education system. Still, the general picture is disquieting. We will elaborate below:

- **Thinking, articulation, and learning skills**: One of the criteria for the effective teaching of skills is what the professional jargon refers to as "skills transfer"—that is to say, a situation in which the skills acquired are not dependent on the specific context in which they were acquired and can be used in other contexts. For instance, if you have learned to compare between two historical events, you have indirectly learned the craft of comparison in general and will be able to apply it to other comparisons, such as between works of art or between financial investments.

Those who swear on the importance of an academic degree are quick to remark that even if the specific content learned in college courses is not entirely internalized, what is really important are the intellectual skills soaked up along the way. Few empirical studies have examined this influence systematically and comprehensively, in different countries and subject areas. The handful of studies that did try to investigate the phenomenon arrived at inconclusive results: either a complete absence of influence, or a moderate—and therefore thoroughly disappointing when compared to the expectations—influence alone.[993]

If an academic degree truly equipped its graduates with sophisticated intellectual abilities, we would expect that the students who dropped out near the end of their degree (in other words, who completed the overwhelming majority of their credits) would succeed in the job market more or less at the same level as those who completed the degree. But studies show that the average salary of dropouts resembles that of young people who did not learn in institutions of higher education at all. This teaches us that the primary benefit of a degree is the status symbol it represents—that is to say, the cover, not the book. Economists call this “the sheepskin effect’” named after the certificates written in the ancient world on a tanned sheepskin. The phrase’s symbolism may also stem from the idea that the outer layer—the skin—holds as much or more value as the nutritious meat.[994] Although this effect has been demonstrated by salary comparisons, it seems that it could also be proven by more anthropological means, that is, by the actual ways that employers use the CVs of candidates for a job. Various studies have found that employment recruiters indeed check whether a candidate has attained a degree and which degree, but they do not make an effort to check its content—for example, which courses were included in the framework of the degree, which professors taught the candidate, and the current curriculum of the particular institution or department.[995]

The truth of the matter is the fundamental question here is not whether academic studies refine the ability to learn. Even without researching the question, it is safe to assume that anyone who devotes three or four years of his life to learning and grapples with a non-trivial number of exams and papers will improve his intellectual abilities at least a little—just as anyone who engages in physical activity, no matter the specific activity, will strengthen his muscles and improve in many measures of physiological health. The real question that must be asked in this context is—why is the acquisition of these skills usually incidental? And what is more: why do only a few academic departments devote thought and resources to the systematic instilling of intellectual skills such as these, while most are largely content with indirect influence?

Many point to critical thinking as one of the most important skills that an academic degree is supposed to instill, but there has been almost no comprehensive conversation in academic departments around the questions of what critical thinking is and what one must do to pass it on. In an article titled "Down with the Four-Year College Degree!" Charles Murray of the American Enterprise Institute noted that while colleges may once have taught critical thinking, and while you can still find institutions in the United States which teach their students how to think, today these institutions are rare. The average professor today, he claimed, wants his students to call him by his first name, does not want to be too critical or "the bad guy," and gives his students a 90 on a test on which they once would have received a 70. Therefore, according to Murray, the claim that academia in the United States today encourages critical thinking is simply a joke.[996]

Today, universities and colleges are expected not only to pass on advanced thinking skills to their students, but to fill in basic gaps in knowledge which these students bring from home and from their primary and secondary education. It turns out that they don't do this, or at least don't fully do this. Studies done in America show that high percentages of B.A. and even M.A. graduates possess limited writing skills and minimal understanding of the rules of grammar. Many of them are unable to string two words together and have difficulty constructing a coherent argument at all, let alone summarizing multiple positions and ideas. More than a few also lack basic writing and speaking skills in a second language.[997] From interviews we conducted, it became clear that this phenomenon is not foreign to lecturers outside of the United States (certainly not in Israel), and it is too bad that governments around the world and international organizations have not launched studies to expose the sheer scope of this ignorance.

Not only schools and academic institutions bear the guilt for this low level. The students themselves bear some responsibility. Many spend most of their time making money and engaging in leisure activities, and are content with minimal time spent learning—just enough to achieve a decent grade, or at least a passing grade. In practice, this translates to reading summaries and memorizing answers from previous exams. Of course, there are also students who delve deeply into their studies, who have a true passion for learning and a willingness to apply themselves, but they are far from the majority.

And there is another important reason for the flimsy intellectual deposit and the low level of many college graduates: the style and structure of instruction. Many studies show that the most effective learning takes place through experience, a concept known as "learning by doing." When one has a defined and practical goal, ideally with a reward at the end, and when the teaching is active—it leaves a stronger imprint on the gray cells.[998] Unfortunately, academic studies (with the exception of laboratory experiments) generally take place in a sterile and passive learning environment—listening to lectures, many of which are simply declaimed from notes or PowerPoint presentations. If the subject matter was presented in academia by interactive and attractive means such as enthralling games, some of which can be addictive, and amusing riddles—the "study deposit" would obviously be much larger.

- **The joy of learning**. Everyone knows someone who will fondly recount, with sparkling eyes, the happy days he spent learning in his younger years—a memory which elicits fierce longing. We would not dare to mock or dismiss those feelings, even if sometimes they can be chalked up to a nostalgia which makes the past better than it was. But, as we have already seen, the statistics tell a different story. It turns out that students in our day spend less and less time in class and devote less time than they once did to their studies.[999] If students really enjoyed their learning, they would not roar with delight every time a class was cut short or canceled.

  As a matter of fact, it would not be entirely out of line to suggest that academic studies not only do not imbue their students with the love and delight of learning, but even in many cases cause them to loathe it. This takes place not only because of boring classes and old-fashioned study tools, but because everything is oriented towards grades. In fact, the education system, from elementary school all the way to university and what comes after, has transformed means into ends. You study in high school primarily to get your entrance ticket to college, and you study in college primarily to get your entrance ticket to a master's degree. At the end of the day, the memory of the grade is stronger than the memory of the content learned—particularly when your grade point average is lower than expected.

  Many studies show that for more than a few students, grades not only do not raise their motivation to learn, they actually lower it. They are nerve-racking and anxiety-producing, and often generate feelings of disappointment, betrayal, insult, shame, and humiliation, as well as a low self-image.[1000] And no less upsetting, they damage the warm, natural connection between a teacher and his or her students. It is true that the professor is accountable first and foremost to the professional code of constructive criticism when he measures the academic achievements of his students. However, in class, particularly in smaller academic settings, many professors manage to create an atmosphere of closeness, friendliness, solidarity, and support that blows up in their faces after the exam, both for the students and the professor. Is this an inevitable evil? Not necessarily.

- **General knowledge**. It is doubtful that anyone would disagree with the statement that widening one's horizons is important both to the individual and to society, not only because wide horizons improve analytical skills and moral sensitivity, but because they allow one to experience the world in a deeper and more meaningful way.

  Those who claim that every student, even a stupid or lazy one, acquires an abundance of new knowledge in academia—some of which he or she could never have imagined learning in other circumstances—are absolutely right. Still, that does not mean that the current method is good, or that it would be impossible to replace this method with a much better one.

  It is worth noting that the term "general knowledge" or "core learning" is insufficiently clear and includes more than a few vague matters and incorrect assumptions. For example, many measure the effect of learning by means of the question: "What has stayed in your memory?" Until today, not many studies have been conducted to examine the general knowledge of graduates of institutions of higher learning. The few that have examined this question seemingly present a depressing and worrisome picture. It turns out that many of the young people reveal a profound ignorance in matters that are perceived among the older elite as crucial intellectual equipment for the educated person (in particular, subjects connected to recent national history).[1001] But this diagnosis should be taken with a grain of salt for the following reasons:

  - The human brain has winding roads of its own. Its cells include not only deposits of factual knowledge, but also "latent knowledge," emotional and logical, which is difficult to pinpoint and calculate by means of surveys and exams. It is not unusual for someone to suddenly remember something that he did not know was stored away in his memory. Moments of creativity, too, are often born out of subconscious connections that even the creator is surprised to see.

- The human memory has a limited capacity. Therefore, it is often inevitable—and even desirable—that one will erase accumulated knowledge or stash it away in the back room in order to clear out room for new knowledge. People who remember everything, including the most minute details, are not necessarily educated; they often suffer from uncontrollable "information overload" and have trouble putting together a complex and expansive understanding of reality.
- There has also been a conceptual shift when it comes to the definition of "the worthwhile core." On the face of it, the major difference between the younger generation today and the generations preceding it is that the former know a little bit about many things and the latter know a lot about a few things. Moreover, in the eyes of the "old people," education = highbrow culture, while young people attach high importance to everyday trifles. Which of the two is correct? Both of them are right and both are wrong. Actually, the main problem with higher education is the strange tendency of university leadership to turn a blind eye to the dramatic change in the definition of basic knowledge and the means to acquire it in the present day.

In the past, the professor was perceived as an authoritative source of knowledge, and people came to him to learn what was impossible to learn from any other source. Scientists also performed the important function of composing encyclopedias, lexicons, and other study materials, which constituted the basis for general knowledge. But in the Internet age, most of those materials are provided by information processing and accessibility specialists. In the heated competition between academia and the Internet, it is clear who has the upper hand.[1002]

Furthermore, if in the past it was common practice to admire those gifted with highly developed memories, a wealth of knowledge, or exceptional computing abilities, today it is clear that intelligence has many facets. Almost every genius in one area is an imbecile in another, and long before us it has already been pointed out that education never prevented anyone from remaining an ignoramus or an idiot.

The new questioning of the need for academic study as a tool to widen one's horizons in the digital age fits neatly in with general criticism of the public school system—and it begs the questions of "what is general knowledge" and "what is core knowledge" in this new era.

In the late 1980s, philosophical and pedagogical debates took place worldwide around the idea of "cultural enlightenment" or "cultural literacy",[1003] but they have faded away. From time to time, lexicons of basic terms and concepts for the educated person are published, but somehow in the very same period in which patterns of information consumption are fundamentally changing, visual information is replacing textual information, and the fake threatens the real, no deep discussion has arisen on the subject of the "core".[1004]

The absence of such a debate is liable to be a source of great sorrow for generations (by the way, thrilling debates around the importance of information and how in-depth it should be take place primarily on the forums of Wikipedia). The elements of the core knowledge required for the enlightened person in our day are indeed the subjects of passionate controversy—political, ideological, scientific, and pedagogical—but we cannot avoid them now that the amount of human knowledge is doubling every two years,[1005] and databases and search engines allow the comprehensive retrieval of information at the click of a finger. The time has come to answer questions such as: what is cultural enlightenment or literacy? Does an educated person need to know facts by heart, and if so, which? What must he remember, and what can he forget? How should the hierarchy, the level of detail, and the importance of study topics be established, and who has the right to establish them? What is the relative weight of each subject area in the great tapestry of knowledge? What is the importance of theoretical versus practical knowledge? How often must we rethink the course? – and more and more additional questions.

Most educational institutions—and specifically higher education—teach subjects and topics that have been passed down and become fixed over many years, not necessarily because they still serve an important goal. Even when subject areas indeed serve vital needs, no one bothers to clarify whether they are doing it in a way suited to the second decade of the 21st century, or whether they are still relevant. For example, the motivation and the ability to read was considered an indispensable attribute for hundreds of years. But is it not also important today to learn how to skim and scan, or even to channel-surf effectively?[1006] Reading a map was perceived as a uniquely important skill in the era before navigation apps. But does it still have the same level of importance in our day? In the not-too-distant past, the ability to take photographs was the exclusive province of professional photographers, but in the age of the smartphone, has the day not arrived to teach every child the principles of visual composition?

Unfortunately, a large percentage of the curriculum—from kindergarten onwards—contains too much peel and too little core. This is the reason that many people "hate school and love education."[1007]

The Deserted Campus Quads

Institutions of higher education have always been considered, and are still considered, an important stop on the way to maturity and formation in modern society—an interim period after childhood and youth, but before taking on the yoke of life. For many young people, leaving home for college is their first departure from their parents' house and from the world of childhood. It is a formative experience etched on one's memory forever.

However, this socializing function of institutions of higher education has begun to lose its importance in the last few years, because many students keep their presence on campus to a minimum, come—or do not come—straight to class, and hurry out to run to work. They prefer to live and spend their spare time in city centers, where the bars, coffee shops, restaurants, clubs, and workplaces are concentrated.

The campus experience is also losing its significance because social networks allow students today to create, expand, and maintain social connections on a large scale with no need for physical interaction. Even in the political sphere, campus is losing its traditional value, because the most critical and effective "town square" for the molding of social ideas and political protest is now the social network. On this platform, there is no need for protest permits, and the possibilities for sharing can ignite solidarity at viral speed.

Wasteful Subsidization

In one of the dialogues in Arthur Miller's hit play *All My Sons*, Joe Keller, the father of the family, who owns a factory for the manufacture of airplane parts, says with bitter humor: "I don't know, everbody's gettin' so goddam educated in this country there'll be nobody to take away the garbage… you stand on the street today and spit, you're gonna hit a college man." Today, those words, written in 1946, sound amusing, but Miller had already identified the real tragedy that was at that time still in its infancy.

The basic assumption, which is still accepted today, maintains that the increase in the ratio of college and university graduates is beneficial for society. Leaders and the public alike see a degree as an important sign of success, and it has already become an almost sacred goal. Governments have hastily rubber-stamped the establishment of public and private institutions, converted professional schools into colleges, increased direct and indirect subsidization, expanded aid programs for disadvantaged groups, and raised the salaries of public servants in accordance with the degrees they possess (this phenomenon is more common in developing countries and countries with a tradition of socialism, such as Israel). Professions which once did not require an academic degree, such as nursing, security, library science, sports, tourism, and teaching, have undergone a speedy academicization. The official reason for this was the aspiration to improve the level of professionalism among workers. In fact, it was intended mostly to improve the image of less-popular professions, in an age in which "if it ain't academic, it's crap."

There is no doubt that the education level of a country's citizens influences their earnings in countless ways. Most of the world's highly educated nations are also the most democratic and the most economically and intellectually robust. Still, it is worth asking the question: Is an academic degree really the most effective means to achieve these goals, and is it right or worthwhile for the country to pay for its citizens' degrees?

It is hard to estimate in retrospect whether the approach of "a degree at any price" was really worth the public investment. What is clear is that, in the past few years, proof has piled up that "degree inflation" contributes less and less to society and in certain aspects may even harm it:[1008]

- Many young people study subjects which are unsuited to their talents and their hearts' desires, only in order to acquire the coveted diploma—coveted, that is, mostly by society and by their parents. Classrooms are stuffed with bored students who have no desire whatsoever to learn and, in many cases, are also incapable of learning.

  In 2008, the *Atlantic* published an article entitled "In the Basement of the Ivory Tower: Confessions of an Accidental Academic." Its writer, cloaked in the pen name Professor X, taught literature as an adjunct professor at a small private college and a remote community college.

  The article, which in 2011 was expanded into a book of the same name, described the humiliating and depressing experience, familiar to many professors, of reading the shamefully low level of work submitted to him by students. In the book, he wrote of one of his students: "I pictured her writing it in a bar, or while driving to class or *skydiving*. Maybe she composed it as one long text message to herself."

  The message was clear: We push everyone towards academic study, even if it is unnecessary for them, even if it does not interest them, and even if it is unsuitable for them, as though giving up on a degree meant a lifetime condemned to work in the coal mines. As a result, we make not only young people miserable but also their professors, who earn very little and despise their students.[1009]

  Many lashed out furiously at Professor X, but what was considered absolute heresy in 2011 has gradually become a more and more widespread opinion. The Korean economist Ha-Joon Chang, one of the world's leading theoreticians in the field of macroeconomics and the author of the best-seller *23 Things They Don't Tell You About Capitalism*,[1010] explained in an interview with *The Marker* in 2015: "If, until the 1990s, only 30% of the population went to college, this meant that you did not need an advanced degree in order to find decent work. But when 70% have degrees, not to go to college is essentially to declare yourself an idiot… This creates a ridiculous situation in which people get degrees in communications and serve hamburgers at McDonald's. It's extremely wasteful and we have to rein it in somehow."[1011]

Germany is an example of a country that has not surrendered to "degree madness" and has reaped the rewards. The percentage of college-educated Germans between the ages of twenty-five and thirty-four is only 15%, and nonetheless, Germany is a leading economic power. The explanation is simple: many students receive targeted professional training, which provides them with a comfortable livelihood and helps the German economy to flourish.[1012]

- Degree inflation also does not help and even hurts society because many of the degrees are only barely or not at all relevant to what degree-holders will actually do at their workplaces, even if they supposedly have a job in the field they studied—for example, a bank teller with a diploma in economics hanging on his wall at home, a clerk at the Ministry of Foreign Affairs with a degree in international relations, or a proofreader with a degree in linguistics. This means that countries and private employers are paying a whole lot for low returns.
- Many public organizations encourage their workers to study in order to increase the prestige of the organization and the profession. The "carrot" is that they fund the degree; there are also tax credits or salary bonuses (including pension benefits) given to those who complete a degree while working. But someone has to cover these bonuses, which are given to thousands of workers, and that "somebody" is the nation's treasury. The result is a rising added weight on the federal budget, compounded with the budgetary burden of pensions.[1013]
- In many professions, theoretical studies come at the expense of practical learning. A striking example of this is the field of medical nursing. University graduates may enter their work in clinics and hospitals with more general knowledge, but they come with less practical expertise and fewer skills. A veteran nurse with 35 years of experience in the field, with whom we spoke, summed up the problem well: "We may have gotten academic degrees, but we've distanced ourselves from the patient's bedside." Moreover, the gap between the glamorous image of the profession cultivated by institutions of higher education and the hard, routine, and draining work in real life creates a sense of disappointment which causes some young college graduates to cut and run after a brief trial period.

- Paradoxically, even absurdly, one of the victims of "the race to a degree" is academia itself. The myth that it is impossible to succeed without a degree leads many young people to study easier and less demanding subjects in high school in order to ensure that they will receive better grades and a better GPA on their high school report cards. This approach influences their decisions later on: many students prefer degrees in the social sciences and humanities only because they are considered easier to study than the hard sciences. One of the results is a shortage of engineers and a decline in the demand for the study of mathematics, physics, and chemistry.[1014]
- Many assume that filtering out candidates in accordance with their education level improves both the profession in general and workplaces in particular. Not necessarily. The (unnecessary) baseline requirement of a degree in order to be accepted to a certain position often blocks the way to more suitable employees, only because they never sat in the pews of academia. This "skills gap," as the economists call it, primarily hurts occupations that do not require academic training in order to advance and succeed. A research report published in 2017 demonstrated that over six million positions in the United States suffered from a shortage of stable manpower because of degree inflation. In the meanwhile, 70% of employers claimed on the basis of their experience that the chances of an employee without a degree to be productive were equal to or even greater than those with degrees, and 30% admitted that there was no justification for the higher salary paid to degree-holders. Half of the employers interviewed in the survey thought that the chances that a college graduate would abandon his workplace and move to a competing company were higher.[1015]
- The aura of glamour associated with an academic degree has mainly lowered the demand for vocational studies in industry and service professions (what is called in Germany "meister degrees"). For instance, if in 1997 120,000 Israelis were on academic tracks and 28,000 acquired professional-technical training, in 2017 180,000 studied for an academic degree and only 8,000 received vocational training. All this took place while, at any given moment between the years of 2003 and 2013, there were approximately 1,400 positions open for engineers and technicians;[1016] while the market suffers from a shortage of plumbers, mechanics, gardeners, and bus drivers; and while professionals in those fields earn much more than many university graduates.

  Technical professions—such as carpentry, electricity, and engraving—have been stigmatized for many years as inferior and have been consequently abandoned, leading to a critical shortage of workers. A survey conducted by the global corporation Manpower in 2018 estimated that out of over forty thousand employers in 43 countries, almost half of the employers were unable to find qualified craftsmen, such as construction workers, welders, mechanics, drivers, and even service technicians, sales representatives, quality control technicians, and receptionists—a negative record over the twelve years in which the survey was performed. In large companies (250 workers and over) the problem is especially severe: almost 70% of employers have trouble finding skilled manual laborers. 16% of them reported that they were considering a transition to outsourcing or production in a different country.[1017]

In simpler, "dirtier," and more routine industries such as cleaning, the situation is even worse. In the past they were also considered inferior, but the mythification of the academic degree has blackened their good name even more, and has essentially erased the noble ideal that "all honest work is good work." Rather than improving pay and attempting to improve their image, many of these "simpler" professions are performed by new, exploited classes of migrant workers.

A Worn-Out Model of Instruction

Since the Middle Ages, and ever more rapidly since the beginning of the 20th century, academia has developed a standard instruction model in which the degree is learned at a single institution and granted by that same institution. Different types of institutions exist: private and public, general and specialized (the latter mainly in engineering, technology, education, military, and liberal arts), institutions which offer every degree level and institutions which offer only undergraduate or advanced degrees. There is also a distinction between research universities, most of which are larger (both in the choice of departments and in the number of students and faculty) and concentrate on research, and colleges, which are usually smaller and more community-oriented, and focus on the acquisition of general or professional education. That said, several characteristics are shared by programs of study at every institution:

- The program of study includes a certain number of courses, which grant the student "credits."
- The courses are composed of a certain number of classes, which take place in classrooms, lecture halls, and laboratories.
- It is the responsibility of the student to learn the material, and more independence is required than in primary and secondary education.
- The academic year is divided into two semesters, with exam periods, paper-writing periods, and breaks in between. Today, some departments also offer a summer semester in order to shorten the duration of studies.

- Most courses are semester-long, and at the end of every course, the student takes an exam and/or must submit a paper. Throughout the course, students are usually required to complete readings, submit exercises, and occasionally take quizzes.
- Every course is taught by a single professor, who prepares the syllabus, sets the demands, writes the exams, grades exams and papers (sometimes with the help of teaching assistants), and assigns a final grade.
- The undergraduate (bachelor's) degree usually spans 3-4 years.
- The cadre of lecturers includes permanent faculty, who largely devote themselves to research, alongside temporary faculty, usually part-time.
- Once students earn their bachelor's degree, they can continue on to advanced degrees (master's and doctorate) depending on their academic record and the demands of the institution and department.
- The classes are divided into five types: required classes, in which students attain initial and necessary foundations of knowledge; elective classes, from the selection offered by the department; review classes, to go over the material learned, taught by adjunct professors or graduate/doctoral students; outings and practical experiments in the laboratory or the outside world (archaeological digs, research institutions, museums, radio and television stations, factories, schools, etc.); and seminars, which are more interactive and intimate courses in which students are requested to respond in class to the reading material, to prepare oral reports ("referats") or presentations, and engage in discussions.[1018]
- Most classes are taught in a lecture format. The interaction between professor and student is different from that between teacher and pupil, but the principle is similar. Symbolic and ritual elements such as the structure of the classroom illustrate the difference in status between the knowledgeable professor, charismatic and authoritative, and the student who has come to lend an ear to the professor's words and will later be tested on them.

For two hundred years, until the appearance of the Internet, nothing really threatened the lecture model in academia, until it seemed that this was truly the very best model and there was no doing without it. Even in the past few years, although we are in the age of transparency, criticism, sharing, and digital technology, the model of frontal lectures has stayed exactly the same, for several reasons:

- The field of higher education is a centralized, even monopolistic field with no real competition.

- The habit of learning in frontal lessons and by means of assigned reading is deeply rooted in every high school graduate.
- Academia is considered the keystone of the education system, and upheaval at the top of the pyramid is liable to endanger the lower and middle levels—making life complicated for schoolteachers, for whom the model of frontal teaching is comfortable.
- It would not occur to the head honchos of academia, nor to most of the public, that it might be possible to give up on the model entirely; instead, they are satisfied with alterations, updates, and slight adjustments. They are also nervous that a move away from frontal lectures would render the traditional function of institutions of higher education irrelevant – a nightmare, from their point of view.

But the flaws are so severe and the potential replacements so enticing that a change in the rules of the game is not only necessary but inevitable. At this point, we must spell out the defects in the current model of academic instruction—which are becoming more pronounced every day.

Here but Not Hear

Academia has created a more or less a single standard timeframe of study for every subject. This includes the duration of the degree, the number of semesters, the number of classes in a course, and the length of every meeting. Not only is this uniformity arbitrary, but its effectiveness has never really been examined.

The result is that academic instruction operates according to Parkinson's Law, and the classes and courses expand to fill the time assigned to them in advance. Moreover, in order to attain a B.A. in economics, a certification in electrical engineering, or a PhD in medicine, today the same number of classes are required as were required in the 1970s, despite the massive changes that have taken place in those fields, and in general, since.

Are seven years of study—no more, no fewer—truly required in order to train a doctor? Are four years truly necessary to train an engineer? Is a B.A. in literature really comparable to a B.A. in psychology, and do they require the same numbers of semesters and courses? No one in academia has attempted to respond to these weighty questions, with the result that academic schedules stay trapped in amber as though nothing around them had changed, and millions of students waste their time in wearisome classes and courses that have been stretched out like gum after it has lost its taste.

The problem of attention and concentration in classes became impossible to ignore when the generation of digital natives (children of the 1980s and onwards) began their higher education. Young men and women accustomed to never-ending and intensive stimulation, not to mention constant distraction, already had trouble concentrating in school—as is evident from the enormous spike in attention deficit disorders in the classroom and the skyrocketing consumption of Ritalin, along with its many derivatives and knockoffs. In academia, the problem only got worse.[1019] But the academic schedule is unresponsive to these patterns of knowledge absorption, and is unable to provide a response to different abilities and styles of learning. Because the method is set in stone, quicker students cannot complete a class, course, or degree early, and slower students do not receive the length of time they need.

Why have they not made this outmoded format more flexible? First of all, because of conservatism and rigidity. In the eyes of many professors, the lecture in front of a classroom is every bit as holy as prayer in a church is for priests. Secondly, the customers (the students, that is) cannot influence the product they buy, at least not yet—and until now, no real alternative product has been placed on the shelves. At most, students can express an opinion of their professors in teaching evaluation surveys, but they cannot voice their criticism of the structure of instruction itself. They have no other choice but to continue attending institutions of higher education, at least on paper. Thirdly, no one really has a full picture of what happens in the classroom—how many students show up, who shows up, and what happens over the course of a class. Fourthly, drawn-out programs of study serve the institutions economically, and frontal teaching in classrooms promises consistent employment for the professors.

The result of this stagnation is the direct and indirect abandonment of academia, which manifests in a number of ways:

- Many students choose the courses which will fit into to their tight schedules, rather than basing their choice on the course content and whether or not they are interested in the subject matter, on the assumption that almost all of the courses will be too long and fairly useless. Anyway, the point is the diploma they will receive at the end, not what they will learn along the way.
- Students may be physically present in the classroom, but their connection to the class is tenuous. Online surfing on a laptop or a smartphone, games, and continuous correspondence—all these and more are already the undeniable reality in college classrooms. Students sit in class with one-and-a-half eyes on the screen and half an eye or a quarter of an ear on the professor. Already in 2012, a survey conducted in Israel found that most students see web-surfing, messaging, and games as legitimate activities during class.[1020] Every professor in the world has experienced the embarrassing predicament of teaching

students whose heads are hidden away in devices, at the same time that the presidents of colleges and universities prefer to hide their heads in the sand.

- Many students simply do not arrive to classes which do not have an attendance requirement. A study published in 2014 found that the average attendance in classes plummeted from 79% at the beginning of the semester to 43% at the end.[1021] And this is not counting the students who scheme their way around the attendance list and absent themselves from required courses as well.[1022] This phenomenon is already evident to the eye. If campuses once thrummed with young and lively students, today they are emptying out, especially as the semester progresses. This mass abandonment calls to mind the "inner emigration" syndrome that characterizes societies in crisis: before people physically abandon a country or a town, they abandon it partially and emotionally. That is to say, they become alienated, and are absent for longer and longer periods of time with feebler and feebler excuses.

The students are also abandoning the classrooms because it is easier than ever to settle for summaries and outlines. This is, of course, not a new phenomenon, but in the past few years it has become a grade-A industry.[1023] Examples can be seen on the American websites Course Hero, Notehall, StudyBlue, Flashnotes, OneClass, Koofers, and StuDocu, which allow students to buy and sell a variety of instructional materials, including summaries, outlines, translations, and test questions. The websites of what has come to be known as "the black market of academic degrees" are so successful that a few of them are already being traded on the stock market.

An embarrassing and amusing event which illustrates the absurdity of the situation took place in 2014, when it turned out that all the students in a certain course at the University of Groningen in the Netherlands received a grade of 10 out of 10. This happened for the simple reason that the professor used an old exam which was available on the website StuDocu (as of summer 2019, the site contained study materials from 11,561 institutions of higher education in every corner of the earth, including 66,000 books and 928,000 test questions).[1024]

Another stop on the way to abandonment, and sometimes in place of it, is the phenomenon of the "exchange receipt": more and more students change tracks during their studies, and move from department to department or from institution to institution. A couple with whom we spoke while writing our previous book, "Generation Y: Generation Snowflake?" said to us, half-laughing and half-crying, "We told our children that we agreed to pay for their degree—but only with one exchange."[1025]

But there are also students, and more than a few of them, who completely lose their patience and utterly abandon their studies. The reasons are manifold, and are often caused by a combination of factors: financial difficulties (in general, students from disadvantaged financial backgrounds drop out more often);[1026] sobering up too late when the difficulties and the hurdles along the way, not to mention the input of time and energy required, show themselves; and disappointment resulting from overly high expectations. Also, the fact that the young people of Generations Y and Z love to sample and try things out, find it hard to commit, and tend to regret decisions that they've made obviously influences the rise in the attrition rate.

It is worth qualifying this statement by stating that the data on complete dropout from academia is in many cases "messy" and includes not only those who chose to give up on their degree entirely, but those who changed areas of study, moved to another institution, or took time off and intend to return. An additional problem is the lack of consistency between institutions and between countries. All of them indeed measure only the dropout rate of students who signed up for a full program of study, but there are those who concentrate on dropout rate over the course of the first year, and those which focus on students who did not finish the entire degree. In the United States and Australia, for example, only students who did not finish their degree within six years of beginning their studies are counted.

Either way, the studies leave no room for doubt that this is a meaningful phenomenon on an upward trend. In the United States, only 60% of students who began their studies in 2010 had finished their degree at the same institution by 2016.[1027] That is to say, only six of every ten who started down the path arrived at the finish line. In Germany and Argentina, the dropout rate in the first year is 25%, and in Mexico, 30%.[1028] In Chile, 30% drop out in the first year and 43% by the end of the second.[1029] In Australia, 30% of students do not finish their degree.[1030] In the United Kingdom, too, a rise in the dropout rate has been recorded, but in contrast to countries where the dropout rate is in the dozens of percentage points, the British dropout rate in the first year was only 5.7% in 2012 and 6.4% in 2016. That said, the dropout rate in certain institutions was much higher, even reaching 20%.[1031]

Incidentally, the nationwide dropout average is a bit misleading, because it also includes the dropout rate at private institutions. Someone who has passed a grueling admissions process, has been accepted to a well-respected university, and pays high tuition does not tend to give up on his or her studies easily. Harvard, for example, holds the American record for lowest dropout rate—2%.[1032] At Cambridge, the rate of those who drop off the hill midway through their ascent is only 1%.[1033] This is also the reason that in countries where higher education is available for free or at a merely symbolic cost, the dropout rate is high. Thus, for example, in Argentina, which grants its citizens higher education at no cost, the dropout rate before finishing one's degree is all the way at 73%![1034]

A Buffet-Style Learning Menu

Beyond required courses, which are based on an international professional consensus, the topics and content of many academic courses—most prominently in the "soft sciences"—are left up to the discretion and the whims of the professors. Not only do they get to set what the students learn, but no one checks what they are actually teaching. The norm is that "the classroom door is closed" and no one is allowed to interfere with freedom of instruction, which is considered an integral component of academic freedom. The result is that the content of a degree changes all the time and is often subject to tangential factors, such as the identities and particular fields of specialization of the professors in the department at the time.

Supporters of the method which grants autonomy to teachers justify it by asserting that every faculty member teaches what he or she loves and knows best. Moreover, the academic "buffet method" supposedly brings with it an important benefit: it allows students to tailor-make their academic program according to their own measurements—that is to say, their areas of interest, the professors they like best, and the hours that are most convenient for them. But the pedagogical disadvantages far outweigh the advantages:

- The selection of dishes on the menu is not rich and nourishing enough, because the academic format requires the student to specialize in only one or two subjects. Sometimes, one is defined as a "major" and the second as a "minor." In the last few years, there have indeed been attempts to expand the options for choice and integration and make them more flexible, as part of a refreshing approach of interdisciplinary learning, generalism, and synthesis.[1035] Still, the course offerings are limited, and courses which could enrich programs of study do not attain their full potential. It is not unusual that a talented professor with an interesting course finds himself standing before a small class, only because students are prevented from taking part in his classes for bureaucratic reasons of overlap between departments and concentrations.
- The excessive autonomy of the professor in the choice of topics, content, and academic demands creates gaps in knowledge and quality between courses, departments, faculties, and institutions, and even between students of different professors in the same department. It causes redundancy and prevents the standardization of the subject matter being learned. Worst of

all, it makes the modular building of a knowledge base difficult, confuses students, and creates an inherent instability in the study program.

Too Long, Didn't Read It

The syllabus—the course outline sent to students at the beginning of the semester—includes a reading list (required and optional). Students are required to read the material in their free time as an expansion or a complement to the content taught in the classroom, and in order to accustom them to coping with academic texts. In most courses, the professor sets the reading list according to what he or she thinks best, but in certain fields, primarily core subjects, a consensus has been developed over many years with regard to necessary, fundamental content.

The final exam of the course generally also contains questions intended to examine the student's familiarity with and comprehension of the reading material. The reading material provides the basis for debate in some of the classes, and students are required to read it before class.

Very few, if any, have questioned or reflected on the importance and the benefit of reading requirements. Academia has also stayed fixed in place on this question, and has experienced pedagogical fiascoes as a result:

- There is a lack of standardization between professors, departments, faculties, and institutions.
- When the primary goal is the achievement of an academic diploma with the bare minimum of effort, more students choose courses according to their (lack of) academic demands, and mostly according to the amount of work assigned. As a result, professors with long reading lists, or those who assign more or more complex tasks, receive lower ratings on teacher evaluation surveys and on online ranking websites for courses and professors. In order not to lose students, many professors are required to cut back their demands, and studies have shown that since the 1960s a creeping reduction has taken place in the amount of reading assigned. In simpler terms: students are required to read less and to write final papers that are smaller in scope.[1036] Thus, many courses have become unserious, to the extent that sarcastic nicknames have already developed to describe the phenomenon: "Mickey Mouse courses" in the United Kingdom, and "bird courses" in Canada.

  Incidentally, it is not uncommon for the paring-down of tasks to take place behind the scenes: the full official syllabus is technically handed out, but students are only requested out loud to read a few of the entries on the list. In many cases, the reading list is provided, as it were, "for enrichment and deepened understanding," the meaning of which is clear to everyone.

- A significant portion of the reading list is duplicated year after year. Only a few professors make the effort of checking whether the readings assigned are realistic and how many students complete them in practice. It is particularly important to perform such checks today, for a number of reasons:
  - Today's generation of students spends more time working and going out on the town during their studies than previous generations. For this reason, they have less time left to complete the readings.
  - This is a generation of short messages, and they are not trained in the art of reading long texts, which require the ability to concentrate for long periods of time. In general, reading has become less linear, and people rarely read texts cover to cover.
  - The range of shortcuts on offer to them is very wide (summaries, translations, and so on).
- In most courses, students are required to read original papers which were first published in scientific platforms. For that reason, the structure and language of the papers are often more suited to research and less to learning. Because reading assignments are in many cases unrealistic in their length and the amount of time allotted to complete them, because the texts themselves are not approachable to the reader, and because the degree is perceived more as a bureaucratic matter and less as an enriching intellectual experience—the gap between the formal demands and the reality in the classroom has grown. Many students skim the texts and split the readings between them, so that each one can summarize a chunk of the material for the rest of his buddies. Others read summaries and translations, most of them of lesser quality, which are passed from hand to hand or openly sold. And there are students, and not a few of them, who give up entirely on reading papers, on the assumption that they will successfully achieve a passing grade even without them. In fact, it is already not uncommon for students to finish their degrees having read very little, if at all.[1037]

The rigidity of the institutions of higher education in this area is particularly ridiculous, given the exciting possibilities for multimedia learning that exist today.

The Professor Has No Clothes

The quality of teaching is a hard variable to pin down. It is difficult to measure, both because teaching is a complex process and because the desire to learn, the prior knowledge, the intellectual level, and the critical criteria and expectations of the students are varied. Different subject areas require different modes of instruction, and by necessity demand different teaching skills. Furthermore, not everything that a student likes and appreciates in a teacher is good for the student. Sometimes, it is precisely the less "cheerleading" teacher who turns out in retrospect to have been a better teacher than the rest.

Academic faculty has always enjoyed prestige, based on the mythological image of the wise, all-knowing professor. The fact that the decision to pursue higher learning is the student's personal choice (as is the choice of some of his or her courses), gives professors a further down payment of popularity, without respect to their actual level of teaching.

It is important to emphasize that there have been—and there still are today—excellent professors in academia, articulate and able to sweep an audience off their feet, devoted to teaching, who love engaging with their students and see their work as a mission. Many people have fallen in love with their fields of study thanks to fascinating courses that left an indelible mark on them. There are also professors who have created unforgettable memories and become their students' "teachers for life." But there are also others. In the last few years, a much less rosy picture of the level of teaching in higher education has begun to show its real face. It is no coincidence that one of the most recent questions to appear on the knowledge portal Quora was: "Why are so many college/university professors so bad at teaching?"[1038]

It is not nice to admit, but a significant percentage—maybe even the majority—of college and university professors are ineffective, unserious, and far from causing any kind of enthusiasm. The students who sit in their classes lose concentration, and fight, not always victoriously, against the desire to sleep. A study conducted in the United Kingdom found that approximately 60% of students were bored in at least half of the lectures in which they were enrolled. Only 2% of the students surveyed claimed that they had never been in a lecture which bored them.[1039] It is no accident that only a small percentage of professors in academia succeed in attracting and piquing the interest of audiences outside campus walls; most of them are never invited to lecture in non-academic forums. Among the twenty-five most popular TED talks of all time, only five of the speakers taught in universities, and only one mentioned his academic position on his personal profile (perhaps because it was at Harvard).[1040]

The bottom line is, the myth of the high quality of university lectures has begun to dissipate in the past few years. This is due to a number of reasons:

- Student associations have become more powerful. These associations publish the results of teacher evaluations, and reveal more than a few negative evaluations.[1041]

- The students of the 21st century are characterized by a highly developed "consumer consciousness," and inform one another of their level of satisfaction with their professors—just as they would with a restaurant, a hotel, or a shampoo. In addition, criticism of courses and professors—even harsh criticism—is published on social media networks, as well as websites designed for that purpose. In fairness, it is important to note that many of these platforms tend to skew unfairly against the professors, because the surveys and grades published are not based on representative models, and because they give a platform to petty and vengeful rants from embittered students, including those who earned their failing grades fair and square from the defamed professor.
- Lectures and professors now have numerous, high-quality competitors and alternatives. For instance, when pitted against excellent documentary series in fields such as sociology, economics, history, biology, astronomy, anthropology, or medicine, most academic lectures simply pale in comparison. Compared to the charismatic speakers who are only a click away on YouTube, many college and university professors seem like amateurs.

We might have expected that an institution which specializes in education and puts its trust in research would consistently work to improve the level of instruction and its achievements. The academic model does not allow for this possibility, however, because of a long line of factors:

- **Short-blanket syndrome.** Every public organization has a fundamental goal, but universities have four: generating new knowledge (research), passing on knowledge (teaching), storing information (libraries and their offshoots), and professional training. There are those who would add a fifth goal, which is not obvious and is connected to the moral foundations of academia: education towards good citizenship.

  There is widespread consensus that research and teaching are the highest priorities on the list, and therefore most of the available resources are allocated towards these goals. One would think that these two areas would complement one another harmoniously; researchers are intimately familiar with and well-updated on the subject matter, and teachers know how to ask deeper and more precise questions for research. The combination between these two aims is also necessary because students in advanced degree programs require a period of mentorship in order to become independent scientists. That said, in a reality where research is becoming more and more complex and expensive, it is difficult for institutions and students to fulfill both of those aims. Studies indeed prove that, in the majority of the world's nations, most professors' time and effort is dedicated to research and not to teaching.[1042] The financial crisis adds another difficulty, and as we have already written, the result is a "draft" of external lecturers (who are not researchers and cost less), an increase in the number of students per class, cutbacks to the number of teaching assistants, and a hiccupping investment in inventive new education technology.

- **It doesn't pay off economically to invest in teaching.** We might have expected that the growing competition in the education market would force an improvement in teaching, at the very least out of financial considerations. This did not pan out, for two reasons: First of all, the differential model for government funding is based on research output and not "teaching output," as is the big money which comes from research foundations. Therefore, even small colleges which specialize in teaching have begun to demand that their faculty members fall in line with the accepted research norms in universities.

  Secondly, because higher education functions as a monopoly, and because patterns of teaching are fairly uniform, there is no real competition on the "market" which could influence "consumer" satisfaction. From a financial standpoint, it is preferable for institutions to give more and more concessions to students —that is to say, to lower the level—rather than invest in improving teaching standards.

  But you can't fool everyone all the time. Lately, the media has begun to feature freshly minted graduates' honest and brave criticism of their disappointing experiences in higher education. An example can be found in an article which was published in the summer of 2018 on the website Ynet and inspired many passionate responses. Its title was: "Goodbye University, You Were Shallow and Predictable." The writer, Nitzan Rivlin, a young book editor and a recent graduate in English literature and sociology at the Hebrew University of Jerusalem, wrote, among other criticisms:

  "Ever since I can remember, I have had two dreams: to fly to Scotland, and to study literature at the Hebrew University. […] Over the years, I enjoyed recounting those two dreams to anyone who was willing to listen […] until in 2015, I flew to Scotland and began my studies. Three years passed, and this week I finished my bachelor's degree in the Department of General and Comparative Literature at the Hebrew University. All that remains of that dream are fragments of memory and, mostly, disappointment. University disappointed me. It disappointed me to what extent the discussion was neither complex nor deep. The professors did not ask of us to open our minds to other possibilities, to a consciousness beyond the one in which we are trapped. They asked us to repeat over and over the same chewed-over and labored slogans which appear in the media and the tedious political conversation. […]

I am finishing my bachelor's degree, and I am not sure that I have in fact become the educated young woman that I thought I would be. […] I do not feel that those three years ever truly presented a challenge to me or planted a new language of phrases on my tongue. I do not say this because my education before university was particularly broad. I say this because I genuinely believe that the university gave up on us. From the beginning, the professors did not give us complicated assignments, and did not expect us to excel on those assignments. Perhaps this was an expectation that faded away long ago, when they removed all entrance barriers to the study of the humanities (I was accepted to the best university in Israel without even completing the psychometric exam [the Israeli equivalent of the SAT]), and when they lowered the bar in hopes that many more students would flock to the faculty. Well, it didn't happen, and what is left is the atmosphere of a kindergarten. […]

I saw entire courses which one could easily pass without reading a single work. I saw ridiculous writing assignments which were evaluated at a glance and inattentively. I saw what the professors want to see and are used to seeing—and I understood the easy way to success. I saw grades that I did not deserve and that I received by way of shortcuts. I saw professors talking to themselves, and not even stopping to make sure that someone was listening to them. I saw bored students. I saw a faculty devoid of any motivation to improve whatsoever. I saw a level of rigidity that left no room for creativity, for change, for flourishing."[1043]

- **There is no professional training for academic instruction**. Only a few academic institutions impart knowledge and skills in academic instruction to PhD students, and even then, this tends to take place in one or two non-required courses (the United Kingdom is one of the few countries to mandate these courses).[1044] In practice, most professors use their students as guinea pigs, cutting a path forward through trial and error. If that were not enough, at the very stage that young professors are supposed to define a teaching direction for themselves and prepare new courses, the system demands that they throw themselves into publishing. With no other choice, many of them are forced to improvise in teaching—a necessity that has become a pattern over the years—and struggle to find a window of opportunity in which they can stay updated on the developments in their field and diversify their selection of course offerings.

In the past few years, internal criticism of the status and quality of teaching in academia has increased. This phenomenon has contributed to raised awareness of the problem, and here and there to the allocation of funds. But most of the time, this is no more than lip service. Only a few universities have a (small) pedagogical unit which advises professors and offers enrichment courses. Most of the time, this unit suffers from meager budgets and an insufficiently skilled workforce. Most faculty members do not make use of these services, whether because they don't have the time, or because they are not required to refresh their approach and stay updated on the latest pedagogical innovations.

In fact, most institutions of higher education do not have the knowledge, the resources, or the incentives to implement a real change in the field. It is no wonder that academic instruction has always lagged behind the developments which have taken place in the world of non-academic lectures. Even PowerPoint presentations, which have long since become archaic, arrived in academia well after they had become standard in business. Furthermore, even academic researchers in the field of education sciences mainly focus on instruction in primary and secondary schools, and only a small fraction of them are dedicated to college and university-level instruction.

- **There is no real incentive for excellence in teaching**. The lecture is not only a pedagogical procedure, but also an opportunity for scientists to regale students with tales of their research activities, pass on their findings and insights, and receive feedback from an audience of listeners. That said, a good scientist is not necessarily a good lecturer. To tell the truth, teaching abilities are significantly different from the abilities required for research, and in many cases traits that are beneficial for research become an obstacle in the field of pedagogy. Many scientists (especially in the exact sciences) are introverted, devoid of charisma and personal charm, not particularly gifted with emotional intelligence, and lacking in social and verbal skills. This is not exactly the profile that makes someone a successful speaker.

We might have expected the institutions themselves to refrain from recruiting particularly lousy professors, unless they were once-in-a-lifetime geniuses of research—or at least to cultivate and compensate first-rate teachers, just as they cultivate and compensate exceptional researchers. Technically, the quality of instruction is one measure used in recruiting faculty members, but in practice it is tossed to the side. In most institutions, candidates are not required to demonstrate experience, and certainly not excellence, in the field of teaching in order to become full-fledged faculty members. The real deciding factor is their research record and/or potential. In the process of promotion, too, excellence in teaching is only minimally weighted, and all that is required of faculty members is to present their course listings.[1045] At universities where it is common practice to send a senior colleague to one of the classes taught by the candidate for promotion and have them write a report on the quality of the candidate's teaching, this is often a ritual performed only in order to fulfill the minimum requirement.

It is tempting to think that the level of teaching in prestigious institutions is superior, and that the astronomical tuition collected by those institutions purchases higher returns of learning on the investment. In practice, this is not the case. In the September 2006 issue of *Commentary*, Donald Kagan, a professor of classics and history at Yale, published an article titled "As Goes Harvard…" Kagan lobbed fierce criticism at the level of academic instruction in America, particularly at elite universities, and claimed that most of the professors at those universities were uninterested in teaching and selfishly concentrated on their publication lists.[1046] Since its circulation (primarily on the Internet), further testimonies have proved Kagan's claim correct. The well-respected universities choose faculty members primarily on the basis of their scientific and economic potential, and invest more of their resources in research than in teaching.[1047] Many courses are taught in cavernous lecture halls, in many cases by inexperienced PhD students. Because most elite institutions almost exclusively accept outstanding students, who were able to pass the grueling admissions process, they presumably assume that the students will successfully make do no matter what.

The striking pedagogical advantage of elite institutions is the homogeneity of the classroom, which allows exceptional students to learn in a society of their peers. On the other hand, the atmosphere of competition which pervades those institutions makes it difficult to create a collaborative learning community. It is the modest institutions, such as small colleges in far-flung states, which often excel in creating a communal atmosphere and high administrative engagement—factors which contribute to the quality of teaching. These are also institutions in which the hiring and promotion of faculty tend to be based more on their teaching abilities.

Mentorship of research students is considered higher up in the hierarchy of academic achievements than frontal teaching, but it too is low on the ladder when compared to publication. The CV of candidates for promotion is also supposed to contain scientific mentorship, but it is not unusual that a scientist who guided numerous master's and PhD students to the finish line but has not published enough will not be promoted, whereas a scientist who has barely mentored a student but has published plenty of times is likely to get the promotion. One of the results is that, in many institutions, students have trouble finding a mentor for their thesis papers. Moreover, talented researchers receive fat bonus checks and various perks as a result of their success, while excellent professors get the crumbs, if anything.

Lately, the voices calling to give teaching more weight when considering candidates for promotion have gotten louder. Thus, for example, in 2016, Kostas Kampourakis, the editor of the journal *Science & Education*, published an incisive critique of the shamefully faint weight given to quality of teaching in promotion over the course of an academic career, and suggested that faculty members submit two equally important lists to the appointment and promotion committee: one dedicated to research, and one to teaching.[1048] At this stage, Kampourakis is a lone voice in the wilderness.[1049] The result is that professors who are productive in research, but could well be described as pedagogical disasters, continue to teach and advance in their careers.

The Student is Always Right

Re-Setting Expectations

The economic pressure on the institutions creates a multifaceted inflation of academic concessions—from fewer day-to-day assignments (readings, exercises, and so on) and easier exams, to overlooking departures from the rules, such as not submitting assignments on time or absence from required courses. Because the name of the game is money, students have started to understand their power as sought-after consumers, and whine about demanding professors with the understanding that their complaints will find a listening ear among the "upper management" (even when those complaints are not justified).

Lately, a majority of young people are turning to small colleges—whether community colleges or private colleges—in part because they know that the chances of receiving academic "discounts" there are higher. This is also one of the reasons for the consistent rise in enrollment at private institutions. In Latin America, for example, more than 60% of students study in colleges of this kind (in Chile and Paraguay, this figure reaches over 80%). The tuition there is usually higher, but the deal pays off for the student—partially because the bar for academic demands is flexible.[1050]

Many students routinely coordinate expectations with their professors in advance—in other words, they find out at the beginning of the course where they will have to invest most of their energy and where they will be able to slack off. Because they see their studies as a kind of barter, they often try their best to bargain down the price, which often succeeds in bringing down "costs."

A question that repeats itself over and over in classes is: "Will this be on the test?" In other words, is this worth listening to, summarizing, and attempting to remember, or is now a good time to upload a story to Instagram? One of the effective means of lowering demands is to "open the professor's eyes" to the fact that the course assignments are more intensive than those of other courses. One professor gave a sarcastic definition: "Teaching is the one service which students pay for and are happy to receive less of it." Many students today can also present proof (not necessarily legitimate) of learning disabilities in order to receive easier conditions. In most cases, their requests are approved, no questions asked.

A survey conducted in the United States in 2007 revealed that most academic faculty members see no correspondence between their personal ethical code and the ethical code implemented at their workplaces.[1051] It is reasonable to assume that similar results would be found in most countries. This does not prevent most professors from falling into line with the current policy of flattery. They are cowed by the deluge of lowered academic demands, because of the financial difficulties faced by the institutions which pay their salary. They worry that they will lock horns with colleagues and student associations. And they surrender to the dictates of political correctness, which terrorize anyone who dares to criticize the students.

The trend of concessions and compromises is developing in silence. It is impossible to quantify, because academic studies take place behind closed doors, and courses are not supervised. University administrations do not publish official policies encouraging "discounts" or easing up on students, but the motto remains "the customer is always right," and the spirit of obsequiousness moves upon the face of the campus. Professors, department heads, and deans are assessed according to the number of students whom they recruited and kept on campus; in a situation such as this, there is no failed student, only a professor who failed him. "No pain, no gain" has been replaced by "flexibility," "consideration," "inclusion," and other such expressions, on the basis of which every student passes muster. It is clear to everyone that public criticism or refusal to participate in the rigged game will not be backed up by faculty or administration. And there will always be the repressed, defensive, and delusional willing to pop up and say, "in my class, all the students are wonderful!"

Shaming Disobedient Professors

As unbelievable as it sounds, although teaching is one of the two central aims of higher education, no sophisticated system exists for quality control in this field. This oversight is especially appalling in light of the fact that academia has made sure to establish a gargantuan system of quality control for everything related to research findings. In fact, the primary tool of quality assurance, and most of the time the only one in this field, is the tradition of teacher evaluation surveys—which has been in place for over fifty years and has only barely changed since.

The purported goals of the surveys are threefold: A) To provide the professors with feedback so that they can improve; B) To allow administration to put out feelers for the skills of their professors and the classroom atmosphere; C) To provide students with information about the professors and courses available for their choosing.

At the end of every course, usually in one of the final classes, the proctors enter the classroom. Sometimes they are sponsored and sent in by the dean of instruction, and sometimes they are envoys of the student association. They distribute questionnaires to the students (most of the questions are multiple-choice, with a few open-ended) with the aim of measuring various aspects of the quality of the course and the teacher: the clarity of the lectures; their contribution to the student's interest level, knowledge, and so forth; the quantity of assignments; the accessibility of the professor; the professor's approach to students; and so on.

The controversy over the validity, reliability, and effectiveness of these surveys began at the moment they were instituted. There were those who already claimed at the time that students were not qualified to evaluate their courses and professors, because they are not experts in teaching and, naturally, they are not objective. Others claimed that the questions focused on the superficial aspects of teaching, or wondered how it was possible to render the same weight to the opinion of a motivated, curious student and the opinion of his lazy and manipulative classmate. Moreover, many maintained that even if we agree that feedback on any service provided is necessarily appreciated, a teacher evaluation survey could not possibly be the only criterion, and not even a major one, because the influence of teaching is complex and in many cases unconscious—not to mention the many other outside noises liable to influence the evaluation process.

In their aforementioned book *Cracks in the Ivory Tower*,[1052] the authors (Jason Brennan and Phillip Magness) summed up the corpus of studies examining the validity and reliability of this tool, and their conclusion was decisive: teacher evaluation surveys have no scientific validity. They do not verify the quality of teaching, but at the most record student satisfaction, and in many instances the students' preconceived notions of the professor. As if that were not enough, studies also show that with the exception of a few small teachers' colleges, the decisive majority of institutions barely use the results of the evaluations, if at all—whether to improve the quality of teaching or to assess a faculty member for promotion (and even that is only in extreme cases). Incidentally, the very idea of using a non-scientifically valid assessment tool for the promotion of faculty in the hallowed halls of science is astonishing.

Why does this tradition continue nevertheless? Brennan and Magness give an unflinching answer: A) This particular tool is inexpensive and easy to deploy (computers make the job even cheaper and simpler). B) Like most evaluations, the teacher evaluation survey provides professors with feedback on the way the courses they taught were received. Mainly, however, it allows administrations to identify major flaws and fix them (for example, a course that receives an unusually low grade or is rated poorly for many years in a row). C) The administration is, pardon our French, covering its ass. That is, this way institutions can continue to lie to themselves with the claim that teaching is a high priority for them. D) The surveys are intended to convey to students the (entirely false) message that they have an influence on the product they are buying, that is, that the system appreciates their feedback and uses it in order to improve teaching standards and rate faculty members.

If for many years the teacher evaluation surveys were "not really necessary, but we'll take it" or "doesn't help, doesn't hurt," lately they seem to be causing real damage to the level of instruction. In fact, once the dictatorship of consumerism extended its reign to academia, the teacher evaluation surveys became a kind of measure of customer service.

Today, the rating of faculty members on these evaluations is more of a popularity contest—dare we say, populism. The winners of the highest ratings are often the institutions, courses, and professors who go easiest on their students, assign the highest grades, and act chummy—not necessarily the most knowledgeable, methodical, invested, or demanding.

When we examine the criteria which move students to grant a high grade to a certain professor, it turns out that a good professor speaks slowly, breaks down the material, doesn't pile on too much work, opens his or her doors to students even outside of office hours, accedes to outlandish personal requests (even if they contradict the classroom rules and policies and make the playing field uneven), permits students to complete assignments in pairs or groups, doesn't check class attendance, turns a blind eye to late submissions of assignments, showers students with compliments, is generous with grades and extra credit, and so on. The professors know that this is what is expected of them in academia at the start of the 21st century, and they behave accordingly.

A British professor confessed to us that his students complained about overwork in his classes, and he was forced to cut out a third of the course material in order to alleviate their criticism—and, in effect, in order to get them to like him. "The university comes down hard on department heads because of the lousy yearly student evaluation, and the department heads make the faculty's lives miserable," he said. His advice to young professors was: "Cater to the lowest common denominator. You can't beat either the system or the university."

Additional faculty members whom we interviewed told us that they were marked as problematic because they dared not to play along with the policy of placating the students. They were called in for withering conversations with the department head or the dean, and picked up on hints that there might be consequences for their hopes of promotion. Some even testified that following absurd complaints by students, they and/or their colleagues were summoned before the disciplinary committee for the sin of "inappropriate behavior"—a charge that had been reserved in the past for sexual harassment, physical assault, or lashing out at a student.

However, the professors fear not only punishment by the administration, but also the revenge of the students. Shaming, which has in the past few years become a loaded gun in the hands of the young, also comes into play here—not only in teacher evaluation surveys, but on the ranking websites for professors which have become common in the past decade (for example, the American website RateMyProfessors.com, the British website RateYourLecturer.co.uk, and the German website MeinProf.de). Transparency seems like it would be an admirable goal in the rating of professors. But in reality, alongside the compliments for professors who "prepare us well for the exam," "go the extra mile for the students," and "write clearly on the board," the sites include anonymous rants with no filter or context. The message to professors is clear: if you demand much, don't compromise, and don't scatter high grades to the four winds, we'll have our revenge. We'll stain your name anonymously out in the open, and you will have no way of defending yourself.

Fast-Degree

One method of attracting students and keeping them satisfied is to cut short the time spent learning. This is accomplished, for example, by concentrating all classes in a short period of time (cramming the subject matter into one or two days a week) or by granting more credits for the same number of hours spent learning (for example, two-hour courses which count for four credit hours).

The first to discover the marketing gimmick of the abbreviated degree with "lite" content were master's programs in business administration, better known as MBAs. They have become an excellent source of funding, because they collect high tuition from students, especially when set against their relatively low operation costs: they have no need for laboratories, and in place of some of the professors, they can hire businessmen who wish to spice up their work with a pinch of teaching. The professors who teach in these programs won't admit it publicly, but anonymously and in back rooms they confess that the level of studies in the MBA programs of many institutions are a sad joke. Even in universities which would not allow themselves to compromise the level of their engineering or chemistry degrees, they are more than happy to lower expectations when it comes to the MBA.

And as much as universities love MBA programs, they love the EMBA (Executive MBA) programs all the more. EMBAs are targeted at business administrators with experience—even if their undergraduate grades were underwhelming. The acceptance criteria for these programs are even more flexible, and most of them reap tuition as high as the academic demands are low. There's a reason these degrees are called "the junk food of academia."[1053] Of course, this does not prevent candidates from knocking down the doors of business administration departments, for a number of complementary reasons: A) Everyone wants to be an executive and earn lots of money, and they innocently believe that the surefire way to their destination is to learn from those who have already succeeded. B) It's always nice to take a breather from work, especially when it consists of studies and a pleasant get-together with colleagues. C) Many institutions and organizations pay for their executives to attend these programs, as a kind of perk before or after retirement. D) These departments operate a well-oiled public relations machine. In the United States, for example, newspapers publish a yearly rankings list of MBA programs, and they include—how could they not?—the average salaries of graduates. It turns out that at the prestigious schools in this field, such as Harvard, the University of Pennsylvania's Wharton School, and Northwestern, the yearly market salary of graduates reaches over $100,000 only a year after graduation. But you have to read the fine print: it's not clear which is the chicken and which is the golden egg.

Same Old Bess in a New Dress

A different way of courting students, which has become extremely popular in the culture of academia, is to dress up familiar subjects in spiffy new suits ("Every cobbler's shop is an Institute of the Shoe, and every underwear store a Butt Boutique," as the Israeli comedy trio HaGashash HaHiver memorably put it in their legendary sketch "Books, Gentlemen, Books"). This is accomplished through "sexier" new names for old degrees and courses (for example, "multiversity" in place of "general B.A."),[1054] through the invention of new subject areas, and through the upselling of subject areas which, in the past, no one would ever dream of learning or teaching in academia—for example, degrees in "Mysticism and Spirituality," or courses such as "Teaching through Tai Chi," "Discussion and Conversation through Music," or "Medical Clowning." Of course, there is nothing wrong with learning these subjects, but the attempt to paint on an academic façade is pathetic.

Israel broke a record in this trend with the launch (in 2019) of a B.A. in behavioral sciences with a concentration in medical cannabis at the Max Stern Academic College of Emek Yezreel. It is perfectly legitimate to learn about the development, manufacture, consumption, and legalization of cannabis, but a degree? And why is it offered under the auspices of behavioral sciences, when the primary components of the concentration (according to the college's website) are a basis in botany and biology, medicine and pharmacology, and economics and law—with nary a word about the behavioral sciences?! You don't have to be a genius to understand that this is a marketing gambit, aimed at attracting students to a small college in the middle of nowhere. Presumably, some of the students have reason to hope that their studies will be a lot of fun.

Honors Students Only

Grades are an inseparable element of the academic world, and they are granted on an ordinal scale (A through F) or an interval scale (the most common are 1-10 and 1-100, but there are also 1-30, 1-20, 4-7, and 1-5 grading scales).

In any instructional context, grades have several important advantages:

- Providing an incentive to put effort into one's studies.
- Tracking students' progress in learning by examining the achievement curve.
- Steering the most talented alumni towards professions and institutions in need of talented manpower.
- Setting a standardized measure of quality which creates an entrance threshold for the next step on the ladder of higher education.
- Providing a basis for the authority and sway of teachers, who are responsible for giving out grades.
- Fulfilling a democratic function in modern society—the principle of advancement on the basis of success, as demonstrated by grades, has replaced advancement on the basis of social standing.

However, alongside the advantages we have described, grades (especially in academia) have several disadvantages:

- The grade is the result of several factors which are difficult to separate or isolate: inborn cognitive traits (memory, creativity, quick thinking, and so on), motivation, hard work, oral and written articulateness, and the objective ability to devote time (full or partial) to learning. When it is difficult or even impossible to know which of these factors had the most influence on the grade, it is hard to get a real sense of the student's profile.
- The grade is the average, which supplies a "bottom line" but does not address the strengths and weaknesses of the student—thereby creating an imprecise tool of measurement.
- Grading "locks down" learning at a fixed point and in many cases does not allow the student to learn, develop, or improve.
- When the grade does not meet expectations, the relationship between the professor and the students is damaged, leading to feelings of insult, despair, discrimination, and injustice.
- In many cases, the numerical grade is unnecessary, because the goal is to arrive at a certain minimum level of familiarity with the subject matter. That is, a pass-fail grade would suffice, or, at the most, a pass-fail grade with an option to indicate excellence.
- The grade generally gives a higher weight (and there are those who claim, too high) to easily measured criteria, at the expense of criteria which are harder to quantify but often more important.
- The grade is highly dependent on the personality of the professor—"good cop" or "bad cop," concerned with tangential asides or with the heart of the matter, hardworking or negligent, open or closed-minded, interested in the numerical results or in the bigger picture, and so on.
- Some professors, including those who are excellent teachers, are not necessarily adept at evaluating and assessing students.

Significant additional difficulties have been added to this list of disadvantages in the past few years, which cast a shadow of doubt on the reliability and usefulness of grades in academia:

- **An excessive burden on the professors**. As the number of students has grown, and with it the amount of work on the professors' shoulders, evaluations of papers and exams have grown less and less thorough. Moreover, given the considerable demands of publication (which we discussed in the previous chapter), many professors are in need of external help in the form of teaching assistants when checking assignments. This means that the student's exam or paper is evaluated not by the expert, who also taught the course, but by a student who in many cases took the class in the previous year. And, when the professors manage to do the checking themselves, they are so busy that they often do not have time to articulate constructive written feedback, and instead make do with general, laconic, and unproductive responses. This gives rise to a vicious cycle: students get the sense that their professors are only skimming their papers, or that someone else entirely is reading them, and their motivation to put in an effort goes down. In turn, the work that the professors receive is less substantive, and the cycle continues.

A solution to the problem of overwork often deployed by exhausted professors is the multiple-choice exam, which is checked by a computer. The problem is that exams of this kind are only suited to certain courses (mostly introductory courses), because they only superficially evaluate the student's understanding of the material, and because in many cases the professors compose them in an insufficiently professional manner (we have discussed typical errors in the writing of questions in the fourth chapter addressing the problem of polls).[1055]

- **We didn't understand the answer**. The level of expression demonstrated by the student in his or her answers is always considered an important criterion towards a grade (along with knowledge of the material). Sadly, the generation of digital natives may excel in audio-visual skills, but these students often struggle to express themselves fluently in words. Many papers and exams submitted to professors are poorly written or even incomprehensible, which puts the professors in a bind and makes it difficult for them to give a grade.
- **Grade inflation**. Pages upon pages have been written about the wrapping of the "snowflake generation" in a thick layer of head-patting and ego-fluffing. The educational model in which many Western young people grew up could be described as "compliments, compliments, and more compliments." And because at home and at school, parents and teachers refrained from criticizing their mistakes and oversights, and instead spoiled them with high grades for almost nothing—when the princes and princesses arrive in the real world (with real grades), they are shocked and distressed. Suddenly, it turns out that they are neither the smartest nor the most successful, as they were told for twenty years. For this reason, they tend to take low grades as a

slap in the face, a mistake, or a personal vendetta, and put pressure on professors to improve their grades (mostly "because I worked hard"). In many cases, it works. Indeed, there is a snowball effect that rolls its way from high school into academia.

There is also an economic reason for grade inflation. No institution will admit it, but the overwhelming dependence on tuition also influences norms of grading. If they want to keep their coveted customers satisfied, there is no way to avoid generous grading.[1056] At the same time, professors see that the average in their class is going down and fear harsh responses from students and administration. So they artificially raise the average by means of various and sundry factors, tweak the distribution curve, and give more and more opportunities to retake exams and submit papers (often more than the formal allowance). Furthermore, many professors prefer to assign papers rather than exams, because this makes it easier to cut corners and engineer good grades.

It is important to note that it is difficult to reveal the scale and depth of grade inflation, for several reasons: A) There is no global database of grades, and at any rate, many institutions refuse to make student files public. B) Every country, institution, subject, and professor is different when it comes to patterns of evaluation. C) As we have stated, institutions of higher education tend to deny that there is a problem, or to downplay its importance for economic reasons.

But despite the difficulty of pinpointing the exact scale of the international phenomenon, there are more than a few indications (including statistics) that this is a genuine epidemic, and it no doubt plays a critical role in the decline of higher education:

- The conversation around this phenomenon is so large in scale that it is hard to write it off as just a rumor or "fake news." Most people who report or respond to the topic have themselves been exposed to the phenomenon as professors (including first-person confessions), students, or journalists who have prepared articles on the subject. In August 2017, Google yielded 334,000 results for the phrase "grade inflation," including 16,300 scientific papers.[1057] In late 2019, the number of results was already close to half a million. Grade inflation has become such a meaningful phenomenon that it now has its own article on Wikipedia.[1058]
- The website gradeinflation.com, which collects data on grading practices in institutions of higher education in the United States, published

that in 1960 only 15% of all grades were A-grades, while by 2013, the percentage had tripled and reached 45%! In other words, almost half of the grades were As.[1059]

- In 2018, the "Office for Students"—the new regulator of higher education in Great Britain—published that in 84% of universities (among 148 checked), there was a significant and unexplained rise in the average number of graduates with first-class honors among all degrees: from 16% in 2010-11 to 27% in 2016-17. In fact, the average downplays the real dimensions of the phenomenon—because in certain universities, this was not a rise but rather a massive and disturbing leap upwards. At the University of Surrey, for example, the number of graduates who received "first-class honors" more than doubled (from 23% to 50%) and at the University of Bradford, this figure tripled from 10.6% to 30.9%. That is, one of every two graduates of Surrey and almost one of every three graduates of Bradford finished with first-class honors. In simpler terms: either a whole lot of geniuses chose to study at the University of Bradford, or the distribution of grades there is fishy.

  The office demanded that problematic universities take immediate action to put an end to the phenomenon, and threatened to levy sanctions such as fines, suspension of the institution's official membership on the office's list of institutions, and even full expulsion from the list. But why worry when you can deny guilt and make excuses instead? Not only did university leadership not see the steep rise in the rate of graduates with honors as a problem which exposed a culture of bending over backwards for students, they even passed it off as a good sign. According to their claim, the dizzying rise was due to the fact that students worked harder (because tuition was higher) and that the quality of teaching had significantly improved. Ha, ha, ha.[1060]
- An interesting study conducted in Israel reflected both grade inflation and its causes. The researcher examined the correspondence between demand for a certain program of study and grades in universities in the academic years 2007-08 and 2014-15, and revealed that in departments with high demand and a high threshold for entry (architecture, systems engineering, industrial engineering, and computer science), grades reflected almost no change over the years. By contrast, in subject areas where the demand had decreased and the entrance requirements were lower (political science, philosophy, and English)—it seems that the average grades should have gone down, but instead they skyrocketed upwards.[1061]

- In 2018, Israeli media outlets reported remarkable facts about the paltry achievements of law students. It turned out that no less than half of law graduates had failed their bar exams, including many who had completed their studies with high marks. The furious students ascribed their failure to a conspiracy by the bar, which had purportedly written an especially difficult test in order to keep the number of lawyers on the market low, and took to the streets to protest.[1062] The bar denied the claim and announced that it would not back down. But those who are familiar with the no-holds-barred competition between colleges over every lawyer-to-be knew the real reason for the embarrassing failure: The quality of law students is going down hand-in-hand with the entrance requirements.

  Undergraduate students pay out a whopping sum of three hundred million shekels every year to ten colleges of law. It is no wonder, then, that these colleges do almost everything in their power to direct as many students as they can into their doors.[1063] Already in 2008, law students were almost a tenth of the general undergraduate student population.[1064] Today, Israel is the nation with the highest percentage of lawyers in the world—many of whom do not actually practice the profession. By the way, a year later, even after Minister of Justice Ayelet Shaked forcibly lowered the passing grade on the bar exam from 65 to 60, most of the test-takers were beyond help. Only 36% of the 2,700 who took the bar exam successfully passed the test.[1065]

- **The ineffectiveness of seminar papers**. The seminar paper has its source in the German universities of the 19th century, in an age in which reading and writing were considered the apex of education. Since then, it has become a central didactic tool in academia—primarily in the humanities, social sciences, and law—that allows students to try their hand independently for the first time at research, processing and organizing information, analysis, and interpretation of data.

  Lately, however, this tool is being worn thin, because the increase in the number of students makes it difficult to mentor students closely, and the Internet is a siren call of "copy-paste." Many students compose seminar papers which are more or less collages of quotations, in many cases without even citing the sources of the material. This is what their teachers in high school taught them to do. Many do not even understand the problem with this procedure, and are shocked to discover that the professor is accusing them of plagiarism. In addition, many professors permit students to prepare and submit papers in large groups. In practice, this is almost never group work, but rather the work of a single student on whom several others have hitched a free ride.

- **With a little help from my friends**. Obviously, students have pulled off various tricks and schemes ever since humanity invented exams. However, they have become more common since higher education became a natural step in the coming-of-age process of young people in the West, and even more so following the debut of computers and the Internet. We must preface our claim by stating that there is no hard data on the prevalence of this phenomenon or on the change that has taken place over the years. That said, the very fact that the topic has found its way to the heart of the public conversation, and that countless papers have been written on the subject, demonstrates that this is not a merely marginal phenomenon.

  All the same, the studies teach us a number of popular tricks: buying or otherwise acquiring exam questions in advance, using off-limits material (by means of notecards, cellphones, and the like) during the test, copying from another student, fabrication of data and evidence for research papers, copying large sections of texts without citing a source, forging sources for a bibliography, inventing patently untrue excuses for the professor ("my grandmother died" and so on), plagiarism of entire papers, and submitting the same paper in several courses.[1066]

  Companies for online course management (such as Moodle) have introduced features which scan papers in the system in an attempt to pinpoint plagiarism. Institutions buy this service, and instruct professors to devote attention to the matter. But these are Band-Aids on an open wound. Only a minority of professors respond to plagiarism with the appropriate severity. Most of them are not eager to submit a complaint against a student who has been caught red-handed, because appearing before the university's disciplinary committee is not exactly a pleasant experience. They also say to themselves: "If for every student who is caught there are dozens who get away, why should I make things complicated for myself?"[1067]

- **Papers for sale.** The most serious and disturbing fraud is the purchase of term papers, research papers, and even thesis papers and dissertations. Sometimes this is a "hired keyboard" who writes the paper in place of the student, and sometimes it is the purchase of an already-written paper that was submitted in the past to a different department or institution (a "fresh-baked" paper is more expensive, of course).

  This fishy gambit is remarkably easy to pull off: the student turns to a supplier, they send him a price quote, he sends a deposit, and the deal is closed and executed. And the incredible thing about it is that many of these service providers declare unabashedly that this is their business model—with full names and contact information, utterly unfazed. Websites which sell academic papers also operate openly on the Internet; they not only offer their services to potential clients, but even encourage students to sell papers they have written in the past in exchange for a certain percent of sales. Bonuses are also offered and paid to "customers" who refer their friends to the site.

A senior editor for one of Israel's leading newspapers admitted to us that he has provided paper-writing services for a number of years. The phenomenon has become so commonplace (he himself has put out approximately three hundred papers) that it never once occurred to him that he was committing an ethical and, in fact, possibly illegal transgression.

- **Chemistry straightens out your head—and your grade**. A new gray area of fraud is the use of Ritalin pills or similar medications in order to improve academic achievement. More than a few young people who do not suffer from attention deficit disorders use these medications for tests, just like hormones, steroids, and "blood doping" in sporting competitions. In a survey conducted in Canada, 18% of students in elite universities admitted that they had used stimulant drugs at least once when writing a paper, preparing for an exam, or during the exam itself. A survey in the United States found that more than a third of college students used these medications illegally. Among students who lived in college dorms, the percentage of users reached 55%.[1068]

The spread of these scams opens up an additional question about the real value of an academic degree. One way or another, the consequences of the deceit are destructive:

- It takes away from the significance of a degree as a certificate of distinction.
- It encourages illegal behavior (in many countries, these are criminal offenses), and even gives it a certain degree of legitimacy, because with the exception of unusually serious cases, academic institutions generally settle for in-house discipline and do not submit a complaint to the police.
- It grants an added advantage to students from wealthy homes, who are able to purchase papers for a fee and free up extra time for their studies or other pursuits.
- Students are educated towards a lack of integrity, and this has a destructive impact far beyond their studies. A positive correlation has already been

found between lack of integrity in college and unethical behavior in the workplace.[1069] One medical school professor told us that she is deeply disturbed by the unremitting lies and deceptions of her students, and added that it is particularly grave because a doctor's work requires him or her to be absolutely trustworthy and sincere. "If they lie to us during their studies," she said, "why wouldn't they lie to us in the hospital, too? And our lives are dependent on each and every one of them."

- Wholesale duplicity of this kind is expected to turn fair-minded professors away from academia. This process has already begun to take place among classroom teachers. Presumably it will expand to include college and university professors, who are bound to lose patience with the depressing state of affairs that is turning them into accomplices to crime.

Can't Stop the (Online) Course

Correspondence Learning

The first buds of distance learning reared their heads in the United States as soon as the modern mail system was invented. However, the first university to offer a degree via correspondence, in 1858, was British—the University of London. It was established as the first secular alternative to Oxford and Cambridge, the only two universities in England in that day, and was the first not to require membership in the Church as a condition for admission. It was nicknamed "the People's University," because of its willingness to "extend [its] hand even to the young shoemaker who studies in his garret."[1070]

The development of the radio at the beginning of the 20th century, and later the invention of television, expanded the possibilities for learning. For the first time, there were attempts to broadcast academic classes (in the style of radio plays), which did not last very long.[1071]

The first time that academic learning at a distance (by means of correspondence) was implemented with real success was in the structure of "the Open University." This model of study, which was first pioneered in Great Britain in the early 1970s, offered learning from home to those who could not conform to the accepted university format because of work, childcare, physical disabilities, and so on. Despite their relative success in Great Britain, then in additional countries, for many years the open universities were considered the red-headed stepchild of academia. Their degrees were considered inferior in quality, they were only permitted to confer undergraduate degrees and in a limited number of fields, and their students lost out on the collegial student experience traditionally associated with higher education.

The dependence on the postal service was also an inconvenience, as was the fact that the professors at open universities in most countries were not first-class scientists, because these universities did not provide them with the necessary conditions for research.

A New World of Screens

Word processing programs and computer games, which first reared their heads in the 1980s, opened up new possibilities for learning. The personal computer, with its electronic screen, became an endless source of diversions; many of them included educational elements, such as games which exercised users' memory, spatial awareness, fine motor skills, graphic design abilities, and more. With time, programs for independent learning and review began to appear on the scene, and initial stabs were made at the use of computers in classrooms (primarily by means of an internal network). The idea of "edutainment" gained a following and began to spread.

Pioneering attempts to build an online academic course had already appeared in the United States and Canada in the mid-1980s,[1072] but the real turning point took place only in the early 1990s, with the premiere of the World Wide Web. Not only did the open network change the world of communications, it had an indirect influence on the education sector.[1073] For the first time in history, a communications infrastructure was created that was easy, fast, and enabled instantaneous connection between the teacher and her students outside of classroom walls. The development of search engines at the end of the millennium, with Google leading the charge, contributed an additional dimension to the technological infrastructure necessary for online learning.

The University of Pennsylvania was probably the first academic institution to announce (in 1995) that it would open an online academic course, and the Open University of Catalonia was the first to be established (in 1994) with the explicit goal of becoming "a virtual university" in its entirety (its administrative offices were located in Barcelona). At the time they bit off more than they could chew, as the requisite technology would not be ready for another decade.[1074] Over time, a handful of pioneering initiatives for online academic instruction sprung up in the United States, and the research interest in this new phenomenon grew. Already in 1997, in California, a new consortium of several colleges was founded under the name California Virtual University, which offered over one thousand online courses. To many at the time, the idea of online higher education seemed right out of science fiction. No one could have imagined that within only a few years, it would become a worldwide phenomenon.

One would think that institutions of higher education would have an advantage in the field of online learning, as they already had access to advanced computer equipment and servers for their research needs. But as long as the personal computer and the Internet connection were the exclusive province of the rich, the revolution took only halting steps forward. It would take another decade until the personal computer entered almost every home in developed countries and the Internet became as integral to everyday life as electricity, water, sewage, and highways.

Technological Improvements in the Classroom

In the first decade of the millennium, online learning continued to develop at a reasonably slow pace. The barons of academia, not to mention researchers of education, assumed (and many still assume today) that distance learning was only useful as an aid for in-person classes. This working assumption determined the height of the expectations and the scope of the resources, such that the move towards computerized and online instruction advanced at a painfully sluggish pace:

- **Classes on film—an unkept promise**. Home video systems, which were first sold starting in the late 1970s, enabled the recording of classes for learning purposes for the first time. A long line of institutions around the world established internal videography divisions. Some of the lectures were recorded in real time, with students present, and others were filmed in modest studios which were established on campus.

  Academic institutions in Israel were among the pioneers and leaders in the recording of classes, mainly introductory courses with especially high enrollment, with the aim of providing support for students who were forced to miss classes because of military reserve duty. At the University of Haifa, for example, classes were recorded and filmed already in the mid-1990s. At the Israel Institute of Technology (Technion), a "Videomat" machine was set up on campus, by means of which students could borrow recordings at any time of day. (A neat personal detail: the first introductory course taught by the author of this book at the University of Haifa, with three hundred students enrolled, was the first course recorded in real time and made available at the university library.)

  In practice, only a few took advantage of the opportunity, because many institutions did not allow students to borrow recordings for home viewing—both because watching a recording did not provide the same social experience as classroom learning, and because the recordings covered only a few courses and could not be considered a genuine substitute for academic studies on campus.

  Most courses were not recorded because the administration feared that students would stay at home and the campuses would be abandoned, and because the professors were not eager to expose their closed lecture halls to the general public. From a technical standpoint, too, the process was not easy, requiring skilled staff and sophisticated equipment which the institutions did not have.

- **The PowerPoint Paradox**. Innovations in the fields of architecture and interior design, alongside progressive pedagogical theories ("student-centered learning"), led to minor changes in educational spaces as early as the 1970s. Classrooms and lecture halls were built in semicircles or on an incline; chairs and tables were redesigned to be modern and comfortable, as were the podium and the blackboard. Here and there the format of studies became slightly more flexible, more discussion-based and less centered on lectures, and incorporated off-campus tours and lessons.

  A more significant change took place with the debut of projection tools—slides, transparencies, and eventually digital projectors. But the real engine behind the new pedagogical reality was PowerPoint. This program, which was marketed as part of the "Microsoft Office" package, enabled every professor to create an educational presentation with his or her personal touch. These presentations became an effective and widespread pedagogical tool, reduced the need for a blackboard and chalk, and upgraded the lecture to a multidimensional presentation in which the professor's statements were backed up by illustrations and pictures. This brought technology into the classroom and whittled away at the gap between the old-school campus and the real world, in which computers had begun to make a tremendous impact on our lives and dictate the pace of change.

  The PowerPoint presentation was also a step up from the lecture format because it forced professors to script and orchestrate the lesson in advance. It helped them to remember the content they are teaching with ease and to emphasize key points. And there was another indirect yet important improvement: To a certain extent, PowerPoint presentations released professors from the tyranny of nervousness, because students' glances are divided between them and the screen behind them.

  But despite their advantages, PowerPoint presentations are actually hastening the end of the lecture model. Because most professors prepare their own presentations, and because most of them are not particularly well-versed in the mysteries of programming, design, and digital accessibility, many presentations suffer from excessive verbosity, pictures of poor quality or inappropriate size, exaggerated color schemes, and so on. They are especially cringe-inducing for the digital generation, which is used to a high level of audiovisual production. Moreover, the typical way in which presentations are used turns many lessons into mere declamations of titles and bullet points, more like infomercials than engaging lectures. Many of the students say to themselves: If the eyes of the crowd are glued to the screen anyway, there is no reason for it to happen in a classroom and at a fixed time. The result is that many students have stopped taking notes on lectures in the classroom, and instead request—or demand—that the professors give them access to the presentations screened in class, which leads to a decline in attendance.

- **Platforms for course supplementation and management**. An additional change in the field of academic instruction took place when learning management platforms came onto the scene.[1075] The pioneers of the genre appeared in the late 1990s; a decade later, they had become standard in most of the world's institutions of higher education. The most prevalent are Blackboard, Moodle, Eliademy, Canvas, SWAD, ClassDojo, and Classroom.

  The learning management platforms enhance frontal classes in that they make some of the instructional material available online; they eliminate the need to go to the library; they open up new possibilities for hosting debates and receiving answers to questions outside of classroom hours; and they make it easier to submit papers, receive feedback on those papers, and publish grades digitally. These platforms are supposedly bringing academia closer to the era of online learning, as they enable professors to integrate distance-learning activities into their existing courses.[1076] Paradoxically, however, the increased use of these platforms delays the great online revolution which academia so desperately needs, for two reasons. First of all, their use creates an illusion of progress and sophistication, when in practice most professors utilize them primarily as storage for course materials and not as a partial substitute for frontal lessons. Second, they reinforce the (wrong-headed) assumption that online learning cannot replace traditional frontal instruction, and that an academic course must be offered only within the framework of an institution of higher education—which, after all, provides the platform.

Let's Share

The appearance of social media networks, most notably Facebook in 2004, played an important role in the further expansion of the infrastructure for online learning, because they too involve millions of users sitting on the same platform and communicating online. If this already happens on the level of social interaction, there is no reason it shouldn't also happen in education.

Technology has dictated and will continue to dictate the pace of change, and in particular photographic technology. Today, in the age of selfies and Instagram, it is hard to believe that fewer than forty years have passed since the first digital camera—the Sony Mavica—was released on the market. 1988 saw the invention of flash memory, which allowed the storage of thousands of pictures on a tiny card; in the same year, an agreed-upon standard was set for digital data compression (JPEG). Four years later, Tim Berners-Lee, the inventor of the World Wide Web, uploaded the first picture to the Internet, and a year after that, the excellent image processing software Photoshop came onto the market.

The ability to download image files, then films, to the computer, to process and edit them, and to publish them online added an important layer to online learning. Of particular importance in the evolutionary advancement was the appearance of the eyepiece camera and the microphone as part of the personal computer and the laptop, as well as telephony programs (Skype was launched in 2003) and instant messaging.

The video-sharing site YouTube was another step in the typhoon of technology, and in hindsight, its influence on the world of education has been no less than extraordinary. The company YouTube was founded in 2002 by Chad Hurley, Steve Chen, and Jawed Karim, all former employees of PayPal. Hurley studied computer graphic design at the Indiana University of Pennsylvania, while Chen and Karim studied computer science and the University of Illinois (Urbana-Champaign). The idea for the site popped into their heads when they became convinced that it was too hard for users to share video files filmed on private digital cameras and access files that had already been uploaded online.

Their success was instant. Less than a year after the launch of the website, the number of visitors to the site shot up to eight million per day.[1077] A year later, the company reported that over sixty-five thousand videos were uploaded to YouTube per day, and every single day approximately one hundred million users watched YouTube videos.[1078] From then on, YouTube continued to develop at a staggering pace and became a cultural phenomenon. In February 2017, no fewer than one billion hours of video were viewed on YouTube daily around the world.[1079] As the number of users rose, possibilities opened up to make a profit from the views.

The influence of YouTube on human society in the fields of consumer consumption, marketing, broadcasting, politics, and art have been analyzed and interpreted countless times, but only a few understood at the time that this platform had paved the way for a revolution in education, and marked the inevitable death knell of the academic institutions. This took place by way of a tide of instructional and educational videos of all kinds—starting with "How-To" videos (how to bake an apple pie, how to build a doghouse, how to play the banjo, and so on), to solutions to practical and theoretical problems in every field imaginable, and all the way to recorded lectures from a thousand different venues. If, in the past, professors in academia had an almost holy glamour about them, and only certified experts were deemed worthy to pass along their knowledge and enrich others with their inspiration, suddenly it seemed that an endless number of people were able to explain an endless number of subjects, and you didn't need a doctoral degree to be a superb and popular speaker.

Moreover, when professors are compared to charismatic speakers on the free market, whose recorded lectures leave huge crowds spellbound, the indirect message is self-evident: Why learn from a professor who was chosen for you on campus, if you can enjoy a fascinating recorded lecture (often accompanied by illustrations and photographs) from anywhere you want? And indeed, many successful educational initiatives have sprouted up on YouTube, such as TeacherTube, YouTubeEDU, Wireless Philosophy, Crash Course, and others.

An especially interesting example in this context is the site MasterClass, in which "renowned personalities in their respective fields" teach a wide variety of subjects: from sports, cooking, and video games to creative writing to economics and politics. It was established in 2014 by David Rogier and Aaron Rasmussen; within a few months, no fewer than thirty thousand people had signed up. A typical course contains between ten and twenty-five video classes, each one of which is at least two hours and up to five hours long. In late 2018, the site offered approximately fifty courses and one thousand classes, which were also available for viewing on mobile phones.[1080]

From Dozens to Millions

A revolution develops by way of chain reactions which gradually multiply and become stronger. One such reaction in the ongoing revolution of online teaching was the debut of the Open Courseware movement, which flew the flag of accessibility to online learning at no cost. The movement was founded in 1999, and cleared the way for another important initiative which appeared three years later. In 2002, the Massachusetts Institute of Technology (MIT) initiated a program which opened some of its courses to the general public. In hindsight, it seems like more than just coincidence that the institution to take up the gauntlet was an elite university with an engineering bent, a close connection to the world of commerce, and an unshakable status in academia. Within a year, over five hundred academic courses were offered for free online, a few of them via advanced streaming technology; a year later, this number had shot up to nine hundred. And it didn't end there—and not in Boston, either. MIT continued to leave its signature on online teaching when it expanded the project by collaborating with additional academic institutions. Thus, for example, in 2005, together with Tufts University, MIT established a consortium of over two hundred universities around the world to make study materials available online.[1081]

The further development of academia's global orientation spurred on similar initiatives—not only among fellow scientific powers such as Germany, France, and the United Kingdom, but in less academically prominent nations such as Romania, Turkey, India, and Sri Lanka. In Hong Kong, Taiwan, and Japan, consortiums of universities were established and made hundreds of academic courses available online,[1082] and China, of course, became one of the most active countries in the field of online learning. In 2003, the Ministry of Education in Beijing launched a program for the dissemination of academic courses called China Quality Course. As of 2010, almost four thousand courses had been opened up for viewing on this platform, which were supplied by seven hundred and fifty of the country's universities; in 2017, the number of courses was already over twenty thousand.[1083]

An "Exit" for Educational Initiatives

Just as high-tech changed the rules of the game in the world of industry and, for the first time, allowed entrepreneurs not gifted with personal fortunes to skip endless long-established steps on the way to becoming multimillionaires, so too did the Internet (inspired by YouTube) clear an easier path for educational entrepreneurs. The first to do this in a big way was a young Bengali-American man by the name of Salman Khan. In 2003, Khan, who had already obtained master's degrees in science, computers, and business administration at MIT, was forced to tutor his young cousin in mathematics. She was twelve years old at the time, and Cousin Salman decided to teach her by way of videos he made on one of Yahoo!'s learning platforms, Doodle Notepad. In 2006, in light of the growing demand for his lessons within his own family, Khan uploaded the videos he had created to YouTube. Much to his delight, he discovered that there was a tremendous demand for his videos, and suddenly everything clicked into place: He opened a YouTube channel called "Khan Academy," to which he uploaded 10-minute instructional videos in mathematics, physics, chemistry, biology, astronomy, history, economics, computer science, and more, which were translated into dozens of languages.[1084] The project racked up momentum in part because it won generous funding from the Bill and Melinda Gates Foundation and Google. This project turned Salman Khan into a cultural hero, and he was included on *Time*'s 2012 list of the world's 100 most influential people.[1085]

As of 2018, over 1.6 million users have taken advantage of Khan Academy videos.[1086] Although Khan Academy primarily serves schoolchildren, it is an important landmark in the study revolution as a whole. Khan conveyed the symbolic message that the "old-school" world of education was becoming less and less relevant in the digital age. It is no coincidence that his book about the revolutionary initiative was entitled *The One World Schoolhouse: Education Reimagined.*[1087]

As the films increased in number and variety, college students (and college students-to-be) also began to make use of them; since 2015, Khan Academy has been the official prep site for the SAT.[1088] It is important to note that Khan Academy put wind in the sails of a pedagogical format known as the "flipped classroom," which had begun to develop at the start of the new millennium. It was initially implemented as an experiment in several high schools around the world, and later in a number of colleges as well, especially in the study of foreign languages. According to this model, new material is learned at home by means of watching videos and reading texts, and in the classroom, the teacher clarifies the material, answers questions, and helps students who are struggling.[1089] In this way, Khan Academy had and continues to have an influence on the change in the deeply rooted consensus that most learning must take place within the physical framework of the classroom.

The Year of the MOOC

In order to gain momentum and start spreading, a revolution also needs good public relations. In 2008, Stephen Downes and George Siemens of the University of Manitoba in Canada premiered an experimental online course on the subject of "Connectivism and Connective Knowledge,"[1090] which was offered not only to students of the university but to the wider public. Participants from a distance had two options: passive viewing at no cost, or active participation for a fee, which also paid for a certificate of completion. 25 students from the university signed up for the course, and 2,300 users from outside the university joined them. This unusually high number spawned the phrase "MOOC – Massive Open Online Course" (the credit for this phrase goes to David Cormier, who was the Manager of Web Communication and Innovations at the University of Prince Edward Island in Canada at the time).[1091] MOOC has since become a figure of speech, branding the phenomenon both inside and outside of academia.

At the same time that these mass academic courses began to appear on the Internet, so did professional courses with no academic credentials, distributed by the American company Lynda (which was eventually purchased by LinkedIn and its name changed to LinkedIn Learning) and the Irish company Alison.[1092] Another prominent up-and-coming initiative on the market was that of the company Udemy, which in 2009 began to supply tools and a platform for the creation and promotion of online courses to anyone who wanted them. Udemy's revenue, which is shared between the course creator and the website, comes from students' payments for the courses. Udemy flourished quickly, and in 2018, it already contained no fewer than one hundred thousand courses. In 2015, the ten leading teacher-entrepreneurs earned a combined total of over $17 million, a respectable sum however you look at it—which proves that post-high school education can yield decent profits if it is run according to a pedagogical and economic model suited to our times.[1093]

The mass academic courses have continued to multiply without stopping for breath, but if they want to make their way to center stage and cause a significant change in academia, a few more conditions must be met:

- More sophisticated technological platforms, which allow user-friendly production of courses and standardization of quality.
- The adoption of the new concept by leading institutions in science, and a stamp of legitimacy from those institutions.
- The serial production of courses with a number of attendees much higher than the capacity of university lecture halls.
- An economic incentive for commercial entrepreneurs who know both the academic world and the digital world well.

Four initiatives which appeared in 2012 in leading universities combined these conditions and created what the New York Times called "The Year of the MOOC":

- Stanford University opened three online academic courses, one of which was called "Introduction to Artificial Intelligence." They included lectures and study assignments identical to those given to on-campus students, and registration was open to all comers. That said, external students were not given academic credit, but only a certificate of completion contingent on submission of all assigned work. The professors expected five hundred people to enroll (the most optimistic figure estimated two thousand) and, from a technological standpoint, the course was built to accommodate a maximum of ten thousand students. But the combination of an attractive subject, fascinating professors (Sebastian Thrun, of Stanford's computer science department, and Peter Norvig, Google's director of research), the option to take a course at a prestigious university for free, and the advance media coverage created a boom effect: no fewer than one hundred and sixty thousand people registered for the course, from no fewer than one hundred and ninety countries, including not only college students but high schoolers, programmers, teachers, and retirees. One hundred people volunteered to translate the lectures into forty-four different languages. One of the students nicknamed the groundbreaking event "the Woodstock of the digital age."[1094]

For the first time, an online course was "massive" in the full meaning of the term. Only a small portion of those who enrolled in the course actually completed it, but the huge number kindled the imagination, and the event received extensive coverage.[1095] Near the end of the course, Thrun turned to the thousand students who received the highest grades, and offered them help in finding work at the cream of the world's high-tech companies—which lent a practical touch to the refreshing new initiative. The extraordinary success of the course—far beyond any expectation—drove Thrun, along with two business partners, to found a MOOC site known as Udacity (the name, of course, is derived from the word "audacity"). Within two years, the site attracted ten times the number of people who signed up for the initial course: 1.6 million learners from one hundred and thirteen countries. In October 2012, *Wired* magazine published an article about Thrun and Udacity. In an interview included in the article, Thrun predicted that in another fifty years, no more than ten institutions of higher learning would remain, and there was a good chance that Udacity would be one of them.[1096] And indeed, the company continues to flourish at a dizzying pace. In 2019, there were already 11.5 million learners on the site (an increase of over 40% since 2017), registered for approximately two hundred courses, as well as collaborations with many universities— including master's programs.[1097]

- Three months after the founding of Udacity, two professors from the same computer science department and the same initial project at Stanford—Daphne Koller and Andrew Ng—established a new MOOC platform known as Coursera. A successful combination of effective fundraising, user-friendly technology, and appealing content (the first courses offered by the site were produced by prestigious universities: Princeton, the University of Michigan, and the University of Pennsylvania) led to an almost-immediate success.[1098] Calculus One—a fifteen-week course uploaded in the spring semester of 2012-13 by Jim Fowler, a young professor of mathematics at the University of Ohio—drew over forty-seven thousand students.[1099]

In 2019, forty-five million people were learning within the framework of Coursera (a 50% increase since 2017), in over 3,800 courses.[1100] The site's takeoff was partially due to the success of the company's founders and directors in bursting the American bubble and creating professional collaborations with governments and with one hundred and fifty universities around the world.[1101] Even as early as 2015, Coursera announced that it had over a million users in China, a market which became the site's second-largest.[1102]

- Only a month after the establishment of Coursera, the third platform in the grand triumvirate was founded: edX. It was created on the initiative of three scientists at Harvard University and MIT: Gerry Zussman, Anant Agarwal, and Chris Terman.[1103] The first course, taught by Piotr Mitros of MIT, covered circuits and electronics, and 155,000 students from one hundred and sixty-two countries signed up. In 2013, the partnership expanded to include Stanford University. In 2019, edX already featured over 2,600 courses, for which were registered twenty-four million students (a 70% growth since 2017).[1104]

  The edX platform was different from its two predecessors in two significant ways. First, it was established from the get-go as a non-profit organization with an ideology of access at no cost. Second, it was based on open source code (a computer program which is open and available for free use). These two characteristics transformed edX into the most important emissary of the massive-open-online-course message.

  One of the most prominent uses of edX's open source code took place in China. In 2013, Tsinghua University, which operates under the auspices of the Chinese Office of Educational Research, established a customized version of edX which it called XuetangX. As of 2018, fourteen million students used this platform.[1105]
- In 2012, a fourth platform for mass academic courses appeared on the scene – FutureLearn—on the initiative of the twelve leading universities in the United Kingdom. In 2019, over ten million students were registered for FutureLearn (a growth of over 40% since 2017), in eight hundred and eighty courses; over one hundred universities, mostly in Europe, uploaded courses to the site. This was also the first platform to enable students to earn academic credit at leading British universities via their tablets and smartphones.[1106]

All of these giant platforms are unique, but of course, they have several common denominators:

- Most courses are split into weekly instructional units, where each unit includes brief videos, often with a transcript beside the video. The videos include the professor's explanations, his or her conversations with colleagues and experts in the field, and illustrations and demonstrations via graphics, animation, images, and film clips. The student typically summarizes and reviews the instructional unit using an online quiz, on which he or she will receive immediate computerized feedback.

- The courses include suggested reading lists, as well as forums on which students can raise questions and discuss them with their peers and with the facilitators. Occasionally, these courses integrate additional learning tools, such as an online laboratory or an interactive map.[1107]
- Several different study packages are offered to interested users:
  - passive participation for free and with no final project
  - study towards a certificate of completion, for a fee (paying students are tested throughout the course and at the end)
  - study towards academic credit for a fee (the recognition of the credits is left up to the discretion of any given academic institution)
  - a certificate of successful completion of a cluster of courses on the same subject (between two and seven courses).[1108]

In the past few years, national programs in every language have proliferated alongside the large international platforms, and have continued to proliferate on a regular basis. They are generally established with government sponsorship and based on edX's open-source code. This sort of online platform exists, for example, in China, India, Australia, France, Germany, Spain, Italy, Belgium, Ukraine, Japan, Korea, Mexico, Thailand, Vietnam, Malaysia, Jordan, and Israel.

No Longer a Marginal Phenomenon

Since 2012, the MOOC phenomenon has continued to develop, as reflected by a series of measures:

- **Massive growth in the number of students.** The quantity and percentage of students enrolled in online courses generally, and MOOCs specifically, is rising every year. The numbers are no longer marginal, but rather in the millions. Thus, for example, in 2019, it was estimated that the number of students in MOOCs around the world was one hundred and ten million – a 10% growth from the previous year.[1109]
- **Growth in the number and variety of courses**. The pressure to coordinate with the leading institutions and the growth in the number of course providers has led to consistent growth in the number of online courses. At the

start of 2013, five hundred mass courses had opened around the world. Only three years later, the number had grown by a factor of ten, to five thousand; in 2009, there were already 13,500 courses.[1110] It is important to note that most of those courses are directed at undergraduate students, but the number of courses directed at graduate and doctoral students has consistently increased.[1111]

If at first, most courses focused on the fields of computer science, technology, and business administration, today the subject areas have become more diverse: hard sciences, social sciences, humanities, education, engineering, health, art, and more.[1112]

- **Expanded accreditation**. In 2016, the number of institutions which integrated MOOCs into their curriculum surpassed seven hundred, and in 2019, nine hundred.[1113] This is a respectable number indeed, but it is still a negligible percentage of the world's institutions. Even in the United States, the leader of the revolution, almost half of the students who study via online courses are concentrated in 5% of the nation's colleges and universities. Furthermore, forty-seven institutions of higher education, constituting only 1% of all American institutions, produced almost a quarter of the MOOCs offered in 2007.[1114]

The traditional model of frontal instruction still reigns in the academic world, in part because most of the world's institutions are struggling to cope with the MOOC phenomenon and are unsure how to assimilate them into the conventional paradigm. Even putting aside the technical difficulties, there is also the difficulty of recognizing a course not created by the institution granting the degree. That said, in the past few years, there has been a significant increase in the number of academic institutions which recognize online courses which were produced by an external entity, including prestigious institutions.[1115] At the same time, more and more government and scientific bodies are calling on institutions of higher education to expand their recognition of MOOCs for academic credit.[1116] The first meaningful initiative on this front was in California, where a law was passed in 2013 that required the state's public universities to mutually recognize MOOCs. In that same year, the European Commission announced its OpenupED initiative, which encourages mutual recognition of MOOCs in universities across the continent.

The growing recognition by governments of the potential of online courses is causing them to divert larger budgets to the cause. The government of Israel, for example, subsidizes online courses for the study of computer science to an extent of up to 50% of the degree, and plays a role in funding the development of courses on the worldwide edX and the Israeli Campus IL platforms.[1117]

- **Growth in the number of institutions which grant a full online degree**. A fantasy which had been the province of eccentrics and dreamers only two decades ago has now become reality: in 2018, one hundred and forty institutions of higher education in the United States did not have a campus, and their studies exclusively took place at a distance.[1118] The number of academic institutions which offered a full online degree program (especially graduate degrees) has also grown from day to day. At the beginning of 2019, students all over the world had their choice of thirty-six full MOOC-based programs towards academic degrees. Two of them were for an undergraduate degree, and thirty-four for a graduate degree (primarily via the sites Coursera, FutureLearn, and edX).[1119] It must be emphasized that at this stage, an online degree requires the sponsorship of an academic institution.

  An interesting and important initiative in the advancement of the online education revolution is the University of the People. University of the People was founded in 2009 as a philanthropic institution by the Israeli entrepreneur Shai Reshef, and in 2014 it received academic accreditation in the United States. The university is run by volunteers and does not collect tuition in advance. Students pay only for exams, a modest sum of $100 to $200 all in all. The initiative is based on the idea that the online format will help make higher education, in all its forms, available to low-income students.[1120] There is no doubt that projects like these, with a socially oriented approach, will continue to develop in the coming years, and put wind in the sails of the movement from an additional direction.
- **Growth in the number of platforms for certain disciplines**. Along with platforms which present a wide range of courses, platforms are springing up which focus and specialize on a specific subject area. These include, for example, Kadenze in the creative arts (visual art, music, and so on); Meludia for online music courses; OpenHPI and HackHands in computer science; OpenTuition in accounting and finance; Woyingzichang and OpenClassrooms in information technology (IT); Pedago in business; and Pacific Open Learning HealthNet in the health sciences.
- **Scientific research on the MOOC phenomenon**. Online learning has intrigued researchers of education from day one, and the number of papers written on the subject has grown consistently. That said, the empirical research on the subject was and is still steeped in preconceived notions, which has led many

> researchers to concentrate more on the challenges and problems of online learning than on its advantages and potential. Generally speaking, education systems are conservative, large, and ungainly, and they take considerable time to adopt innovations that have long since become a natural part of life in the real world. Academia is no exception in this matter, including many of the education researchers for whom academia is home turf. They have fallen in line with their skeptical parent institutions and supplied pessimistic evaluations which were compiled on the basis of the existing technology, without taking into account the appearance of technologies that are likely to be game changers. In practice, a self-fulfilling prophecy has been created (at least for now): The institutions have been skeptical of the implementation of digital instructional formats, and so their researchers have sought out weak points and obstacles which would confirm those assessments. So much so, in fact, that at a number of recent worldwide conferences on online learning, there were already even those who announced the death of the MOOC. It is no accident that up until now, the current data on the integration of online courses into academia has mainly been collected and published by a private initiative, the website Class Central, and not a public or academic entity.

But as we know, the good and the effective has a dynamism of its own, especially in the field of technology. The number of conferences, reports, papers, and books which deal with online learning in general, and MOOCs in particular, is growing nonstop—and a continuous flow of data is there to teach us (as we have seen above) that reports of the death of this revolutionary phenomenon have been greatly exaggerated.

It is important to note that edX was and is still assigned great importance in the research of online learning. The organization constantly updated data based on the behavior of the millions of people who have registered for and learned on the platform. The most comprehensive report on the subject was published in December 2016 by a collaborative group of researchers from Harvard and MIT, under the headline "HarvardX and MITx: Four Years of Online Courses" (HarvardX is the Harvard Business School's free online branch, and MITx offers free online courses from MIT). The report summarized four years of online learning by 4.5 million students over two hundred and ninety courses, and indicated consistent progress in all of the measures examined by the study.[1121] In this context, it is also important to note the website Best Colleges, which publishes wide-ranging surveys of trends in online education.[1122]

The Profit Dilemma

The dizzying growth of the Internet created, or so it would seem, commercial potential on an unheard-of scale. If every user were to pay a single cent to surf a popular site, the profit would swell up to fantastical proportions. In practice, however, it turns out that making a profit only from user visits to the site or use of its content requires a very high level of online traffic. Although making money in this way includes a non-trivial number of technical hurdles—collecting payments, measuring use, protecting copyrights, and more—the real problem is conceptual, a problem of principle. People perceive the Internet much as they perceive natural resources (air, water) or public resources (highways, schools, hospitals, sewage systems), which are supposed to be available to everyone, without payments or flat fees. Because they already pay a "surfing tax" to an Internet service provider, they are not enthusiastic about paying for the use of websites. In effect, the most popular websites have gotten all of us used to surfing for free, particularly news sites and social media. People and companies are ready to pay good money mainly to advertise online and to purchase goods and services—mostly premium services. The basic use of the site is free, and payment is only collected for more advanced features.[1123]

This built-in problem, alongside the fact that the network is full of free lessons (primarily on YouTube), left the MOOCs with an unstable economic jumping-off point. Moreover, the preparation of a course requires the hard work of professionals in a variety of technical fields, and such a thing costs money.[1124] To this are added additional expenses such as studio fees, pedagogical consulting, permissions for the use of copyrighted material, updates to content, and so on. The continuous maintenance of a course also requires a budget—for example, for the use of a platform (including computers, servers, software, and the like) or for management of the registration and forums. There is no doubt that technology will provide a sophisticated solution to these needs which will enable automation and lessen expenses, but for now the financial investment is still dauntingly high. Because it is difficult to raise these funds from governmental and academic sources, the current situation, as of the writing of this book, is that most platforms subsist on public donations and investments of venture capital.[1125]

At the same time, the MOOC companies are trying to redirect their learning initiatives onto a profitable track by a number of creative means, such as:

- Study materials for the course are accessible at no cost, but grades on assignments and tests and academic credit require a modest payment, usually hovering between $40 and $120 per course.[1126]

- The online course is integrated into a conventional degree program, and the university pays a kind of rental fee for the use of the platform. [1127]
- Users are offered a full degree in an online format. It isn't cheap (a recognized degree from Coursera costs between $15,000 and $25,000), but the company helps students to get loans in order to fund their studies.[1128]
- Some of the companies offer counseling and academic support services by experts ("mentorship")—that is, a kind of private tutoring for students—for a fee.
- Here and there, some revenue comes in through the sale of ads (still on a small scale).
- Hefty revenues come in from non-academic courses, sold either to individual customers or to companies which provide study packages to employees. In fact, a change in direction is starting to take place as, because of economic constraints and market forces, platforms which were originally established in order to provide academic certification are gradually transitioning towards general professional certification. In general, experience teaches us that liberation from the shackles of the academic degree increases the potential for profit. The first to make this transition and find their way to a for-profit track were Udacity and Udemy, which primarily market "nanodegrees" (we will later go on to discuss the importance of this phenomenon). When the course is provided by these and similar companies, the profit passes entirely to them. When it is provided by external entrepreneurs who upload the course to their platforms, the profits are shared between the entrepreneur and the company, as we have stated. Udemy collects 15%-30% of the profit, and leaves the rights to the course in the hands of the entrepreneur.[1129]
- A new model, which combines teaching and job placement, has recently started to operate. Udacity, for example, promises a job at the end of the study program for anyone who takes a collection of courses which train towards a specific job. And if this doesn't work out—they get their money back.[1130]
- A source of additional revenue is helping countries, institutions, and for-profit companies to establish their own independent teaching platforms. This is accomplished by renting out the software license or by building a separate platform. Google, for example, provides its employees with a platform for learning and practice that was developed through Udacity.

That said, none of these funding sources solves the profit problem, and at this stage most of the players in the MOOC industry are not only not profitable, they are even losing money. The providers of courses usually make them public out of ideological motivations such as the importance of knowledge-sharing, not to turn a profit—and not even on a "build now, profit later" economic model. Actually, as long as academic institutions have a monopoly on the granting of academic degrees, no private entrepreneur in the field of MOOCs will be able to sell courses of this kind independently.

Institutions of higher education are also struggling to find a profitable formula by which to produce MOOCs and upload them to national and international platforms. Therefore, they primarily content themselves with supplying online courses within the campus bubble—that is to say, courses conceived and built mainly by faculty members, sometimes with the support of computer technicians, and intended exclusively for the students of the institution. While these courses are indeed eroding the frontal teaching model and making a wider range of learning possibilities available to students within the framework of a traditional degree, they still haven't changed the rules of the game.

Lately, a new idea has reared its head: the use of MOOCs to recruit new students to conventional degree programs. The method is simple: in place of regular entrance exams, a student is invited to take a selection of MOOCs. If the student's final grade clears the bar, he or she is accepted, and the courses he or she took online are counted for credit towards the degree (in Israel, Tel Aviv University already offers a track of this kind; Arizona State University has tried it in the United States). But here, too, it is unclear whether this option will be able to change the entire picture. In fact, tragically and paradoxically, institutions of higher education have no real interest in promoting distance learning, because the resounding success of the new model will inevitably lead to the economic collapse and elimination of these institutions. If students could learn a variety of courses on a variety of websites, selected entirely according to their wants and needs, there would be no reason for them to register and pay for a single institution with a much smaller set of course offerings. The heads of academic institutions know this and are stopping up their ears. Therefore, they are taking their time to let go of the reins, and holding up the revolution in the meantime. And governments are still falling in line: On the one hand, they build platforms and fund the development of courses, but on the other hand, they preserve the monopoly of the institutions of higher education.

In fact, the debate over the profitability of online courses is irrelevant at this stage. The moment that the education market opens up and the concept of an academic degree vanishes in its traditional form, people will pay separately for every course or cluster of courses. That is to say, the tuition paid today to a single university will be paid per course to a number of different suppliers. Moreover, there is no reason that the existing public platforms—with edX at the head— should not receive significant and comprehensive international subsidization which will allow anyone or any organization to upload and improve courses, perhaps for a symbolic "rental fee."

The Feedback Dilemma

An additional and significant challenge faced by the MOOCs, and by online courses of all kinds, is feedback. It is difficult, even impossible, to check the assignments of hundreds or thousands (or even hundreds of thousands) of students with the requisite care in a digital course—let alone give comprehensive feedback.

The administrators of MOOCs are mostly forced to resort to mechanical formats of grading and assessment:

- A constant parade of short "pass-fail" assignments, mostly graded by computer, intended to ensure active learning and help the student stay interested.
- Multiple-choice quizzes, (with randomize questions) graded by computer, with all their well-known advantages and disadvantages.
- "Self-grading," in which students are asked to evaluate their accomplishments independently, using criteria and a rubric set down by the professor. We must remark here: Studies prove that most people are able to grade themselves adequately—not too low and not too high, and any deviation is almost never significant. Students who grade themselves cannot complain that they are being treated unfairly, and are grateful to be trusted with the responsibility.
- Peer grading, in which other students in the course supply the grade, once again by means of a rubric determined by the teacher. This method is more widespread in the humanities, social sciences, education, and law, in which written responses are required. Its rationale is that reading a colleague's responses and giving feedback are additional tools for learning.[1131] The final grade is determined as an average of several peers' evaluations; studies show that this strategy tends to be reasonably reliable.[1132] The obvious disadvantages are the additional burden on the students, and the fact that that this style of grading does not account for unusual answers or creativity.[1133]
- Automated grading, by means of content analysis programs. Today's technology still does not allow for in-depth grading, which checks, for example, critical thinking. That said, sophisticated tools are being developed today by a number of companies around the world which deploy artificial intelligence for this purpose.

In addition to the major time investment required to check and assess students' work, there is another problem: Students' autonomous work, without close supervision, creates fertile ground for plagiarism and forgery—including the use of a shadow test-taker who answers the test questions in place of the student registered for the course.[1134] In order to alleviate the problem, various companies develop a variety of services of solutions such as automated timer for the whole exam or per question and online proctored exams (using a one-time password, biometric and facial recognition). The student is also monitored in real-time through the webcam and screen capture via artificial intelligence.[1135] This technology is still in its early stages and many problems, such as privacy protection, will need to be solved in the future (as the problem of security at the moment of digital money transfers has been solved).[1136]

One way or another, the general solution will require a rethinking of the effectiveness of evaluations and grades and their suitability for the new era. If online learning programs content themselves with a pass/fail grade with a high passing bar in certain subjects, along with the possibility to come back and take the test over and over again, the stress on the system will be reduced and there will be less motivation to cheat.

The Dropout Dilemma

From the moment that the online courses received a seal of approval from the prestigious universities and were uploaded to international professional platforms, there was an expectation that their success would be overwhelming. If the demand for those courses indeed were to realize its full potential, and hundreds of thousands of students were to pay for online learning with a degree alongside, the innovative platform would receive economic and professional approval, which would really change the rules of the game. This has not happened, in part because of an unexpected problem: The attrition rate of MOOCs is close to 90%. And if that were not enough, in addition to the high number of dropouts, the percentage of failing grades is higher than the typical failure rate in conventional courses.[1137] That is to say, fewer than one out of ten students who begin a MOOC finish it successfully.

The skeptics and the gatekeepers who have opposed mass online courses from the beginning have pounced on this data with relish, and have fallen all over themselves in their eagerness to claim that the MOOCs have failed. They have not taken into account that the staggering dropout rate is only temporary, characteristic of a new medium which is still in its trial phase. Indeed, it can be attributed to several causes:

- **Unprofessional production values**. Many students abandon courses because, while they may be online, they are often built according to an old-fashioned and stultifying template, and do not take advantage of the wealth of innovative and user-friendly tools available online. If you're used to watching fast-paced TV shows, and you get stuck with a "talking head"— it is only natural that you will quickly get tired of it. A study conducted on the edX platform found that students' median viewing time for video clips was the first four minutes and forty seconds, while the average length of an online lesson was 12 to 15 minutes.[1138] That is to say, the video clips are not suited to the attention span of 20- and even 30-year-olds, and the viewers "break down" long before the end of the lesson. Also, the online forums for debate—which students in distance learning programs desperately need—are often built according to an old-fashioned approach. A 2016 study among students in Coursera courses found that fewer than 5% actually participate in the forums.[1139]

Moreover, many MOOCs are far too labor-intensive, and do not give the impression that any thought was put into the scope of the demands, the time, and the effort that the course requires. In many MOOCs, the graphics and design are "old" and tired, and the presentation is monotonous. That is to say, more than the dropout rate teaches us about the students, it teaches us about the professors and the producers—or, more accurately, the shoddy product.[1140]

- **It's easy to have second thoughts**. In a typical academic course, even when you're bored, you can't leave, because the course is part of the "degree package." By contrast, in a MOOC, the choice whether to continue until the end of the course or cut and run is entirely in your hands. This is significant because it provides a genuine measure and reliable evaluation of the course's quality—an evaluation that does not exist in a traditional academic course. Furthermore, unlike many university courses, in which students can choose not to come to class and take a final exam on the basis of course outlines which they copied from friends or purchased somewhere, an online course actually demands active participation by way of continuous assignments. When you're too busy or the assignment "hits you the wrong way," it's both tempting and easy to leave.
- **Experimental enrollment**. Like many other statistics, the general data on the attrition rate of MOOCs is misleading. From the very beginning, many people enroll in online courses just to get a sense of them. After all, the taste-test doesn't cost money. And indeed, studies show that when students pay for the course in advance, they tend to drop out at a far lower rate: 70% of users who pay for instruction, participation in exams, and a certificate of

completion finish the course successfully.[1141] Moreover, when online courses draw students from diverse backgrounds and with all kinds of constraints and limitations, some of the users who register will not have the requisite background or the ability to finish the course.[1142]

- **Lack of social interaction.** MOOCs do not provide one of students' most basic needs: human interaction and support. A small minority of courses make an attempt to provide some human dimension using a series of means: oral rather than written feedback on assignments; active participation from the professor in the students' discussion group; airing brief questions during the lecture, and showing the statistical distribution of students' answers in real time; regular video updates on the course's progress; and sending personalized messages to support students who are struggling to keep up the pace.[1143] But none of these tactics sufficiently fulfill the students' need for personal, human connection. Hence, the solution lies in the development of hybrid courses and online classrooms and lecture halls, based in part on 3-D technology and virtual reality.
- **Force of habit.** For anyone who got used in school to being spoon-fed, negotiating with teachers over academic expectations and assignments, and getting let off the hook left and right—it's hard to give up all that bounty. In mass courses, you don't get any sympathy. There are no easy ways out, and many students feel that the situation is overly demanding and unfeeling. As a general rule, online learning requires a high level of self-discipline and resilience. These ingredients are only available in a fairly low dose among the young people of Generations Y and Z, and many of them don't feel like adapting.[1144] Indeed, research shows that the dropout rate is higher in the first MOOC in which a student enrolls, and lowers as the student racks up experience with the format.[1145] Therefore, online academic courses are much more likely to succeed if students come to them after trying out this type of learning in high school. In fact, the online academic revolution is largely dependent on a shift in perspective in schools, and vice versa: as academia changes, it will be easier to institute online courses in high schools, too.
- **Excessive expectations**. The mass online format is still new and unusual. People see these courses as a new experiment, and naturally they come in with both high expectations and doubts. Furthermore, most students are forced to integrate online courses into a conventional degree. From the moment they run into a difficulty, they can easily change direction and switch to a traditional course.

In other words, there is even a positive element to the high dropout rate, because it implies a process of natural selection, and a course from which many students drop out may have been a course that never needed to exist in the first place. The new—and quite refreshing—principle at work here is no longer "we'll screen you," but rather, "you'll screen yourselves (and us)."

Cut the Bullshit

Students' need and habit for short, concentrated, and dynamic messages has been discussed in endless venues in the past, and various positions on many sides taken on how to cope with this "decree." But today, it is already clear to everyone that the world of teaching will have to adjust to the new reality and make the best of it.

In its early days, YouTube only allowed users to upload videos under fifteen minutes long. This limitation was obviously put in place for technological reasons, but these reasons became ideological and have even turned into a motto. Since then, the limitation has been revoked, but the message has stayed loud and clear: Stay on-topic and focused, and don't wear out the viewers. In retrospect, this is probably one of the secrets of the platform's phenomenal success.

The lecture convention TED was founded in 1984, long before the Internet burst into our lives. However, it was only after the world turned digital from head to toe, and the lectures featured at TED conferences were uploaded to the Internet (in 2006), that TED became a cultural brand and one of the symbols of the epoch. The lectures—which were focused, fast-paced, and riveting, and bound to a strict time limit of exactly eighteen minutes—turned into a hit, with over half a billion views. TED's success, naturally, spawned numerous competitors, which adopted the same basic concept. At the beginning of its road, the TED craze was met with mixed feelings. Alongside the enthusiasm, there was also savage criticism, which protested the initiative's alleged superficiality, populism, and commercialism. The high-speed format lowered the level of the lectures and made discussion shallow, TED's opponents claimed. This was perhaps true to a certain extent, but it is hard to argue with at least one thing: most people today lack the patience to read or listen to too much verbiage. TED proved not only that it is still possible for a lecture to fascinate viewers, but that it can fascinate them even when it comes to complicated topics, and—at least to a certain extent—can clarify complex subject matter for them.[1146]

Of course, no one is arguing that every class should be transformed into a capsule only a few minutes long. Sadly, though, the lesson learned from the brevity and pace of YouTube and TED has not been internalized by academia. Even the message of the popular and entertaining expression tl;dr (too long; didn't read), invented by the millennials, has not sunk in—and this, of course, means that the academic world is hiding its head in the sand. Not only do today's young people skim long passages, they watch too-slow video and audio clips on fast-forward (for example, recorded lectures).[1147] On the other hand, they also rewind in order to revisit especially complicated or well-done sections.

The ones who have had no choice but to internalize the message are the MOOC companies. Only two years after the establishment of Udacity, its founder Sebastian Thrun admitted that the academic product supplied by the company wasn't catching on, and from then on Udacity would concentrate on professional courses which were short and goal-oriented—skill acquisition, professional certification, continuing education, and so on. This focus, which, as noted above, has also proven itself more profitable, has been adopted by additional platforms under a number of different terms: mini-degree, micro-degree, nano-degree, micro-master's, micro-certification, digital degree, online degree, and so on. It has found its expression in the scope of the content, not to mention the length of the lessons and courses. A course that once stretched over fourteen lessons, as was typical in the traditional format, today spreads out over no more than six or seven modules (learning units).[1148]

In fact, the world of training is transitioning entirely to a concentrated format, and it appears that there is now a kind of competition to see who will manage to impart knowledge in the shortest possible time. This is in effect a variation (and there are those who would call it a new evolutionary stage) on both traditional frontal classes and the original MOOCs, which were perceived as too long and therefore unsuitable for a world in which people have less time and motivation to invest effort in anything. A prominent example is the platform "Coursmos," which specializes in micro-learning and offers tens of thousands of "bite-size" lessons, most of them no longer than three minutes. These lessons are grouped into courses, also brief, and some of them into content clusters which culminate in professional certification in a variety of fields, some of them with the addition of an applied project.[1149]

The End of the Beginning

Church bells continue to toll in the cathedrals, and online learning is still a battering ram that has not yet managed to break through the fortifications of conservatism. But its proven successes and never-ending improvements are slowly pounding at the walls and gradually changing reality. In late 2016, the University of Oxford—the academic institution which, more than any other, is associated with the myth of the venerable professor and his students thirsty for knowledge—announced the establishment of a MOOC platform supported by edX. It seems that even the strongholds of conservatism are beginning to understand that the wheel of time cannot be stopped, and that many more improvements are expected to solve the difficulties of acclimating to the new format.

In addition to the difficulties which we have already enumerated, we must name a few more: Many countries are still lacking the technological infrastructure suited to a widespread implementation of online courses. The fact that most MOOCs still take place in English also makes it harder to internationalize the format. Moreover, in most of the world's institutions, not only have they not spelled out a master plan or written up a vision for the future use of MOOCs, not a single one of the captains of higher education is really preparing for the day after the age of frontal teaching.

Many college and university presidents reveal total ignorance when it comes to anything concerning online courses. The whole idea of a degree that doesn't take place under the roof of a single institution, a single department, or even a physical classroom seems like an apocalyptic, unrealistic forecast to most of them. It is also hard for them to push forward the online initiative because this would mean immediately diverting considerable resources (which they don't have) to the development of online learning, laying off employees, and cutting positions. These moves would certainly be received with fury and protest. What university president would willingly bring that down on himself?

But at the end of the day, the advantages of MOOCs are too significant to give up:

- **Opening the gates of education**. The online course tears down the limitations of time, place, and financial ability, because all that is required of the student is an Internet connection. This is expected to expand the social circle of students and the "educated" even in neglected, underserved locales, where education at all—let alone higher education—is unavailable to most people.

  Moreover, when the course leaves behind the physical borders of the institutions and the classroom and becomes available to anyone who is hooked up to the Internet, the old status symbols attached to instructional frameworks (universities and colleges) are erased, and the course is judged more fairly and to the point, without the unfair biases which give preference to elite institutions. At the end of the day, online instruction is expected to break down the hegemony of the rich, and to put an end to the enduring discrimination and unfairness in the area of higher learning. There will be no more separate education for rich and poor. The same courses and the same tools will be available to everyone.
- **Flexible classes**. The online course makes it more convenient to study. There is no need to leave the house and drive to campus at a designated

time, to get stuck in traffic, or to search out a place to sit in the lecture hall. You can simply plop down in your armchair at home, watch the lesson in absolute peace of mind and with no distractions, and pause your viewing for a cup of coffee or a conversation. You can rewind and listen to a complicated explanation a second time, or even a third or fourth. All the study materials can be found online, and the student can watch them at anytime, anywhere, alone or with peers. And indeed, online courses have already earned the epithet "learn while you earn."

- **Fixing errors and making up for failures.** Online courses have a sizable potential for review, fixing mistakes, and improving results. In the traditional academic model, the student has only limited opportunities to make up for a failure. Exams have fixed dates, and additional opportunities to take the exam are limited (most of the time only one or none at all). Generally speaking, there are not "second chances" to submit a paper. If you failed an online course, or if you are unsatisfied with the grade, you can go back and try over and over again after only a brief waiting period, if any.
- **Instantaneous feedback.** The online format increases the potential for immediate feedback that accompanies the student throughout the learning process. Technological improvements will allow students to find out in real time about their weaknesses, strengths, mistakes, and successes. They will be able to see how they are doing in relation to the rest of the students in the course, according to numerous segments.
- **More cost-efficient.** Today, the prices of online courses are already much lower than those of traditional courses (only 20% of the cost). When academia has no campus, this will cut down on enormous costs—buildings, offices, equipment, upkeep, and so on—which at the moment are wastefully funded by students and taxpayers. The online format also eliminates the need to double up on professors (a single good course can serve millions of students), enables the unlimited enrollment of students, prevents the cancellation of classes, and will eventually prevent the exploitative practice of employing professors at starvation wages. The money saved can be redirected to the maintenance of the public learning platforms.

As we have noted, the first tendrils of the campus-free universities have already appeared on the scene, and a few of them are already earning public support. Take for example WorldQuant University—an online international university founded in the United States in 2015, with the support of a foundation of the same name. As of 2017, 900 students from 75 countries studied at the university.[1150]

- **Suitability to the dynamic job market**. Online courses can be updated more consistently, efficiently, and quickly. This is a meaningful advantage, given the need to conform courses to the new world of employment and the changing demands of employers.[1151]
- **Custom-tailoring the course to your size**. A typical university course usually takes much longer than necessary, because of its uniform structure, old-fashioned assumptions about what a course should look like, and economic reasons—when the course is long, the institution can demand higher tuition. Significant time is wasted because weaker and/or irritating students take over the lecture and dictate the pace. Online courses, by contrast, save professors and students this headache. A comprehensive summary report of data gathered by edX found that half of students finished the online course in less than a third of the average time it took for students who passed the same course in a classroom format.[1152]

  At this point, online courses are still administered in a relatively one-size-fits-all format—that is to say, all students start down the same path, and the only variable that the students set for themselves is the pace of their progress. In the near future, however, courses will be customized differentially to each student, according to the model known as "personalized learning" or "adaptive learning." Furthermore, we are close to the day that an online course will be able to characterize the student's traits on the go, and will customize itself to her by means of machine learning. When every student will be able to tailor the suit that suits him just so, the achievement gap will shrink and students' love of learning will grow.[1153]
- **Advanced, exciting audiovisual study materials**. Online courses allow the integration of presentation and illustration methods much more advanced than those which can be incorporated into in ordinary classrooms. Professors who tried their hand for the first time at converting an academic course into a MOOC reported that the need to professionalize the lectures and the subject matter, as well as the work alongside advisors and experts, substantially improved their courses, even when the course in question was one which they had taught for years.
- **A different kind of social experience.** Online learning may miss out on the social experience of "togetherness" and the classroom conversation which creates an interpersonal dynamic, but there are other advantages to compensate for the loss: It allows students to take time to think through and articulate their ideas; it does not require students to elbow their way into the conversation, which can be particularly difficult for women, for insecure

students, and for those who find it hard to be assertive; it enables asynchronous discussion, that is, students can respond at a time of their choice and not necessarily the second after the question was thrown out into the atmosphere; it does not require permission to speak and lets everyone, including shy or modest students, reply without a time limit. The online platform also increases the potential for learning via play—a highly effective tool that has almost never been used until now in academic environments.

- **Consistency and quality control**. In the traditional format of teaching, the professor builds every aspect of the course, without supervision or critique. Even putting aside the fact that most professors are experts in their field but not experts in pedagogy, this format is entirely dependent on the individual professor. When professors retire or leave for a sabbatical, the course is retired or put on pause along with them. Online courses, by contrast, promise quality control and uniformity.
- **A wealth of courses on offer.** If, up until now, the student has been forced to choose courses among the limited options offered by his or her institution at a certain time, in digital academia he or she will be able to choose from among an unlimited list of courses offered around the world—including courses in foreign languages with dubbing or translated in subtitles.
- **Encouraging independent learning.** With all its desire to remove every obstacle from the paths of our children, education lost sight of one of its primary goals: imparting independent study skills. One of the most striking advantages of online learning is that it forces students to take responsibility and demonstrate independence.

The Path to the Post-Academic Era

Studies Without Borders

A revolution generally begins as a slender footpath, and expands with time into a wide, paved road. The lengthy birth pangs of the online revolution are expected to pass, and on the horizon we can already single out and spot a number of trends:

- Teaching and learning technology will improve in all of its aspects, in particular its presentation and interactive features, including through the incorporation of virtual reality.
- Artificial intelligence and Big Data will make teaching more targeted towards the customer, in part—as we have already stated—by collecting information on students and stitching together a personalized set of courses for each student.[1154]

- Media companies which specialize in developing products for communications, entertainment, and advertising will take advantage of their databases of content, their creativity, their knowledge, their equipment, and their labor force, and enter the world of higher education. This trend can already be seen in the field. For example, *National Geographic* permits free access to its catalogued library so that students can pull up images, maps, papers, and so on. *BBC Education* makes exceptional materials available for teaching and learning, and operates multiple educational initiatives.[1155]
- Online teaching will become multidimensional (hybrid) and will combine social experiences with various styles of learning: classroom meetings (lectures, discussions, and so on), tours, simulations, games such as escape rooms or roleplaying, and more. Already, a number of companies today are attempting to merge the digital experience with the classroom experience. In 2010, for example, CreativeLive created a learning platform which broadcasts live lectures by experts to an audience, on subjects such as photography, design, graphic design, business administration, and more. The Israeli company Jolt offers educational and training programs in which students sit together in a model classroom to view online lectures by exceptional speakers, including representatives of leading companies. The result is that both the speakers and the audience come out on top: the speakers because they connect with the people, get out of the industry bubble, and build their reputations, and the viewers because they get to enjoy a focused lecture delivered by a speaker with proven experience and a record of success, with no geographical limits or borders—and they get to take part in the group meetup along the way.
- Additional agreements will be signed between institutions and countries for mutual recognition of online courses, which will lead to a gradual increase in the online slice of the degree pie, at the expense of the on-campus learning slice. This change will mandate financial adjustments in kind. An interesting initiative which potentially indicates the way forward was forged in 2017, when Mission College in Santa Clara, California began to offer an abbreviated degree in data analytics and business intelligence. This degree is only twelve months long, and combines face-to-face and online learning. Studies are free, but students commit to paying the university 15% of their salary in the first three years after completing the degree.
- Academic faculty members will be forced to gradually surrender their central place as lecturers in classes, pass the baton of delivering the lessons to professional presenters, and resign themselves to curriculum consulting for

courses. This will accelerate the divide between teaching and research—they will concentrate on the latter, and split the academic labor force into teaching experts and scientists. This trend will also put an end to the identification between a certain course and the professor who teaches it or the institution which offers it.

- Many courses, particularly introductory courses, will undergo international standardization. Companies such as the American StraighterLine, which specializes in providing courses, already do just that. This adjustment will lessen the need for a workforce of teachers; at first, it will create hidden unemployment, and eventually it will force institutions to cut teaching hours and positions.
- Workplaces will purchase online study packages for their employees—for training, enrichment, and/or as a condition for promotion.[1156] This process has already begun. Giant companies such as Boeing, Red Hat, and Microsoft buy thousands of "seats" in mass courses for their employees, and operate their training programs by means of designated curricula and lesson plans created especially for them.[1157] In 2015, 8% of for-profit companies in the United States used MOOCs for corporate training, and another 7% had considered using them.[1158]
- One of the solutions to the problem of alienation in the MOOCs is personal mentorship. In courses with thousands of participants, mentoring of this kind can be complicated and expensive; all the same, companies do a limited version of this already. At Harvard, they found a creative way to provide mentorship of this kind, at no cost whatsoever: In 2013, they turned to graduates to volunteer as mentors for students, or as active facilitators of discussion groups, in a MOOC in which 27,000 students had enrolled. The course, on heroes of ancient Greece, had been taught for many years within the traditional university framework, so that many graduates were already familiar with the course, and many of them took the university up on its request.[1159]

  Obviously, this cannot be the solution for every course, but digital technology already offers various strategies for personal guidance from afar, and will offer yet more in the future. Today, platforms such as Tutor.com, eTeacher, Chegg Tutors, and StudySoup already provide private tutors through the digital medium.

Fast Track to Employment

Experts estimate that the academic diploma has become unnecessary for 60% of high-tech positions today.[1160] The result is that companies scout out talent via alternate routes.[1161] But what was once an exclusive legacy of the technological elite has begun to spread lately to additional fields—especially in small companies (which by their very nature are less rigid, less "square," and more flexible), and in dynamic and entrepreneurial professions, which require highly intelligent employees with the ability to learn quickly, as well as independence, creativity, and out-of-the-box thinking.[1162] In a 2014 Gallup poll conducted among over six hundred senior executives in the United States, over 80% of those polled claimed that the experience and talent of candidates were more important than their academic degree or the name of the university where they studied. Another poll, conducted in 2018 among six hundred veteran human resources managers, found that no fewer than 90% were willing to accept candidates for a job with no academic degree. For most, a professional certification of some kind was enough.[1163]

The primary reason for this new trend is disappointment in the knowledge and skills with which college and university graduates arrive to the world of employment.[1164] Company bosses say to themselves: If I filter out candidates myself anyway using interviews and expertise and personality tests, reject many college graduates, and train my employees myself, why should I rule out talented candidates without academic degrees? Better to locate them as early as possible, in order to recruit people who are open-minded, curious, and hungry to succeed, and instill them with whatever is really necessary both for them and for me.

It is worth qualifying this statement to emphasize that most employers still demand a degree as an entrance qualification, mainly because of deep-rooted consensus and conservatism. Our sense from interviews with senior executives was that even the most purpose-driven, flexible, and open among them tended to reveal a certain hesitation and even rigidity when it came to higher education. But the low level of many college graduates, along with academic study's lack of relevance to the job market, are causing more and more employers to break the taboo.

2014 may be remembered as the year of the turning point. Three American corporate giants in professional services and business consulting—Ernst and Young (EY), Deloitte, and PricewaterhouseCoopers—made the headlines that year when they announced that they would remove the entrance requirement of an academic degree when recruiting new employees.[1165] The announcement published by EY noted that the decision was made as a result of an internal study conducted by the company which found that there was no correlation whatsoever between success in various roles and academic background. Further, the company announced that rather than seeking out graduates of higher education, it would screen candidates using personality and intelligence tests. Soon after, several additional corporate giants joined the trend, including IBM, Bank of America, Google, Apple, General

Electric, Intel, Hilton, Home Depot, Publix, Costco, Whole Foods, Unilever, Nordstrom, Penguin, Random House, and Starbucks. The IBM website proclaimed: "What is New Collar? New Collar jobs are roles in some of the technology industry's faster-growing fields—from cybersecurity and cloud computing to cognitive business and digital design—that do not always require a traditional degree. What they do require is the right mix of in-demand skill sets. Ready to take the next step in your career? We can help you get there!"[1166] A promise made is a promise kept: In 2018, the media reported that 15% of IBM's employees had no academic degree.[1167]

The big companies can allow themselves to waive the degree requirement, because they can rely on outsourcing or on their sophisticated screening and training systems—companies such as Coca-Cola and IBM operate training systems on the scale of a college education. These systems include strategies and tools that academia can only dream of, from professional workshops to online courses. In 2018, half of all courses and 90% of the most popular courses on Coursera and edX were courses for professional training.[1168] How symbolic, in the present day, that Microsoft has nicknamed its training system for IT positions "Microsoft University."

Therefore, we may safely assume that what began on the upper fringes of the employment world, and was once primarily applied to the highest echelon of workers, will find its way to less rarefied sectors. More companies and enterprises will produce "boot camps" for newly hired workers, which will train them on the fast track to meet the employer's demands.

In 2015, the British government launched a program for undergraduate and graduate degrees that incorporate hands-on internships (known as "Degree Apprenticeships"). The program includes full-time work alongside academic studies.[1169] Many institutions took up the challenge. One of them was Exeter University, which in 2018 launched a program in "Applied Finance" together with the leading finance company J.P. Morgan. The program combines one day a week at the university with four days a week of work at one of the company's branches; it is competitive and built for outstanding students. One of its goals is to break down the stereotype that young people who choose work or an apprenticeship track after high school are the kind of young people who could not get into academic programs.[1170] And indeed, it seems that the stereotype is faltering, and on the "small island" of Britain, the demand for professional internships in the framework of endeavors such as these is rapidly rising.[1171]

If, not too long ago, apprenticeships and professional training largely characterized engineering, technical, educational, and caregiving professions, the trend is expected to expand in the next few years to other fields. In place of an undergraduate degree, people will want to undergo a concentrated training period which will equip them with knowledge and basic skills, followed by mentorship at a relevant company. Germany and Australia are probably the most advanced nations in this context, both because the vocational track is considered well-respected there, and because the practical training is combined with the best of the world of education, not to mention industry. Thus, for example, in place of a degree in social and behavioral sciences, young people will choose a mentorship period in companies or organizations that deal with the workforce and/or serve certain populations: police, regional councils, human resources departments, and so on. In place of a degree in economics, they are likely to prefer a training period at a finance company, such as a bank or an insurance company, or in the financial department of a large corporation. In place of a degree in chemistry, they will be able to undergo a period of mentorship at a pharmaceutical, food, or plastics factory.

It is important to note that an approach emphasizing education which trains towards the world of action, including an internship, is expanding these days even at the high school level—for example, the incorporation of lessons on robotics or biomedicine. Eventually, this method is expected to influence the entire chain of education from elementary school to university.

From Training to Job Placement

Many young people, maybe even most, choose an academic field to study without the foggiest idea what constitutes the study of that field, whether and how they are skilled in that field, and what real options will open up for them when they finish their studies. Thus, many students find themselves in the wrong place at the end of their studies, and regret the choices they have made. Even worse: They miss out on the profession that is right for them.

Academia doesn't help students choose well, because the selection and screening mechanisms used by institutions of higher education are astonishingly superficial. Only in a few subject areas, such as medicine, architecture, and business administration, are students required to pass specialized aptitude tests—which are also fairly general, and do not examine specific traits and skills which are vital to success in those professions. For the rest, however, acceptance criteria are uniform for every subject area, and based on high school GPA and general entrance exams. The result is that prestigious and in-demand subjects attract the students with the highest scores on the SATs, but not necessarily those who are best suited to the professions in question.

Moreover, not only are students not redirected to fields which might be more suited to their individual bent, but when they finish their studies no one is there in a professional capacity to help them choose a workplace suited to their skills and needs. Job placement today is largely based on supply and demand at any given moment, leading to mistaken choices and failed matches.

That said, a positive change in the relationship between education and employment can already be seen on the horizon—a change that is preparing the ground for a new educational model suited to our times:

- More companies are opening their doors to visitors and launching experiential incubators in schools and after-school enrichment clubs. Potential workplaces invite young people for visits, demonstrations, and simulations, and offer an early trial period to see what it is like to work in this kind of job. This trend is expected to grow stronger not only because it contributes to the job market, but because it is easily combined with another trend: the enormous development in the tourist sector, which offers a huge selection of educational tours, including guided tours of artisans' workshops and industrial factories (many factories have opened appealing visitors' centers which provide them with an extra source of revenue).
- More and more museums, libraries, community centers, and schools are opening "makerspaces", which allow students and adults alike to experience a different kind of learning. This style of learning emphasizes the individual creation of physical items, manual work, and the use of traditional work tools alongside advanced machinery, including computer programs and robotics. At the same time, hackathons (or "Makeathons") attract Makers who come to these events in order to get inspiration from one another, collaborate, and work together on their projects.

  A number of factors underlie this phenomenon: the need to enhance traditional instruction with new content, not necessarily from the academic-intellectual fields that have dominated in the past few decades, but rather from the artistic, design, technological, and practical fields;[1172] the educated use of project-based learning (PBL) and learning by doing; disillusionment and fatigue from theoretical learning, which push students to develop a practical orientation; the desire to balance out the culture of screens, which has given birth to generations of passive young people; the entrepreneurial ethos, the message that great success can be achieved with initiative, an idea, and some elbow grease; the aspiration to return "the hunting and building instinct" to "the new men," and by the same token to bring women into a realm that was once considered masculine. The fashions of nostalgia, vintage, and sustainability all also point in this direction, as they propagate the message of reducing wasteful consumption and reusing and recycling more at home.

This trend, which has already been termed "the next educational revolution," helps to connect education and employment on several levels: It allows young people to get to know their inclinations and strengths better, tears down stigmas that have been built up around physical labor, and brings the world of industry closer to the world of study.

- More and more companies which train young people in a professional capacity also include job placement services. For instance, the company General Assembly has campuses around the world which train students towards the programming professions. Studies last for a single intensive semester; at the end, the company helps graduates to find work, including preparation for job interviews, and accompanies them along the way until their final acceptance.
- Just as Internet media companies such as Netflix and Spotify make their services—and therefore the reach of their marketing—more effective by way of profiling, which catalogs their users' consumption patterns, and just as police and espionage organizations catalog traits in order to locate people who might be a security threat, so too job placement companies have started to use elaborate algorithms to characterize job seekers and direct each and every one of them to work which is suited to his or her skills, experience, and expectations. This trend is expected to expand and grow more sophisticated, and what seemed in the past like fantasy will become a day-to-day reality. If, today, genetic tests attempt to find the diet or medication most suited to the individual, there is no reason that individual examinations, based on a comprehensive collection of thousands of tests and daily behaviors in the digital realm, wouldn't upgrade employment compatibility, and thereby save a great deal of money, energy, and frustration.
- Along with information about open positions, job placement portals will eventually begin to show detailed information about the nature of each job; the talents, skills, knowledge, and experience required; the way to attain those skills; and the expected salary for anyone who chooses to enter the field. In other words, the portal will not only facilitate connections between job seekers and employees, as it does today, but also between young people interested in entering a certain profession and those who are able and certified to train them. In fact, many employment agencies today already offer not only matchmaking services between candidates and employers, but also information about courses and training.

It is important to point out that academia is making feeble attempts to hop onto the moving train and strengthen the connection between academic studies and job placement. This is achieved, as we have already indicated, by means of educational tours of factories, the integration of experts from the field as professors, and the opening of incubators on campus. Lately (2019), a new kind of experiment has been tried towards this goal: the recognition of an array of micro-degrees for academic credit towards undergraduate and graduate degrees. This initiative is the result of a consortium of MOOC providers in Europe, among them the British company FutureLearn, the Spanish company Miriada X, the French company Fun, and the Italian company EduOpen. A total of fifteen million students learn with these four companies combined.[1173]

Institutions of higher education around the world also offer short and concentrated programs towards micro-degrees, as well as professional credentials, as part of the "external learning" on campus.[1174] These hesitant attempts may not yet be changing the traditional model of the academic degree, but they are creating a kind of bridge to the post-degree age.

A Playlist of Certifications

The traditional academic model is based, among others, on two assumptions. The first is that a person attains a single profession or field of specialization over the course of his or her life. The second is that most of our days will be spent in the same workplace, or in a small number of similar positions in the same field.

The rules of the game have changed. The young people of the third millennium do not aspire, as their parents and grandparents did, to an uninterrupted, long-term career that promises stable employment. Routine bores them, reality changes in the blink of an eye, and they are looking for variation, flexibility, and challenges. And the benefits that workplaces once offered in order to keep their employees and reap the benefits of their accumulated experience—such as tenure, set raises in salary on the basis of seniority, and budgetary pensions—are vanishing from the horizon.

Because young people have a growing tendency to switch jobs—and sometimes also fields—every year to three years, it is fair to assume that fewer young people in the future will devote their time to long and expensive training which closes off options, such as academia.[1175] In fact, the entire concept on which academic study is based—to devote an extended period of time exclusively to one's studies—has become anachronistic.

Also, the idea that someone will work in the same discipline for his entire life is simply illogical in our day and age. A survey conducted in Israel found that 85% of working people between the ages of 26 and 35 are considering a career change. And that is only the beginning. In the future world of employment, we will have to learn, reboot, and keep changing for our entire lives.[1176] The post-industrial technological revolution is already crouching at the door. Dramatic changes in the power of computerization, nanotechnology (entirely in the palm of the hand and on the skin), robotics, artificial intelligence, reading and editing of genetic code, the "Internet of Things," virtual reality, Big Data, the Cloud, quantum computing—all these and more will fundamentally change human needs, and with them our vocabulary of work and livelihood.[1177] Economists and futurists estimate that almost 50% of professions which exist today are liable to undergo automation in the coming decades, rendering human workers unnecessary in those professions.[1178] In the past those were the blacksmiths, the cobblers, the watchmakers, the icemen, and the tailors. In the not-so-distant future, they will be the salespeople, the drivers, and the cashiers, and after them white-collar workers: bank tellers, family doctors, accountants, and more.[1179] Experts predict that most of today's children in the Western world will grow up to work in professions that have not yet been invented, and the future economy will require training primarily for temporary needs.[1180] As we have stated, the MOOC companies were among the first to understand the way the wind was blowing—they found that they had to change direction from long general enrichment courses to short courses for focused professional training.

We must emphasize: People will not learn what is necessary at any given moment, but rather will fill their wallets with "professional visas" which will allow them flexibility and mobility in employment. These wallets will be multifaceted and colorful, and will contain professional certifications and qualifications in a variety of different fields and at various levels of professionalism. For example, one person may have in his or her wallet certification in some programming language, graphic design, and fluency in Mandarin. Not only will these combinations allow their possessors to wander between workplaces and fields throughout their lives, but training in a certain subject area almost always enhances one's abilities in other areas as well.

As we may recall, after vinyl records, followed by CDs, disappeared from store shelves and homes and became collectors' items, digital devices came onto the scene, and the make-your-own musical playlist pushed aside the inflexible listening experience of a selection of pieces packaged for you by someone else. Not far in the future, the institutional, classroom-based learning space will also split up, become more flexible, and allow the building of a personal study "playlist" made up of many different courses in a wealth of formats: alone or in a group, online or in a classroom, with a mentor or with a textbook (or instructional software), and so on.

It Doesn't Matter Where You Studied

The flexible personal wallet of certifications is expected to change another deeply rooted consensus. If, until now, the employee selection and screening process has given a decisive weight to the institution where the employee learned and the amount of time he or she spent learning, in the future the evaluation will be much more to the point: What do you know? What experience do you have? Are the knowledge and skills you've acquired compatible with the specific demands of the job you've applied for?

It is also reasonable to assume that with time, a divide will occur between the learning process and the educational assessment. When the institution which teaches and trains students also administers the exams and decides whether to grant certification, a conflict of interests is created, because the institution has a motive to demonstrate that students who study there are not throwing away their time and money. Therefore, exams and certifications should be carried out by unbiased entities. Moreover, when teaching and certification become separate roles, the teacher and student will find that they have a common interest—because both of them, in effect, are being tested.

The competence and knowledge of the student will be examined both by the employer and by companies or sites that specialize in such examinations. An example that already exists is the company Degreed, which supplies not only instructional tools but also tools which measure the user's level of professional skill in a variety of fields. This separation between the training body and the testing body is also more effective and fairer because it allows you to study and take the test over and over again, with no limits and no black marks from previous failures, like the SAT or the driving test. As we know, even if you have to take the driving test multiple times in order to pass the theory section or the field test, from the moment you become a licensed driver you are subject to the same laws and must drive with the same care and skill as any other driver. No one cares where you learned or how many tests you had to take on the way to receiving your license—or your diploma.

Assessments of students will not disappear from the social and employment landscape, of course, but they will take place separately from instruction, and the tools used will be much more complex and delicate.

A Free Market of Education

You can't just wake up in the morning and found an institution of higher education. In the majority of countries, the establishment of a scientific-academic body, and even the opening of a faculty, department, or program of study, requires examinations by a government entity, fulfillment of strict conditions, and licensing. Occasionally, the entity which makes this possible is not governmental, but rather a private, government-certified professional body which represents its profession's guild. For example, in the United States, there is the Accreditation Board for

Engineering and Technology (ABET), which is certified to approve the opening of institutions, faculties, departments, and programs in the fields of engineering and technology.

Because the right to grant academic certification is seen as a stamp of quality, many institutions have done and continue to do all they can to ensure that they receive it. Professional training colleges have insisted, and still insist, on becoming "institutions of higher education," and study programs have changed and updated so that their students will achieve an academic degree.

There is no doubt that accreditation, the process of approval and inspection for institutions of higher education, has in most cases created a standard of quality, and has prevented negligence and even fraud. That said, it seems that in the past few years, the Frankenstein's monster has destroyed his creator. The laws and the procedures which are conditions for approval have become arcane and domineering, and they create a market of higher education which is homogenous and devoid of healthy competition. In a dynamic age of high-speed changes, academia acts like a dinosaur, not a race car.

When the cardinals of science, funded by accreditation processes, are mostly the village elders, it is only natural that they tend to loosen the reins slowly, making sure along the way that the changes do not threaten the age-old and sacred model which has shaped them—and which, by now, they have shaped. The cartel-style higher education market is closed off to worthy competitors, and human society loses twice over: once because academia is frozen in place, and once again because entrepreneurs are prevented from creating vibrant and innovative alternatives.

Absurdly, the accepted bureaucratic processes for opening an institution, department, or program of study do not guarantee a high level of teaching, because the production of academic courses is usually not at all contingent on meeting clear criteria. As we have already pointed out, the content and demands of most courses are set down by the professor or, at the maximum, by the department, without any need for official approval.

If so, what makes a course "academic?" The simple, and rather preposterous, answer: the suit, not the man. In other words, it is sufficient that the course is taught in an academic institution and by that institution's faculty members.

The rubes, unfamiliar as they are with the rules of the game, tend to mistakenly see a shimmer of quality around academic courses.

In our estimation, the distinction between academic education and "regular" education is likely to break down and, slowly but surely, disappear, as a result of several factors:

- In the past, one's education was a single track from kindergarten to the end of an academic degree. In the new era, however, learning will be required throughout one's entire life.
- In the traditional model of education, a clear division was set down between work and play—that is, study time and free time. The statement "no pain, no gain" will probably stay true forever, unless someone manages to invent a pill for knowledge. One of the more attractive aspects of learning is the challenge it poses, along with the feeling of satisfaction that comes with meeting the challenge head-on. But suffering is not a value. It is also possible, and even desirable, to enjoy one's studies. Every day, new for-profit projects pop up which combine entertainment and instruction—including simulators, game apps for language learning, knowledge quizzes, interactive maps, and more. These ventures will leave boring, one-dimensional academic classes in the dust. When people—both potential students and employers—become convinced that the results of this kind of study are no worse and sometimes even better than those achieved by higher education, they will get rid of the requirement for academic qualifications, and the line between a full-fledged student and an "ordinary" learner will be blurred. All of us will become liberated students of the University of the World.
- The non-academic educational market is experiencing rapid growth. Countless professional schools and colleges today offer a variety of educational and instructional guidance. A few of them offer semi-academic professional training—in areas such as photography, graphic design, computer programming, or marketing—but there are also those which compete head-to-head with academia, such as schools for journalism or tourism. Over time, they are expected to win the fight, because of their relative advantages: a) a brief, goal-oriented program of study, content-rich and directed at job placement; b) teachers with experience in the field, and some of them with genuine talent; c) a friendly learning atmosphere; d) a sophisticated instructional environment; e) occasional opportunities for hands-on engagement in the real world over the course of one's studies.
- Commercial entities, which never engaged in teaching before, are discovering today that teaching can be an additional channel to market the accumulated knowledge of their team. This might be a restaurant which sells cooking classes taught by its senior chef, a hotel which offers a course in professional hospitality, a software development company which markets courses to programmers, or a communications company which takes

> advantage of its studios, along with its experienced and often knowledgeable staff, to transform itself into a school for media studies.
>
> Often, initiatives like these are the brainchild of professionals in the field, who have built up experience and know how to impart their professional expertise effectively to others. An interesting and representative example from Israel is the case of Yaron Biton, a graduate of the IDF's Center for Computing and Information Systems, who led one of the army's most elite programming courses for seven years. Today, he offers an intensive programming course, only twelve weeks long, under the umbrella of the programming company MisterBit. In a May 2018 interview published by the online magazine *web-mine*, Biton said: "Today, there is a major shortage of programmers on the market, and someone who studies computer science in university is not necessarily being trained as a programmer ready for the challenges of the real world. If we add to this the fact that the goal of a university degree is not to train its graduates to be useful to an employer immediately after graduation, and that academic courses are dedicated to relatively old programming languages, taught through a combination of many different courses rather than a specific, structured program—we can understand the shortcomings of university graduates. In order to meet the existing need, we have decided to build our own course, which accepts only candidates with talent and a natural touch for programming. We teach them only the most cutting-edge programming languages and train them to be leading programmers in the Israeli market." Sure enough, over 90% of course graduates find work soon after completion of the course.[1181]

And what about risk-intensive fields which demand supervision over the level of students and the content of their studies, such as engineering, medicine, education, or clinical psychology? Will the market open up and the barriers be torn down there, too?

It is fair to assume that in those areas, some kind of public inspection will also remain in the up-and-coming model. But in contrast to the current model, the training and certifying institutions will not necessarily be part of the university conglomerate. They can become—in fact, they may have to become—separate professional schools: a school for medicine, a school for civil engineering, a school for law, a school for education, and the like. This process will also be healthy for academia, because it is impossible for professors to excel in a function that includes research, teaching, thesis mentorship, and hands-on work (such as a medical practice). Each has to come at the expense of another.

In the meantime, the idea that the teachers who train students in those fields will not necessarily also be the scientists and researchers is perceived as heresy. It is particularly hard to swallow the thought that the study of medicine and engineering will be offered outside the exclusive context of higher education. But entrenched and revered conventions are not immune to the passage of time.

In the past few years, endless reports, papers, and books have been published which deal with the future of engineering education. The common denominator shared by almost everything written on the subject is the need to rethink the traditional method of training. But not a single one of these learned commentators has proposed the possibility that engineering studies will cease to be the exclusive province of the universities. All of them are beholden to the model of the professor, according to which the teacher must also be a scientist.

That said, in practice the door has been opened to change, because today everyone agrees that a more practical orientation is required. In the future, this consensus will grant widespread legitimacy to a change in the classic profile of the professor—which will in turn lead to a gradual change in the characteristics of engineering schools. The signs are already there for all to see: if in the past, the leading criterion for the ranking of engineering departments was excellence in research, in the last few years the quality of pedagogy has become more and more important, as has the practical aspect of the department, including collaborations with companies and enterprises outside of academia.[1182] The demands of the certifying bodies are being updated in accordance with the shift, and more and more institutions around the world, including prestigious institutions, employ professors today who come from the world of industry and bridge the gap between industry and academia. In the United States, they are termed "professors of practice," and their role is entirely dedicated to teaching and curriculum preparation.

We can reasonably assume that many more professional guilds (for example, in the fields of medicine, law, clinical psychology, and accounting) will establish schools for professional training outside of academia—after all, they already grant full or partial certification today by means of residencies and professional exams.

In fields of non-professional study, such as philosophy, history, sociology, biology, or mathematics, there is no need for certification at the moment—but here, too, a change can be seen on the horizon. Language departments will be replaced by schools for editing and creative writing, philosophy departments may be replaced by schools for moral reasoning and crisis problem-solving, law departments will obviously be replaced by schools for mediation and arbitration, political science departments will be replaced by schools for diplomacy and leadership, and history departments will be replaced by schools for various kinds of record-keeping, archiving, and preservation. Alongside them, schools will be established—and indeed already exist—for core education and the general expansion of one's horizons.

The rise in the number and status of specialized professional schools at the expense of conventional institutions of higher education is also expected to lead to a change for the better in the inferior image ascribed in many cultures to physical and technical trades, such as engraving, carpentry, electricity, and mechanics. As we have noted, we are on the brink of a more democratic and egalitarian age, in which more and more of us will adopt the outlook that every profession and every specialty is a credit to those who pursue it. At the same time, leisure pursuits will become more important than the work one does for a living. The hierarchy of reputation is expected to become redundant and eventually vanish for another reason: Many blue-collar professions are undergoing a technological upgrade, and require knowledge of computers and finance. By the same token, the traditional reputation of white-collar professions is falling away, because many of these professions have been replaced by computers and robots, and because more and more people understand that you can't take status symbols to the bank. If once we saw the need to cloak applied subjects—such as nursing and teaching—in a veil of academia, in the future the opposite is expected to take place: These and other subjects will return to professional schools, and their prestige will only increase.

The breakdown of the academic monopoly of the education market is inevitable for two additional reasons. First and foremost, this breakdown will expose the training programs to the real forces of supply and demand. Rather than an endless stream of redundant institutions, departments, programs of study, and courses, which continue to operate on the basis of convention and public funding, the market will specialize and conform to needs and changing demand. Secondly, the change will encourage the creation of learning communities which are not beholden to a single institution, such as communities of language learners or computer programmers—and in fact, these already exist in the virtual arena. In these communities, not only do students help one another, but professionals in the field—representatives of companies, for example—integrate into these communities and serve as mentors and job recruiters.

It is important to point out: there is still something special, even romantic, in frontal classes. They provide a break from life and create a remarkable state of consciousness which to a certain extent resembles entering a house of worship. It may be possible to pray anywhere and at any time, but you only arrive at an elevation of soul or an ecstatic experience when you are in a house of prayer, a sacred place, with the crowd of fellow worshippers and the appropriate atmosphere. Therefore, just as communal religious practice has not disappeared from the world, it is fair to assume that the experience of classroom learning and the lecture format will not entirely vanish. What is certain is that this format will no longer be as central, and will generally be reserved for encounters with exceptional speakers—the kind we seek out when we want to see and hear them and only them, just as we go to the stand-up comedy shows or concerts of beloved artists.

Co-Learning Spaces

Experts agree that the world of industry is experiencing dramatic changes which will influence—and in fact are already influencing—the world of higher education. One of them is the phenomenon of co-working spaces, which offer complexes with work tables, network connections, secretarial services, meeting rooms, a kitchen, and a lobby, as well as offices built in an open-plan style. The business model is largely based on monthly or yearly subscriptions, and sometimes daily or hourly.

The world's pioneer of co-working spaces—WeWork—was founded in 2010 and has continued to grow ever since. In 2018, it opened a new co-working space almost every day,[1183] and derivatives and competitors sprang up. In 2019, WeWork ran into financial difficulties, but the revolution which it signaled had already gotten its start.

If at first these spaces were only established in major metropolises, today they can be found in smaller cities and over a wider geographic circle. Most of the customers are educated young people, who work in creative professions and new media; however, even here there is a trend towards gradual expansion into other industries and demographics.

The evolution of this trend has several causes:

- The new world in which we live allows many people, particularly those whose primary work tool is the computer, to do their job from anywhere in the world. In this sense, co-working spaces have expanded and codified a global trend that had long since begun to flourish—work from your laptop in a coffee shop.
- There has been rapid growth in the number of freelancers and entrepreneurs who are not tied to a single employer. The new "hubs" are suited to this clientele like a hand in a glove, because they allow subscribers to save on rental and maintenance, at a time when rents in big cities have gone through the roof.
- In light of the growth of commuter traffic, a co-working space right down the street is an excellent solution.
- Co-working spaces provide a partial answer to the increasing problem of work-life balance. When you can work from anywhere and at any time, life

becomes more comfortable not only on a personal level, but for couples and families. It is true that when work becomes physically and emotionally mixed up with your personal life, eroded boundaries are a danger—but the flexibility, oh, the flexibility! And that's putting aside the money, time, and air pollution saved by getting rid of your daily commute.

- In a world where loneliness and alienation are becoming a malignant trend, co-working spaces solve the pressing need for fellowship which working from home cannot satisfy.

The co-working phenomenon both reflects and accelerates a much deeper trend in the history of the human race—an unprecedented release from the shackles of the physical. That is to say, not only a decline in the importance of the geographic location of one's home and work (and, soon, one's studies), but a transition from property ownership to property access. Instead of a regular living space, acquired at great expense—temporary rental. Instead of cultivating a private garden—spending time in a green and spacious park taken care of by the city. Instead of meeting friends in your living room—meeting up at a bar or in a coffee shop. Instead of cooking in your own home—eating at the community restaurant. Instead of a library packed with books and newspapers—reading on your cellphone, your Kindle, or your laptop. Instead of a hard disk—the Cloud.

It is no accident that alongside co-working spaces, spaces for shared housing, known as "co-living," are also springing up. These spaces allow you to rent an apartment without any long-term commitment, and to enjoy accompanying services and public areas characteristic of the co-working structures, such as a kitchen, a shared living room, laundry machines, and a gym.

Some co-working spaces already include possibilities for learning, and in the future there will be more co-working spaces with the aim of education and training. In fact, spaces of this kind already exist in several countries.[1184] The initiative will be not only private but public, and especially on a municipal level. The first buds of this change have appeared in Israel, for example, where the national "Digital Israel" initiative has formed collaborations between the federal government and the heads of city governments, with the aim of converting community centers and local libraries into co-working spaces.

Because building upkeep costs a small fortune for institutions of higher education, and because young people want a maximum of flexibility and mobility—these are yet more reasons not to maintain a physical campus, which chains the student to a single place, schedule, and faculty of professors.

Co-learning spaces, however, will not only release the student from the university campus, but can compensate for the most striking disadvantages of online learning: isolation and a lack of face-to-face support. Co-learning spaces will enable students to learn alone, together—sometimes with the aid of local experts, and sometimes through shared viewing of online lessons. By the way, the Internet has also created more and more such collaborative communities of learning in a variety of fields: languages, history, art, philosophy, programming, and so on. It is easy to imagine that the number of these communities will grow, and that technology for sharing and conversation will likewise become more sophisticated.

Presumably, co-learning spaces—in a variety of styles—will, with time, become lively hubs of activity, which offer a wide selection of work, leisure, and learning activities, including master classes, workshops, and coaching. And just as workplace complexes in high-tech have started to include home-like amenities—ping-pong tables, relaxation rooms, gyms, daycare, and babysitters—so too the world of learning will obviously integrate elements of this kind. Co-learning spaces will bring together young people from all over the world and help them to satisfy their need for friendships and romantic relationships, a need which was fulfilled in the past by studies on campus. Alongside digital nomads—who work over the Internet from anywhere in the world, and plop themselves down wherever the cost of living is cheap or the view is breathtaking—will appear "learning nomads," who will combine backpacking, studies, and work opportunities.[1185]

And what will happen to the empty classrooms and lecture halls? They will be subjected to a conversion. Some of them will be sold (already, universities are being sold as real estate today), some of them will be rented out, and others will become state-of-the-art learning spaces. This process has already started to unfold under our noses. Many university libraries adopting a new goal; from closed-off, cold, and rather alienating spaces in which it is prohibited to bring in backpacks, food, and drink and which require students to read in total silence, libraries are being transformed into youthful, vibrant multipurpose hubs, with computer and media stations, discussion rooms, lounging areas, and dining spots.

It's OK Not to Go to College

The gap between the old-fashioned academic culture and the new, dynamic lifestyle that is taking over the world is steadily growing. Despite this chasm, it is still hard for a young person to make the decision to steer clear of higher education. It isn't easy to go against the grain, it isn't easy to disappoint parents and teachers, many employers still demand a diploma, and many young people are more than happy to take the pleasant break from life promised by the student experience after high school and/or military service.

Social change takes time, particularly when the convention in question is so rooted and so sacred, and it requires a continuous increase in the legitimacy of the alternatives. This increase is happening. Articles which addressed problems and challenges in higher learning were already being published in the media years ago, but it was rare to find people of high social status who dared to state frankly that it was possible, and maybe even desirable, to toss academic degrees aside. In the last few years, this taboo has been broken. One of the first pioneers to voice this new opinion, if not the very first, was the successful entrepreneur and philanthropist Peter Andreas Thiel, who founded PayPal with his partners in 1999 and ran the company until its 1.5-billion-dollar sale to eBay in 2002. After the sale of the company, Thiel concentrated on various philanthropic efforts, expanded his public and political activities, and became one of the most out-of-the-box speakers in the United States. Together with David Sacks, he published a book criticizing the trend of political correctness and identity politics in academia, which naturally provoked a storm of controversy.

In spring 2012, Thiel was invited to teach a course in entrepreneurship at the University of Stanford. A dedicated student by the name of Blake Masters wrote down the main points of Thiel's lectures and added his own remarks, which, in collaboration with Thiel, eventually became the best-selling book *Zero to One*. The book was intended as a guide for entrepreneurs, and one of the literature critics of the *Atlantic* said that it "might be the best business book I've read" and that it was a "lucid and profound articulation of capitalism and success in the 21st-century economy."[1186] Thiel's worldview, with its "cut the bullshit" spirit, is what allowed him to become the first maverick among senior business executives to publicly decry the inflation of academic degrees. He claimed that the United States had imprisoned itself in another economic bubble—the "bubble of higher education." And because it is a bubble—just like the real estate bubble—it is expected to burst at some point, and bring about a mass collapse with dire ramifications.

In 2010, this outlook caused Thiel to establish a unique foundation—the Thiel Fellowship, whose goal is to grant scholarships, $100,000 apiece, to talented students under the age of twenty-three who would rather establish new business initiatives than go to college.[1187] "I feel I was personally very guilty of this," Thiel has said on the subject of higher education. "You don't know what to do with your life, so you get a college degree; you don't know what you're going to do with your college degree, so you get a graduate degree. In my case, it was law school, which is the classic thing one does when one has no idea what else to do. I don't have any big regrets, but if I had to do it over I would try to think more about the future than I did at the time... You cannot get out of student debt even if you personally go bankrupt, it's a form of almost like indentured servitude, it's attached to your physical person for the rest of your life."[1188]

One of the first winners of the scholarship was a young man named Dale Stephens, who did not study in high school but rather at home, and who dropped out of college behind after a brief period of study. During a conversation with a friend about the disconnect between academic studies and "real life," the idea for the site UnCollege popped up in Stephens's mind.[1189] The idea quickly became a reality, and the site, founded in 2011, has offered forums and workshops for the acquisition of useful skills ever since. That said, the central importance of the site is primarily symbolic and ideological. The apt, provocative name—UnCollege—does part of the work, and so do the principles articulated on the website. Some of the claims written on its About page:

- Many people pay too much for university and learn too little.
- You can get an amazing education anywhere—but you'll have to stop writing papers and start doing things.
- You need an excellent education to survive in a world where 50% of the population is under 30.
- Subjects taught in traditional universities are often contrived, theoretical, and irrelevant, promoting conformity and regurgitation rather than innovation and learning.
- You don't have to decide what to do with your life at age 18.
- You can contribute to society without a university degree.
- You cannot rely on university to give you a complete and relevant education when professors are often more interested in researching than teaching.
- If you want to gain the skills requisite for success, you must hack your education.[1190]

In this way, UnCollege dared to say clearly and publicly what in the not-so-distant past had barely been whispered in secret. Not only that, it was built with the funding of a man who had learned and taught at the very best academic institutions, made a fortune in start-ups, and become a well-respected personality.

The site's message has not been unusual for a long time. To figure out just how much harsher and more widespread the criticism and doubts regarding the benefit of academic study have become, all you have to do is look at the number and content of online publications on the subject. For instance, a Google search for the phrase "why you should not go to college" yielded two hundred and thirty thousand results in late 2019.

Another sign of the transformation in society's view of academic study is the change in the figures whom the media chooses to label as "successful." These days, it is increasingly common to see gushing profiles of successful people who "made it" in a major way despite—or because—they gave up on an academic degree or started their studies, grew disillusioned, and dropped out. Headlines in the style of "No Academic Degree, But Billions in the Bank" are already a matter of routine.[1191] If the pantheon of success stories who did not finish a degree once mainly starred luminaries in the field of high-tech, such as Bill Gates, Steve Jobs, or Mark Zuckerberg, figures in music, culinary arts, fashion, tourism, and other fields have lately begun to join them.

The message of these articles is that if you have been gifted with creativity, perseverance, instinct, diligence, and dedication, you can also succeed without formal education. While your friends waste their time on uninspiring classes and sink deeper into debt, you can enrich your professional knowledge and your experience, build a network of connections, learn about the potential market, and focus on the areas in which you truly excel.

In conclusion, we can expect that the voices calling to move past the academic degree will continue to grow louder. The trend will become so overwhelming that at first, it will successfully define a degree as only an option—and after that, the lesser of the options.

8

Liberating the Arts

The Crisis of the Humanities

It's Harder for the Soft Sciences

The humanities are the fields of study focused on society, culture, and the human spirit. In principle, they rely upon qualitative methods of research, such as archival work, face-to-face interviews, field observations, and interpretations. Based as they are on a weaker empirical foundation than that of the exact, natural, and engineering sciences, they are often referred to as the "the soft sciences" (in contrast with the "hard sciences" or the "pure sciences"). This cluster usually includes the faculties of the humanities, social and behavioral sciences, arts, education and law—which often include philosophy, history, classical studies, literature, local and foreign languages, cultural studies, religion and gender, archaeology, regional studies (Middle East, East Asia, Africa, and so forth), artistic research (current and historical), psychology, economics, anthropology, sociology, political science, international relations, communications, education, teaching, and geography.

The disciplines that comprise the lion's share of the humanities are also known as the "liberal arts." The term comes from the ancient Greco-Romans, from a time when the liberal arts were considered the underpinning of all the knowledge of the free citizen—in other words, those citizens who took part in public debates, defended themselves, and served in a court of law (either as judge or juror) and in the army. The *trivium*, as it was known—the familiar word "trivia" is derived from the Latin word—consisted of three spheres of knowledge: grammar, or the art of language; rhetoric, or the art of persuasion; and *logicae*, or the theory of logic. The curriculum was expanded by cathedral schools and monasteries during the Middle Ages to include an additional four fields, which were then called the *quadrivium*: arithmetic, geometry, music, and astronomy. In all, there were seven core disciplines, which were perceived as shaping a moral individual, virtuous, knowledgeable of the world and able to articulate himself at a high level. Later on, the term took on an additional meaning—the sciences that liberated individuals from prejudice. Today, the term refers to the core areas of knowledge, such as history, languages, and literature, which enrich students' general education in place of providing them with qualifications, employment or trade.

Despite the fact that academia as a whole is in the throes of a severe crisis, no doubt the humanities (from here onwards we will be using the term humanities to refer primarily to the liberal arts and the social sciences) are bearing the brunt of it. This field also generates an exceptionally large proportion of comments, publications, and discussions from myriad angles. Merely typing the words "decline of the humanities" in Google yields over one million results. The considerable public attention lavished on the discipline is the result of a number of factors:

- In the past, the humanities were held in high esteem, a sign of the wisdom and creativity of humanity. In the collective consciousness, the concept of education is associated with the greatest philosophers of the times, and so the crisis in the humanities is also perceived as a crisis of the human spirit.
- The humanities have fewer ways to generate income for universities compared to those across the hall in the "hard" disciplines, and naturally, when economic times are rough, they draw most of the fire. Many institutions of higher education already perceive their humanities researchers as parasites, and administrations are parching departments by terminating academic positions and stifling budgets. Governments also play their part in the suffocation of the humanities. Although a funding crunch is never explicitly announced, it is implemented through budget formulations which favor the STEM disciplines.
- The politicization of the arts is another reason for the intense public interest in the crisis currently engulfing the humanities. This will be touched on later.
- The humanities are where the decline in demand for higher education has first reached critical levels in several disciplines and institutions. This has

necessitated drastic measures, including merging departments, and in extreme instances even closing them down, as well as the significant reduction of academic positions. In the past, boarded-up departments tended to be small in terms of the number of faculty members, areas of expertise (mainly specialist departments such as Assyriology, Semitic linguistics, or African, Russian, Greek, French, or Eastern European studies). However, larger departments are now being shut down more often, and at times, even entire faculties.[1192]

Japan is an extremely interesting example in this regard. In 2015, the Minister of Education there sent a letter to the 86 state-funded public universities (as opposed to public urban universities), asking their respective deans to concentrate studies in those fields that are better suited to the needs of the nation. This, he proposed, should be implemented by curriculum changes in social studies and the liberal arts, and, if all else fails, by closing down "redundant" departments. The request came as part of a broader effort by the Japanese government to stimulate practical, professional education, and was also related to economic pressures felt by Japanese universities, forced to operate with low admission numbers due to low birthrates among the Japanese. Although the Japanese Council of Education did strenuously object to this request, and even expressed concern for the future of the liberal arts in the Land of the Rising Sun, a survey conducted among deans of Japanese universities found that only three out of 60 of the institutions with humanities departments reported an intention to ignore it. 26 of them lost no time taking steps to comply with the request.[1193]

In 2018, the University of Wisconsin-Stevens Point, in the United States, announced plans to terminate several departments, among them geography, geology, French, German, art, and history. This symbolic step sparked a heated response, covered by the *Atlantic* in an article headlined "Why the Liberal Arts may not Survive the 21st Century." The author, Adam Harris, a staff writer at the *Atlantic*, provided a summary of the issue: "The national conversation around higher education is shifting, raising doubts about whether the liberal arts—as we have come to know them—are built to survive a tech-hungry economy."[1194]

Empty classrooms in humanities faculties provide a glimpse of the future awaiting the remaining sciences, and put a fine point on an age-old question: Does academia have a moral or ethical educational mission? And if it does—should the public be funding that mission?

The Diminution of the American Mind

Demand for the humanities varies between countries and institutions, and between one field of study and another, but, as we have shown, recent decades have exhibited a generally declining trend. The most comprehensive data on this issue has been published by American researchers, who naturally focus on the United States. Nevertheless, the American education system sets the tone for the entire world, and this data provides an excellent barometer for general trends the world over.[1195]

At the close of the Second World War, with patriotism at its zenith, demand for the humanities was peaking as well. However, anti-establishment protests, which began sprouting up in the late 1960s, tempered that rise. From the 1970s onwards there was a gradual, but discernible, drop-off in the number of American students electing to specialize in the discipline, and this decline only accelerated in the wake of the economic crisis of 2008.[1196] Many attributed this downtrend to the economic hardship, during which people tend to put considerations relating directly to their livelihood above all others. But if anyone held any hope that trend lines would realign once the global economy recovered, they were in for a rude awakening. Demand for studies in these fields continued to plummet. Between 2012 to 2018, American humanities departments suffered an average decline of 25%. Departments which did not belong to humanities faculties, such as sociology, education, and political science, were victims of a similar decline, from which not even the prestigious research universities were immune.[1197]

The toughest blows were absorbed by disciplines which, for many years, had been the fields most in demand: philosophy, history, English, literature, and foreign languages. Furthermore, in disciplines such as history or English, which in the past had attracted their share of outstanding high school pupils, demand dropped by 50% over a decade (between 2008 and 2017).[1198] In fact, only very few young Americans now believe that the study of humanities will end up proving useful to their lives. Furthermore, a significant number of prodigies highly suited to these fields are staying away. The only subjects that have experienced immaterial damage, and which for a time were even expanding, have been cultural studies, gender studies, ethnic studies (by virtue of their increasing sociopolitical relevance), and Asian studies (in the wake of the rapid rise of China and the Asian Tigers).[1199]

No less embarrassing than this desertion of the humanities is the fact that many of those who do study them end up regretting their decision. A survey conducted in the United States among a representative sample of around 90,000 graduates of the humanities found that almost half of them (48%) would have chosen another field had they been given the chance to do it over again.[1200] And as if this were not enough, the declining appeal of the liberal arts is also reflected in the relatively low demand for online courses, compared to other fields of knowledge.[1201]

The plummet in the demand for the humanities in Israel is interesting and especially symbolic of the spirit of our times, especially when contrasted with the immense popularity they enjoyed in the early decades of Israel's existence. From 1985 to 2017, the number of students applying to study in humanities departments fell from 23% of all students to 8%. Some departments have experienced truly dramatic declines. For example, between 1997 and 2017, departments of Hebrew literature saw 74% fewer applicants, Hebrew language 60% fewer, Jewish history 56% fewer, land of Israel studies 37% fewer, and archaeology 31% fewer. It's important to note that these subjects were once the most prominent and popular in Israeli academia, and a source of pride for many institutions.[1202]

This declining appeal is also reflected in the fall-off in demand for teacher training in various fields of the humanities, to the point of a conspicuous lack of teachers in subjects such as Jewish studies, linguistics, Bible studies, Talmud, Jewish thought, literature, history, and Arabic studies.[1203] (The severe shortage of teachers is indeed relevant to all subjects and closely tied to the low pay and lowly status of teachers nowadays, but it is especially prominent in the humanities.)

Some explain this decline in demand in Israel as a result of new regional and private colleges, which have sprouted up all over the country and do not house liberal arts departments, only social sciences. Yet, it is doubtful whether a drop of dozens of percentage points can be attributed to that alone, particularly taking into account the fact that a large proportion of university departments have lowered their acceptance standards to match those of the colleges.

A Cry of Bloody Murder Born of Denial

It is hard to come to terms with these figures on the demand in humanities departments, and the phenomenon has forced academic institutions to take action all over the world. On a practical level, the most common response has always been, and still is, cost-cutting. In other words, so long as the lights are still on, they continue attempting to streamline operations and minimize the square footage they require, but all within the framework of the old system. Those in more advanced stages of their career tell themselves, "Let's pass the time until retirement—and then it becomes somebody else's problem!" Younger professors, who are barely making it as it is, avoid making waves because the alternatives awaiting humanities researchers outside academia are no more appealing. At the same time, institutions of higher education are marketing the same tired old goods in new and improved packaging. For instance, "performance studies" instead of "theater studies"; "cognitive sciences" instead of "psychology and neurology"; or "multiversity" instead of "interdisciplinary studies" or a general B.A.

The most amusingly pathetic example of this forced labeling is the trend known as the Digital Humanities. It was created towards the end of the 1990s and was at first termed "Computing in Humanities." The basic idea was to add some sparkle to the humanities' cobwebbed reputation, which appears to be literally stuck in the Middle Ages while all other disciplines have passed them by. The digital rebranding serves as a sort of proud statement, or perhaps a more accurate term would be marketing: We don't just analyze bits of crumbling documents, we also use advanced computer programs.

However, surveying papers and books explaining the term Digital Humanities (including its Wikipedia entry)[1204] makes one wonder: What exactly is so novel here? After all, hasn't everyone been using digital tools for ages, without announcing it to the world and without changing generic names? In fact, instead of presenting these departments as modern, and showing off a new strength, it makes them seem weak and digitally illiterate. Those who flaunt this rebranding can be likened to the *nouveau riche* who openly parade their brand-new status symbols, and in so doing only emphasize their differences, their feelings of inferiority, and the difficulty they have blending in. The new title "Digital Humanities" looks like naming the watching of cable or satellite television "digital watching."

At the same time, the humanities are trying to convince potential customers of the quality of the product (for example, graphs showing that humanities graduates also find employment).[1205] Other attempts to win over customers include tasting menus and discount vouchers. Stanford University, for example, where demand in the humanities has plummeted by 14% over the last decade, has sent out letters and leaflets to outstanding high school students with the hope that this will motivate them to apply; allowing them to take courses in the humanities already by the 12th grade.[1206]

Many institutions try to boost demand in the humanities by administering more practical courses and workshops,[1207] expanding the offering of elective and enrichment courses, and creating study plans combining a number of courses and programs. In Israel, the Council of Higher Education initiated a 5-point plan in 2014 to resuscitate the humanities. It included everything but the kitchen sink: establishing a motivational foundation to distribute research and study grants; increasing the budgets received by universities for each undergraduate student; collaborations between humanities departments and cultural institutions, to allow students to acquire employment experience; reinforcing ties between institutes of higher education and high schools, including the development of programs to expose and motivate students to write their graduate papers on topics in the field; and launching a learning program to encourage teachers to visit libraries and museums, exchange ideas on teaching methods, and share insight and materials with colleagues. But as expected, none of this really helped. The key got lost somewhere else, and looking under these lights isn't going to work. The irony is, high schools are also seeing drops in the number of students majoring in the humanities.[1208]

At the same time, and as part of their attempt at survival, an uncoordinated campaign by faculty members around the world took off. In interviews, papers, and books,[1209] they swore by the importance of saving the humanities, along with apocalyptic warnings that their demise would lead to a social catastrophe. These were the essential main points:

- Science is a completely interrelated system, like the axles and wheels of a machine. Each field is related to the other, and feeds off and fertilizes it. Therefore, the extinction of one field may upset the balance and lead to a devastating chain reaction, just like the extinction of species in nature, which disturbs the existing balance and leads to damage up and down the chain.
- Experimental scientific research in many fields overlaps with ethical and moral aspects—for example, in the study of sustainability, food, medicine, or education. Without addressing life's most far-reaching questions, the smaller, more practical questions cannot be properly addressed, since these are all interwoven. Furthermore, at a time in which computer sciences and biology are breaking new boundaries and coming up with things that were considered pure fantasy not long ago, ethical, moral, and spiritual checks and balances are required. One could say that the hard sciences are leading us towards a new future, while the soft sciences are meant to keep their feet on the ground of conscientiousness and humanity.

  The strengthening of the neoliberal economy clarifies the importance of the humanities as the last beachhead before institutions of higher education are transformed into entirely commercial organizations. The surrender of the humanities is commensurate to a final acquiescence of the traditional goals of academia, which will lead to being swept away in the murky waters of material culture, in which spirituality is no more than (inexpensive) merchandise changing hands.

  Prof. Paul Krugman, winner of the Nobel Prize for Economics, published a column in the New York Times in 2009 which claimed that "the economics profession went astray because economists, as a group, mistook beauty, clad in impressive-looking mathematics, for truth."[1210] Since then, calls for the revitalization of curriculums in economics and business management to include models and theories which do not conform to the neoliberal approach have grown. Gary Morson's and Morton Shapiro's book *Cents and Sensibility: What Economics Can Learn from the Humanities* was devoted to an analysis of the significance of the dialogue between economics and the soft sciences. The authors argue that it is impossible to solve ethical problems using economic tools. People need the "spiritual" sciences alongside the "pragmatic ones," much as they need air to breathe and food to eat in order to survive. They are not machines that can be calibrated, and social behavior is not always rational or coherent. The bottom line is that the economy is a thicket of human dynamics, and to understand how they function, one must understand, and tell, human stories. Therefore, in the absence of social sensitivity and empathy, economic theory cannot be implemented. One example cited by Morson and Shapiro is the economic crisis of 2008, which they view as a result of the defrauding of bank customers and of values of greed and covetousness which reached poisonous heights.[1211]

- If the humanities are to be sacrificed on the altar of practicality, usefulness, profitability, and the "here and now"—it will become the first link in the chain that drags down the human spirit into a robotic, soulless world devoid of any significance.[1212]
- The humanities play an indirect and central role in training employees and managers, by imparting language and rhetoric skills, psychological understanding, and basic historical and cultural knowledge. They also develop general skills such as critical and abstract thinking, meta-cognition (thinking about thinking), and creativity and learning (such as reading complex texts, creative writing and content presentation). The humanities stimulate curiosity and cultivate the abilities to ask questions, express clear and well-reasoned ideas, and to argue a point.[1213] It is hardly surprising, then, that many schools of business administration, medicine, and engineering also incorporate studies of the liberal arts.
- The role of the humanities is to document, research, and preserve the legacy and assets of humanity—global, national, ethnic, and religious – and it is these assets and this legacy which are at the foundation of human civilization. Without a common history and culture to tie us together, and without the ability to separate the wheat from the chaff, the special from the ordinary, the profound from the shallow—the future is undermined as well.

- As human communication turns increasingly audio-visual, the need is arising for scientific guardians of the written word. This is likened to the need for archives to preserve a hard copy, even in an era when data is now based on bytes. In other words, the humanities are the hard copy version of human civilization.
- The desertion of the humanities is a symptom, and not the actual illness, which is society's affliction with superficiality, vulgarity, incoherence, populism, materialism, greed, hedonism, worship of kitsch, and addiction to instant gratification. Instead of addressing the causes, it's easier to get rid of the symptoms, but this is no remedy. The humanities are the last line of defense against these ills. Eliminating the humanities is like taking out your liver to fight alcoholism.
- The humanities are the primary laboratories manufacturing the vitamins and minerals of democracy. Their extinction would impair human sensitivity, openness between individuals, and the foundational values of equality, human rights, and respect towards one another. It is no accident that the humanities are inconsequential, or entirely absent, in totalitarian states. Especially at a time in which the extreme right is rearing its ugly head and fake news is becoming a pandemic, the humanities, bestowing and blessing doubt and criticism, play a crucial role in democratic societies.

    Famed philosopher Martha Nussbaum of the University of Chicago, the recipient of 40 honorary doctorates, is of the opinion that the future of democracy is hanging by a thread. In her book *Not for Profit: Why Democracy Needs the Humanities*, she compares the crisis of the humanities to a cancer spreading through the body. She argues that if we continue suppressing the cancer and insisting on an attitude of business as usual, we are liable to raise a young generation that is spiritually and morally impotent. Without the humanities, she writes, we will lose Socratic questioning, the ability to collaborate (mainly between civilizations and societies), and the ability to criticize our leaders. We would be unable to step into someone else's shoes and understand his or her thoughts, aspirations, weaknesses, strengths, and pains. We would become devoid of human sensitivity, which is at the very core of community, and would instead be sucked into self-centered limbo. (It is worth noting that her book was originally published in in 2010, before social media became such a sweeping cultural phenomenon.)[1214]
- In the era of the multicultural melting pot, the humanities play an important role by teaching tolerance and acceptance of the other. It is well-known that one source of social tension is sociological ignorance. If we aspire to a

world of peace, acceptance, and respect, it is important that young people be imbued with a foundation of cultural and historical knowledge.

- There is no creation without interpretation. Therefore, the demise of the humanities would also be liable to jeopardize various types of art. The humanities have preserved and resuscitated fine arts and various crafts through the ages, and without them they might vanish and end up forgotten. Moreover, when technology creates an explosion of stimulation, which leads to a sort of exhaustion (how many songs can we even come up with?), we will need fields of study that will try to develop new creative, expressive, and thrilling horizons.

The arguments in favor of study and research in the humanities indeed carry considerable weight. No one doubts these disciplines' importance and indispensability to the human race. They do indeed address fascinating topics which are thrilling, thought-provoking, pleasing, painful, and awe-inspiring, and enrich our lives in myriad aspects. But these claims are missing the main question: Is academia in this day and age the most suitable framework for the study and research of these fields? The answer is evidently "no," for the following reasons:

- **The emergence of quality alternatives.** The market for science and learning is replete with strong competitors to classic academia, from public and private research centers, to trade schools (for tourism, curatorship, museology, communication, art, writing and editing, and more), all the way to companies offering courses and lectures on these subjects.

  Unlike the empirical sciences, which require state-of-the-art laboratories and technological tools, the study of humanities can be conducted independently—without special equipment or resources. Indeed, there are endless self-proclaimed researchers, collectors, and preservers (some of whom do it as a very dedicated hobby) alongside associations and nonprofits—both public and private—of researchers, museums, municipalities, and others. This may be a society of car collectors, a group of medieval history fans or Victorian clothing, or a community of architecture or ethnic kitchen enthusiasts who go on exploration tours or conservation projects. They do it with enthusiasm, passion, and exhilaration, and very often at a high professional level. Individuals and social organizations of this sort develop their own platforms for publishing and sharing new findings and ideas. Unlike academics in the humanities, who often live in a bubble, they are mostly looking for public discourse.

Once the practice of the humanities is unshackled from the academic framework, it will be able to flourish in infinite formats and collaborations. Research fields will also be allotted appropriate dimensions in terms of variety, focus, and resource allocation. Moreover, digital technology, alongside the rise of leisure and entertainment culture, will, with time, strengthen the tools and possibilities available to the wider public to gain exposure and contribute to these fields.

- **Passing on talented free agents**. Aside from a few exceptional cases, academia has not granted many tenured positions to prominent intellectuals, such as authors, poets, publicists, and artists. This has been a thrice-missed opportunity: First, employing them might have provided a shot in the arm to the humanities. Second, it would have elevated the status of the humanities, and third, a large share of artists and philosophers are barely surviving financially, and society, which has forsaken them, "owes them." And that goes double for humanities researchers, since most faculty members can sustain themselves on their works and musings. One can easily find a member of a humanities faculty in every country who enjoys a fat check while no one has ever read their writings, while influential and prominent philosophy giants have trouble making ends meet.

  One can of course claim that each is responsible for his own fate, and that the door is open for artists and philosophers to choose an academic path, but such a choice, which would force them to concern themselves mostly with research, would not allow them to make time for their important works of the spirit.
- **Neither quantitative nor qualitative.** The humanities, which are qualitative in method, were envious of the quantitative sciences and made an attempt to copy them, mostly by making use of statistical tools. But they ended up neither here nor there, with quantitative study which hardly scratches the surface, and without the relative advantage of profound qualitative study.[1215]
- **The end of the era of paternalism.** The idea that the state should provide its citizens with education even once they have matured and are no longer children constitutes an archaic, paternalistic approach. In our times, we have nearly unlimited access to information, and anyone can choose how and using which tools to educate himself. It's important to note that interest in the social sciences only increases as a result. Social networks create a vibrant market for the exchange of intellectual ideas, and panels on matters of logical basis, ethics, politics and more rumble from every which way. When the floor is open to all, (academic) mediators of the liberal arts are no longer required.

- **The pot calling the kettle black.** The laments of representatives of the humanities that the field is being drained dry are both hypocritical and sanctimonious, because in many ways they themselves are responsible for the draining of their discipline by barricading themselves in their ivory towers.[1216] A significant share of the writing is inaccessible, often addressing marginal and even bizarre topics unrelated to the current public debate, and they discourage the publication of macro-studies or books. It has been said of the humanities that they act like a "delicatessen owner who sells rancid meat and then blames his business failure on the vulgarization of customer taste."[1217] And most of all: The politicization of the social sciences has pulled the rug out from under the feet of the claim that they provide a general education. A large share of the public is of the view that for years now, humanitarian and social sciences courses have served an extreme and in-your-face pseudo-humanitarian political propaganda, which seeks to undermine the very foundations of society and should therefore not be propped up by public funds (we will expand on this later in the chapter).

  Even the claim that the social sciences allegedly bestow thinking skills is an exaggeration, since this is, if it exists at all, a byproduct. If indeed it was the goal, liberal arts faculties would not adhere to the traditional system of degrees according to subject. It is actually because the liberal arts are unable to offer a professional degree that students should be offered a multidisciplinary education, which opens horizons and allows people a taste of various fields. In reality, most courses are focused on some fly on some nose, and are therefore both tedious and ineffective. Reading materials are clumsily written and can barely hold the attention of the few obsessive individuals. Beyond this, the syllabus studied in the social sciences is no less harsh than that of the hard sciences, includes fewer foundational courses, and is mostly based on the interests of lecturers. Even core subjects, necessary to understanding any type of society, are barely taught in many cases (for example, world history, philosophical theory, or social psychology). Although there are institutions around the world offering core-based courses (for example, reading international canons and masterpieces), these are mostly elective courses.[1218] Exceptions in the academic landscape are Columbia and Yale Universities, which require students to devote a third of their undergraduate courses to "core curriculums." These include subjects such as general history, great literature, and art, and are considered as a complementary alternative to the professional training which characterizes worldwide academia.[1219] However, this is a limited form of general education, because it is not based on a deep understanding of what constitutes "core" in our days, and especially what is truly required, and can be read and understood, in the digital age. In fact, this program marches in the old, familiar aristocratic path of a classic, and essentially conservative, liberal education.

- **The fall from grace of the scientific text.** The first scientific publications appeared in England by the 16th century, but it was only in the latter stages of the 19th century that scientific literature became an integral part of academic culture.[1220] By the mid-20th century, the development of scientific publishing complemented the rapid expansion of higher education systems around the world, but since then the academic publishing industry has gradually marginalized scientific books.

  There are still prominent publishers of academic literature, with a hefty market share (Oxford, Cambridge, Peter Lang Publishing, Rutledge Books, and others), but generally this market is more decentralized than that of journals, since more than a few universities operate humble book presses of their own.[1221] Books on scientific subjects are published by non-academic publishers as well, for the wider public beyond the scientific community. Many have even gone on to become bestsellers, breaking through the boundaries of scientific debate and granting their authors a public aura beyond the academic. Prominent Israeli examples include our colleagues': history professor Yuval Noah Harari's *Sapiens: A Brief History of Humankind*, or behavioral economics professor Dan Ariely's book *Predictably Irrational.*

  However, over time, the aforementioned decline in the prominence of books proceeded in science in general and in the social sciences specifically, because:

  - Unlike papers, books are not ranked according to the number of times they have been cited, a term known as a paper's Impact Factor. Although there are a few ranking lists here and there, mostly sponsored by the larger publishers or daily papers, and only based on sales, they are not regarded much.
  - Books do not constitute an important component in the ranking of institutions, and are compensated less than papers according to governmental budgetary models. Therefore, institutions encourage their faculty—especially the more junior ones—to publish more papers and fewer books.[1222] The temptation to publish books is gradually decreasing also because books contribute less to personal advancement up the hierarchy. A study published in 2017, for example, found that nearly 70%

of researchers publishing academic books on the social sciences and liberal arts are by then in the advanced stages of their academic career.[1223]

- The share of books out of all scientific publications is steadily declining. Institutions of higher education find it more difficult to subsidize publishers, and academic libraries purchase fewer books,[1224] just as bookstores are also gradually disappearing and a book's shelf life grows shorter.[1225] The bottom line is that it is tough these days for traditional scientific publishers to survive financially, and authors are forced to fund, partially or even fully, the production of most of their books.

The consequences of the book's loss of luster—on science in general and the social sciences especially—are severe. To start, researchers of macro trends (for example, a study of a wide-reaching social phenomenon, or of extended historical periods; writing on topics which require knowledge and understanding of a variety of fields; research which requires the collection and reading of a large number of documents) are impaired, leading to the elimination of an important and rare type of researcher, who up until just a few years ago was at the forefront of the social sciences. Naturally, writing a book is founded on extensive research and involves a long and grueling writing process. It necessitates wide horizons, creativity, and high skill levels for processing and combining materials. The cause and effect is the increase in the number of "technicians of science," who lower the level and reputation of science in general, and specifically of the social sciences.

Second, the public influence of the social sciences has been lost and they are removing themselves from the public debate. If a young scientist has no incentive to write a book, how exactly will he or she leave a mark? Furthermore, the fact that institutions of higher education prefer that publications be made in English rather than in the local language, increases the disconnect from the immediate audience, the important one, the one that might respond and who funds their paycheck.

The decline in the status of books is undoubtedly related to large-scale social and technological trends, but it is at this of all times that one would expect the social sciences to commit to keep least some of the fire burning, as the last line of defense. In reality, not only have they aligned themselves with the commercial rules of the game, they have also let the digital revolution pass them by and have not established open platforms for scientific books, which would have expanded the spectrum of writers and readers while also saving costs.[1226] Although some attempts have been made to electronically publish scientific books,[1227] these have remained on the margins and have not engendered a new trend.

Even the idea of self-publication, using platforms such as Amazon, has been missed by academia, due to their persistence on the traditional reviewing process, that long and pointless process which quells one's desire to write. Instead of allowing scientists to control the process of production and timing of publications (data shows that from the moment a scientific book is sent to a publisher until it is printed, one year and even two have usually gone by), and instead of allowing readers to judge the product and determine its quality – academia continues to stick with old habits.

Why Did Students Stop Showing Up?

In the heat of the attack on the humanities, some extreme and baseless criticisms have also been heard. But in this debate, it doesn't matter who is right, because the fact is that the social sciences are hemorrhaging students. There are probably good reasons for this, born out of the changes in the spirit of the times on the one hand and the paralysis of higher education on the other:

- **What's in it for me?** The West's younger generation, raised in an ultra-consumerist world, is, more so than previous generations, driven by material considerations, and is therefore less inclined to select studies with limited employment and income potential.[1228]
- **Wide horizons are not a big deal anymore.** In the past, an education in social sciences was considered a symbol of status. Prestigious institutions required that students take not only difficult base courses in philosophy, history, and literature, but also Latin, and adopt gentlemanly manners and status-appropriate mannerisms in dress and language. In a post-status world, in which education is open to the masses, schooling of the rich and privileged is no longer a thing. Oxford University is one of the only schools still offering a degree in Literae Humaniores, the classic interdisciplinary studies, which include literature, history, philosophy, languages and archaeology of Greece and Rome, and more. But there as well, this degree no longer attracts the elite, not even the British elite, and studies there are less demanding than before.[1229] As we know, being rude, demanding, and outspoken, when presented as honesty and authenticity, are more important to success in the Age of the Reality Show, than politeness, refinement, and wittiness.
- **A degree for the weak.** The desperate competition for every student has led many social sciences courses to lower their admission standards and accept

students they would not have in the past. Many young people view the social sciences as a default option, leading to damages of double and triple proportions: Not only are courses losing students of a high quality, but most of the students that do attend are not interested in the material, and are mostly there to obtain a degree with ease.[1230] Naturally, since students are at such inferior levels, so too do the requirements fall, and with them the image. A caveat: Philosophy is considered the exception in the humanities family, since it attracts more than a few curious younger people who are lovers of debate, logical thinking, and solutions to tangible problems. It is no coincidence therefore, that the average grades among philosophy graduates in admission studies for a master's degree in the U.S. (GRE, LSAT, GMAT), are among the highest of all graduates of all subjects. Studies have shown that their average paycheck is highest for non-STEM courses.[1231]

The vulnerability of the liberal arts is also demonstrated by the profile of its lecturers. If in the past, professors of the social sciences were considered liberal arts giants, today many courses are being taught by temporary and random professors who come and go. A glimmer of hope has perhaps appeared recently. With an academic degree becoming more common and less distinguishing in general, the value of the exceptional rises. Job recruiters, inundated by resumes that may as well have been cloned, are looking for something else beyond the usual suspects—for example, an outstanding student who has decided to study foreign languages, ancient Assyrian, or Japanese studies, out of an assumption that anyone who decides to specialize in such an unusual field is intelligent to start with.[1232] In the United Kingdom, for example, many banks have already decided to recruit humanities graduates from elite universities, assuming that these are a select few with highly developed cognitive and emotional skills.[1233]

A 2013 Google study, aimed at evaluating the prominent skills characterizing its best employees, found that a background in the STEM subjects was ranked only eighth. Attributes such as mentoring skills, communication, attentiveness, empathy, solidarity, critical thinking, self-efficacy when dealing with problem solving, and the ability to make connections between complex ideas, all preceded it. As such, their conclusion was to change their policy and begin recruiting humanities graduates as well.[1234]

Nevertheless, this probably does not indicate a trend reversal that will rescue the social sciences from its terminal disease, since only a select few students, mostly concentrated among the prestigious institutions, in advanced degrees, and in a number of especially difficult subjects, select these subjects by choice and not by default. This minority cannot resuscitate the social sciences. Even if the study of the humanities does indeed develop the aforementioned attributes, this occurs indirectly and while valuable time on archaic and tedious learning is wasted. Anyone truly interested has no special reason to pursue them within the framework of an academic degree, in which the irrelevant and tasteless supersedes the essential.

- **A feminine science.** The share of female students and faculty members is higher among the social sciences than in other fields.[1235] This obviously has its origins in cultural traditions, societal balance of forces, and perhaps even gender-related tendencies (women have an advantage over men in verbal expression and sympathy). In any case, what should be viewed as a credit and a badge of honor for the social sciences, is perceived by many people as a negative, i.e., the "feminine science." This tarnishes the image of the liberal arts, similar to what has happened with the teaching profession.[1236]
- **No work in the field.** The amount of time it takes to complete a master's degree in the social sciences is longer compared to the other sciences— which makes the investment in advanced studies an even bigger gamble.[1237] It's too long and does not fit with the 21st-century lifestyle. And as if that weren't enough, upon completing their studies, the chances of being accepted as a tenured faculty member are lower in the social sciences, due to the lack of students and funding. In the past, many qualified graduates in the liberal arts became schoolteachers, but the tarnished image of the education profession, alongside the unappealing wages, have made this option, too, less desirable.

  The disintegration of old media and the book industry has dealt another blow. In a previous age, many of these graduates were employed as editors, journalists, researchers, translators and more, and it's harder to get a job and make a living in these fields nowadays.
- **Why make the effort to argue**? The young generation in the new millennium enjoys a good debate, especially about current affairs, and less about abstract and theoretical issues. They are connected to the Here, to the Now, and to the Individual Me, and aren't looking for revolutions. Many have adopted the pragmatic and superficial creeds of "Each to his own truth" and "Live and let live." They are not drawn to studies which demand independent thought, and are satisfied with "quick fixes." Their parents and teachers have gotten them used to getting everything spoon-fed, preferably chewed up and with a kiss and a pat on the back.
- **The past is the past.** The study of history has always been, and still is, the main anchor of the social sciences, and the crisis enveloping it impacts the

entire tree of the social sciences. Teenagers were never ones to inquire much about the past. A young person looks forward, or in the mirror, and hates memorizing facts. The fact that most textbooks in this field have been written in a particularly non-user-friendly manner has not helped. But unfortunately, history, especially in academia, has become less and less attractive to the younger generation, for the following reasons:

- If in the past historical information was accessible nearly only through books, the Internet is now packed to the gills with such information. A friendly answer can be Googled for any question at any time and from any place, and the need (as well as the motivation) to remember events, places, figures, and theories, or to memorize stories of the past, seems a bit archaic.
- In the age of information overload, people are exposed to an endless number of human interest stories every day, leading to a cumulative fatigue. The orientation of the news also plays a part. People—especially young people—prioritize “hot” stories with an immediate connection to their lives over episodes from the distant past.
- The chronicles of history in the naïve and total age of nationalism were considered near-holy texts. In the age of globalization, most young people in most countries do not perceive nationalism in such hallowed and unsophisticated terms as they did in the past, and their views of history have correspondingly been impacted. Furthermore, they perceive history, especially the more distant parts of it, as a stale story that has reached its conclusion, which is why it doesn’t thrill them as much. You can turn the page or change the channel.
- The historical narrative of previous centuries was primarily based on documents preserved in the national archives. They mostly included minutes from meetings, correspondence, official publications, newspaper articles and a few black-and-white photos. A few journals and personal letters have survived here and there, but they are negligible in number, since people did not tend to write much about their personal lives. At a time in which nearly everyone holds a personal archive of thousands of emails, posts, WhatsApp messages, digital images, and videos, public history seems meager in comparison.

▪ **They totally missed the audio-visual means.** Rigidity, limited familiarity with the computer—very prevalent among the social sciences—and budgetary problems have caused many liberal arts courses to miss the opportunity to leverage classes using advanced teaching and demonstration tools when this was both possible and desirable. It's true that other fields also completely missed the boat of the digital revolution, but it is more critical among the social sciences, and more significant—firstly, because the commercial market is replete with spectacular films, TV series, and channels dedicated to culture, society, and history. And second, because studies of the hard sciences also take place in laboratories, making it a more dynamic discipline, while the liberal arts are almost entirely based on frontal instruction.

- **The art of tediousness.** The reading materials generated by the liberal arts include interesting texts—eye-opening and even poignant—but these are the exceptions. Most of the materials published in recent years on the academic platforms in these fields are poorly written: too predictable, too long, too clumsy, too niche, in many cases basically gibberish and in many more cases inflicted by political bias. That doesn't stop any professor from including them in reading materials. Things aren't much different in classes and lectures. You can still find some excellent professors who are a pleasure to study under, but most produce oral tediousness, unsuitable for the dynamic of enticement common to the digital age. While in academia they have not yet separated the wheat from the chaff, the Internet is exploding with fascinating material focused on a variety of topics. An endless array of articles, portals, lexicons, question-and-answer websites, documentaries, and series summarize basic facts and interpretations for the reader-viewer in a manner much clear and more accessible than is offered by academia.

In his book *The Crisis of the Humanities*, Prof. Yoav Rinon, an expert in comparative literature and classical studies at Hebrew University, writes: "It should be said immediately and wholeheartedly: the change in the academic writing method in the humanities from structuralist ideology to poststructuralist ideology is no less than a catastrophe, since that which is not understood, which until recently was the moral property of literary writing in general and poetry specifically, has become the primary subject of critical writing, whose stated goal is to make it more comprehensible, but in essence maintains and even reinforces it. The most prominent sign of this value-oriented transformation is the rule, in some academic senses almost without limits, of simply poor writing. As if scant and measly writing replenished with a 'thin' title, and therefore a "scientific" one, was not sufficient, we are now sentenced, in addition, to a landslide of ideas that could occasionally be interesting and groundbreaking, were they not halfheartedly worded; words are not carefully selected but just the opposite, spread in nearly endless abundance that is as cheap as it is cheapening; and most severe, the destructive relationship between content and format has transformed the entire debate on values to one lacking in content and weakened the essence of its value-oriented status."[1238]

As math teachers would say: QED. The interesting and amusing element here is that the style of this typical text provides a much more convincing explanation as to the sinking of the liberal arts (and the social sciences as well) than its contents.

A World Without Truth

After the trauma of World War II and the sobering-up that came after it, the liberal arts began an accelerated development. This contributed to the understanding of man and human society, and indirectly, also to the promotion of democratic culture. This progress was mostly represented in the study of man's internal world, his desires and weaknesses, and in understanding the balance of powers and mechanisms of control, social discrimination, and oppression. However, starting at the beginning of the 1980s, the liberal arts changed direction and became colored with a political taint that damaged their credibility and public image.

Before we go on, it's important to clarify a few principles:

- Right and Left, in a political sense, are schematic categories, especially nowadays, and serve as a tool for tarnishing and taunting used by both sides. It is almost inconsequential to say that there is truth on the right, just as there is on the left, with regard to an endless array of issues (defense, economy, education, and more); in fact, truth is almost always somewhere in the middle, far from each extreme.
- Right and Left are political distinctions created and charged in the distant past, when the majority of human society was pretty sharply divided according to demographic, cultural, educational, and economic attributes. The world has changed since then, becoming more multivariate and colorful, and therefore the old sociological catalog has become less relevant over time. So, for example, among Republican voters in the U.S., one can find fervent Christians, the middle and lower classes from the center and the periphery, members of the financial and military elite, and secular professors.

  It is also hard nowadays to distinguish between the left and the right because many people hold split political views: for example, on economic matters, they might be closer to the right flank of the map, and on social or defense matters lean towards the left. This duality is common in academia as well. Many faculty members who support protest movements and civil rights on the left, at the same time also support the process of industrialization and commercialization of institutions of higher education.

The antiquated schematic catalog has also become anachronistic because most citizens of democratic countries are not attracted to the extremes, and possess pragmatic and moderate opinions about most matters. That is also the reason that parties and politicians from the center usually win elections in the West, and that the differences in platforms between the larger parties are negligible.

- The terms Left and Right vary from country to country because they are charged with local historical and cultural significance. So, for example, the distinction between right and left in the United Kingdom (the Tories and Labor) is not identical to the accepted distinction in Israel, which is mostly related to the Middle Eastern conflict. In general, such terminology is these days mostly attributed to the extremes rather than the center, both because the extremes have grown more extreme and because the citizens of most democratic countries possess, as mentioned, dual and moderate opinions.
- The ideals of the Left are fundamentally humane ideals, which emphasize equality of rights (gender, ethnic, religious, and so on); empathy and sensitivity to one's fellow man; restrained use of force, authority, and control; distributive justice; promotion of underprivileged populations; fair competition; sustainability; openness; and pluralism. At the same time, the radical left, the progressive/liberal camp, as it is known in the U.S. and elsewhere, infuriates many due to its simplistic and dogmatic implementation of these ideals, which stretches noble values to an absurd level. Occasionally, this move to the extreme turns the means into a goal, turning it obsessive and grotesque, transforming a positive objective into one with devastating consequences. Furthermore, the liberal worldview, in its extreme version, often serves as a disguise or camouflage of an un-pluralistic and even violent worldview towards individuals or groups (we will demonstrate this in the following pages using the Israeli-Jewish example).

  Sensitivity and a spirit of compassion on the right (nationalistic and/or religious) is also in many cases a thin veil hiding discriminatory and exclusive beliefs (fundamentalist Christian factions are one example).
- Leftist extremism—like rightist extremism or any other extremism—is not a new phenomenon in the history of mankind. The most familiar example is of course that of Russian Communism, which was transformed from the idea of a government of the people to a ruthless and brutal dictatorship. But as we know, extremism always brings along weapons of self-destruction.

Although history never repeats, some older phenomena return in new clothing. The comparison between communist extremism and the extremism of the progressive left, now a favorite of many on the conservative right (for example, Jonah Goldberg's best-selling book *Liberal Fascism*),[1239] is not entirely unfounded but is definitely exaggerated, simplistic, and even dangerous. The extreme left, especially in academia, media, and the arts, has indeed adopted a slightly tyrannical style, represented in its narcissism, division of the world into black and white, witch-hunts, and censorship and stifling of freedom of expression. Nevertheless, the term "fascism," which currently serves both the left and the right, has been cheapened and turned into a far-too-common derogatory term, with meanings that are not necessarily true to its origins.

- Academics, just like in any other institute or workplace, are distributed along the political spectrum. Even if they primarily identify as leftists, that does not automatically turn them into members of the progressive left or radicals. In the absence of accurate data due to the difficulty of quantifying the phenomenon, one can be content with the statement that the radical left has a vocal presence in academia, and that its influence on internal discourse, research, writing, and teaching in the humanities is significant. It is not incidental that this phenomenon has generated an endless number of articles, papers, and books.

Is Everything Relative?

The idea of cultural relativism, developed within modern anthropology, states that every culture possesses a set of values and views of its own, which is why people from different cultures judge the same reality in different ways. Every individual is primed with the value system on which he was raised, and therefore interprets what he or she sees and hears through a selective lens. In order to avoid biased interpretation, a researcher must make every effort to neutralize previous baggage and step into the shoes of the people he or she is trying to understand. Furthermore, since scientific research deals with what we have (facts) and not what we want (values), the study of society must avoid moral judgment as much as possible, and should definitely not patronize the subject of its research.

But unfortunately, what started as a sound approach of humility, conscientiousness, and respect for one's fellow man has, beginning in the second half of the 20th century, taken an unpredictable turn, primarily in the study of history.

For hundreds of years, the acceptable perception was that historical research exposes an objective truth. But the more science developed, the less naïve historians became, and their studies exposed more and more holes, contradictions, and inaccuracies in the puzzles of the past. Concurrently, an acknowledgment grew that historical scientific truth is less stable and definitive because it is dependent on surviving data, or that which is accessible to researchers, and is influenced by cognitive, emotional, cultural, and political noise that the researchers bring from home.

But some philosophers were not content with a note of caution and a softening of scientific pretense, and went a few steps further. They claimed there was no truth at all to the historical sciences, but rather a collection of narratives, full of contradictions and contrasts, not necessarily true or untrue. This approach, known as "postmodernism," pulls the rug from under a long-lasting intellectual tradition, brushes off the traditional role of historical science in determining the judgments of the past, and catalogues it under the same category as literature and art. History is no longer a positivist march to the truth, based on an objective collection of data and free of prejudice, but rather a subjective interpretation of texts and a restructuring of them into an artificial framework narrative, which has been termed "deconstruction."[1240] So, for example, there is no objective history of the Zionist movement, but rather a national narrative structured by Jewish historians through the collection of testimonies (from the Zionist archives, of course) which fit their desired story.

A foundational point must be clarified here. Only the margins of the margins in academia are of the view that the stories told by the science of history, or any other science, are completely random, the fruit of a scientist's feverish imagination. Even the greatest doubters are familiar with solid evidence that is hard to challenge. However, postmodernist academics are characterized by extreme suspicion and doubt regarding historical and sociological traditions. In their mind, there are perhaps a few correct pieces, but putting them together into the narrative we have been raised on is biased due to subjective interpretation, and especially tainted with political interests.

Postmodernists view older historians as mobilized scientists—a tool of propaganda meant to justify and certify the cultural supremacy of the imperialist countries and Western civilization. This idea was somewhat inspired by Marxist philosophers and their Leninist and Stalinist heirs. In their eyes, science—including history, psychiatry, and even genetics—is a collection of bourgeois theories meant first and foremost to preserve class hierarchy.

To emphasize once again: only very few among the scientific community are of the view that science in its entirety is no more than political propaganda meant to maintain oppression and discrimination. Scientists all know that biases and political noise cannot be entirely neutralized in social research. But those of a postmodernist orientation—and they are not a completely marginal minority—are of the view that such biases in science dictate the tone and tilt the balance primarily towards the ruling class, of which academia serves as a branch.

Naturally, the postmodernist approach has earned its share of criticism among academia and the public. But alongside the critics were those who recognized a positive aspect to this trend: First of all, the anti-establishment rhetoric ignited an important theoretical debate in the academic world. Second, it significantly contributed to the development of design, architecture, and art. Thanks to postmodernism, alongside the classical mode—reserved, clean, and methodical, and thus occasionally boring—sprung up a variety of informal, tradition- and template-breaking, eclectic, and unpredictable styles.

This would all be well and good had the postmodernist gesticulating and rhetoric not spun out of control, and had it not blown up in their face and evolved into a much more dangerous trend than anyone could have imagined. These are the substantial criticisms hurled at postmodernism:

- **The complexity method.** Ironically, the camel doesn't see his (political) hump: Many postmodernists tend to see the shadow of a mountain as the mountain, to confuse the victim and victimizer and to paint a conspiratorial, superficial (black and white, good and bad) picture of the forces at work shaping society. This bias is especially prominent in the study of wars, economies, and social gaps. In this sense, postmodernism has laid the foundation for identity politics, on which we will expand in the following pages.
- **Not everything is relative and not everything is made up.** Beyond the logical failure at the basis of the relativist approach (since if there is no truth, postmodernist truth is just as relative as any other truth), it ignores the stores of historical testimony painstakingly collected by a multitude of researchers, which draw up a historical narrative with inherent logic. In other words, yesterday's words are not completely arbitrary. Furthermore, critical discourse (in the sense of a healthy debate concerning facts and interpretations) was and remains an integral part of the scientific world. Not only is ongoing research adding and honing the historical landscape more and more—one pixel at a time—but when errors are exposed, they are usually corrected without bias. And the claim of a "mobilized science" is rather farfetched. Academics in a democratic society are not required to serve the establishment or to censor or revise findings based on orders from above, and many studies in the new era have not hesitated to expose an historical truth that was not flattering to their country or its heroes.

- **The danger of a world without truth**. The social consequences of extreme relativism are apparent far beyond the scientific realm. If all individuals and groups were to have their own truths (including historical truths) the concept of justice would disintegrate—and alongside it authority, security, and social solidarity.[1241] If truth is relative, the evidence and testimony stages of a trial are pointless, as is any search for facts. If justice is relative, there's no point in aspiring to fix the world.
- **Mannerism-packed writing.** As we know, one of the advantages of the soft sciences is that it is easier to tell a story. Not only do they deal with humans and social dynamics, a subject which is always dramatic, but they can even be written in a way that intrigues individuals in other fields. A talented author is often a type of gifted anthropologist, and a gifted anthropologist is often also a type of storyteller. More than a few history, art, and sociology books read as fine literature, and sometimes even as poetry. They summon marvelous metaphors, fascinating comparisons, and rich language for the reader. And still, science is science and not art, and the linguistic wrapping should not replace factual truth.

  The postmodernist trend has changed the rules of the game. A new writing style, supposedly literary-philosophical, has replaced its focused and disciplined predecessor. Long-winded philosophical deliberations and kitschy blather—primarily developed among French intellectual circles (those nicknamed "coffee-house sociologists")—have grown more important than content, and the need to impress has become more important than the honing and clarifying of ideas. As Impressionism has replaced "photography" and ambiguity been welcomed, not only has careful scientific accuracy disappeared, but technocratic academics have barged into the gates of academia, with the aim of publishing hollow pseudoscientific texts.

  The postmodernist style camouflaged itself in obliqueness in order to envelop the liberal arts in an aura of artificial vigor and dynamic wit. Paradoxically, there was nothing fresh there, since with so much nonconformism and pyrotechnics, everyone began to parrot the same terms and the same clichés, in an ambiguous style which frequently covered up a meager message.

  Many were, and still are, captivated by the postmodernist trend, both because of the tendency to confuse ambiguity with profundity (if something is incomprehensible it must be complex), and for the sake of posturing, which allows anyone to produce bullshit and play intellectual. Exactly how many of the academics in these fields are spouting gibberish and obfuscating themselves? Hard to tell, but this is not some marginal trend—and it is especially prominent and overbearing in sociology. The web is full of criticism and ridicule of this phenomenon.

What we find interesting and amusing is that young students and professors automatically adopt these styles of language and writing, and they have become the most familiar attribute of the progressive cult. These texts can be identified almost immediately based on the use of the same meandering and tree-hugging prose, quotes and citations from the same philosophers (a sort of body of village elders), and the overly labored use of such typical terms as narrative, colonialism, defamiliarization, exclusion, mirroring, hegemony, the Other, privilege, minorities, subjects, objects, paradigm, practice, critical, adaptation, reflexivity, epistemology, marginalized, constructed, and imagined.

A symbolic and chuckle-inducing example can be found in a post published in 2017 by a young Israeli professor on one of the discussion platforms for progressive academics in Israel. She wrote, among other things:

"Generally, I conduct myself in the academic political spaces with an attempt to frequently remind myself of the privileges I come with, not always successfully […] In recent years, thanks to a number of female students who were in my courses and were able to mirror me, my eyes were suddenly opened. […] The image put before me regarding the way I speak by a few students, mostly from the Jewish Levant and all college-educated, was important. They mostly addressed my use of the jargon […] and how I take it for granted that they are familiar with the jargon, and how this taking-for-granted is exclusionary. It was an inspiring lesson, they Bernstein-analyzed my practice, and things opened up for me.

From that day on I made a significant change, although not yet perfect, in the manner in which I speak in class. […] When I let something slip, or when use of the jargon is required, I explain the terms I used, but in any case, I hope, in a way that doesn't broadcast that the standard was to know the term, and that whoever doesn't basically needs to be ashamed of himself. And you know what, as we know very well, jargon doesn't always serve the idea and its clarity. At times, it is no more and no less than a social practice of exclusion. […] It is clear to me that to be reflective regarding my patronizing conditioning is important work."

No, this is not a feuilleton. It is all true and entirely typical. It is also entirely amusing, because the lecturer supposedly confessing her exaggerated use of scientific jargon (this is known as "symbolic capital," according to the standards set by the "Holy Scriptures")—which hinders her students, patronizes them, and excludes them—articulates her self-criticism in the same hindering, patronizing, and excluding jargon she claims to have gotten rid of.

The Critical Science Oxymoron

While postmodernists claim there is no historical truth, a new (or rather, old-new) school of thought has come about which claimed that although truth can be exposed (especially the truth of hidden interests), science and scientists must not be content with merely exposing facts.

The term "critical theory" and the ideas it expressed were already in existence by the 1930s within the Frankfurt School, developed by a group of sociologists who refined theories of social analysis inspired by Karl Marx and Sigmund Freud, and which have gained momentum since the '80s, especially in the social sciences.[1242]

"Theory" and "criticism" are two terms that supposedly cannot coexist: A theory is meant to explain reality—in other words, to address that which exists (facts), while criticism is a value-based subjective response dealing with the judgment of good and evil, proper and improper. It is truly difficult to settle this contradiction (which is not a problem for many academics in the social sciences and liberal arts) unless one applies a slightly different meaning to the word "criticism." The idea is that in order to decipher the true oppressive forces at work in society, one must peel off the outer layer on which the familiar theories regarding those forces in society were developed—by the hegemonic classes, obviously—and expose hidden motivations. This is an alternative theory to the establishment one, which therefore indirectly critiques it.

In his famous book *The Closing of the American Mind: How Higher Education Has Failed Democracy and Impoverished the Souls of Today's Students*, philosophy professor Allan Bloom claimed that things started to go wrong in the 1960s, when universities took "the imperative to promote equality, stamp out racism, sexism, and elitism (the peculiar crimes of our democratic society), as well as war." They did this because they assumed that such attempts at social change "possessed a moral truth superior to any the university could provide."[1243]

Bloom was apparently right. From the moment that criticism walked in the front door of the scientific world, which is meant to address that which exists and not that which should exist, an idol was erected in the sanctuary and the oxymoron of "critical science" was born. From here, the path was a short one to the politicization of the humanities and the moral transformation they had decreed upon themselves, which vitally harmed their public credibility.[1244]

The primary criticisms hurled at this phenomenon were many:

- **Sacrificing objectivity.** The critical approach should be commended for exposing the behind-the-scenes of society and culture and analyzing the hidden significance in social exchanges. It's hard to imagine modern sociology and philology without influential theoreticians associated with the critical school of thought, such as Noam Chomsky, Michel Foucault, or Jacques Derrida. But the price was steep. Critical science is similar to a "critical trial." It promotes studies with a political agenda, which destroys the principle of objectivity and turns scientists into lobbyists for the groups on which they are writing.[1245]
- **Simplistic worldview.** The worldview of the critical schools divides society superficially and schematically: On the one side are the privileged, who have obtained their wealth and excess privilege through exploitation and violation, and on the other hand, those with no assets or rights, who have been oppressed through no fault of their own.[1246] But not only is such a worldview blind to human complexities, it also misses primary social phenomena which do not coexist with this dichotomous division (for example, the new middle class or the rise of the moderate New Right). This also gives rise to errors and embarrassing omissions when projecting social trends and processes.
- **Not every leader is corrupt.** The attack on hierarchy wherever it may be, and especially focusing on corruption, violence, and destructiveness among leaders throughout history has created a general contempt for anyone in a leadership position. One is from the start suspected of serving his own agenda, of manipulations, greed, hedonism, and abuse of status, and more often than not, dishonesty.

  This has all made young people today inclined to disregard any authority and be contemptuous of any senior position-holder or governmental representative, and has caused good people to stay away from politics. It does a disservice to good leaders, tarnishes their character, and prevents a profound and fair examination of the complexity of their work. And of course, it disintegrates citizens' affiliation with the collective and the state. Thus, again, what began as an uprooting of prejudice has turned into the promotion of prejudices no less misleading.
- **The world is not that bad**. The superficial analysis of social reality, alongside the emphasis of all that is wrong with the world, lead to an apocalyptic yet empirically baseless conclusion—that the world has deteriorated over time (there are also philosophical issues here, in the definition of good and

evil). In his book *Enlightenment Now,* psychologist Stephen Pinker claims that the state of humanity is improving.[1247] Using facts and numbers, he demonstrated the dramatic upgrade in quality of life in most places around the world. This is exhibited, among other things, in the eradication of lethal pandemics, more efficient diagnosis and treatment of illnesses, a decrease in crime, a rise in levels of education, and the reduction of inequalities between many groups (including men and women). This thesis, backed by the data, obviously did not please the progressive herd (the intellectual mob, as Pinker termed it) who leapt on the sinner in jihadi-Pavlovian rage.[1248] Pinker grew so hated by progressive circles for denying them reasons to moan, blame, and predict ill tidings, that they coined the term "Pinkering" to mean an overly rosy interpretation of the world.[1249]

- **The strong is not always the oppressor and the weak not always the victim.** The excessive emphasis on the element of force, together with guilt over the historical injustice inflicted by the white superpowers, have led to every powerful and successful individual, wherever he may be, to be extemporaneously perceived as a violent abuser, past and present, and the weak as innocent victims. The rich West, according to these simplistic definitions, is neo-colonialist, and democratic culture a camouflage aiding the enshrinement of economic and political advantages. Everything has lost proportion and been radicalized to the absurd, with a grain of truth drowning in an ocean of lies and exaggerations.

  These feelings of guilt are so powerful that they lead critical researchers to ignore the fact that historical and cultural responsibility might also be laid at the feet of the weak. "Nothing is more Western than hatred of the West," wrote French author and essayist Pascal Bruckner in his book *The Tyranny of Guilt: An Essay on Western Masochism.*[1250] Bruckner analyzes how Europeans' guilt over the sins of colonialism, slavery, fascism, and racism have created a perception of the white man as the forefather of sin. In order to amend the sins of the past, they develop an obsession of guilt and self-hatred, leading all the way to a destruction of self-confidence and total loss of optimism.

  This exaggerated, and occasionally exclusive, accusation of the powerful societies, headed by the hegemonic groups—read: rich white men—and, on the other hand, the liberation of the weaker countries from any responsibility for their actions, including violence, oppression, and persecution, does injustice to the truth, prevents a reckoning by the weak as well, and delays the healing process. Furthermore, it is a patronizing view, because anyone catalogued as oppressed and victimized is likened to a child who is not responsible for his actions and granted a moral waiver. It's not him, it's just colonialism, oppression, exploitation and circumstances—a phenomenon known as the "soft bigotry of low expectations."

In the well-publicized book by Palestinian-American researcher Edward Said, *Orientalism*, whose influence on progressive discourse has been immense, nearly nothing was said on the culture of clan and desert in Islam, not to mention its oppressive and brutal treatment of women and minorities, or the patterns of honor and vengeance in Arab society which have engendered mass killing and chronic instability. Any such mention by a researcher or philosopher constitutes libel, with the blame falling only and exclusively on Europeans, who were the victors and had enslaved the Arab tribes. To emphasize again: The long history of racist oppression by Europeans must not be ignored—the exploitation of the naïveté and helplessness of the locals; the nurturing of murderous regimes, by, among others, equipping them with weapons and ammunition and supporting tyrants; and the extraction of resources and raw materials that mostly enriched the powerful countries. At the same time, blaming white European cultures exclusively for the atrophy, violence, and corruption prevalent in Third World countries does a disservice both to the victimizers and the victims.

The alibi provided by progressives for the "victims of the West" is not only a form of reverse racism. It also encourages victimization and prevents a long look in the mirror—which is the key to self-correction and active escape from distress and low self-image (the success of Judeo-Christian civilization is partly attributed to the shift from an external attribution to an internal attribution when it comes to the identification and solution of problems). The mere idea of dividing society into victims on the one end and victimizers on the other is superficial and anti-moral, and in effect creates a mirror image of the same previous oppression lamented by those on the progressive left.

Paradoxically, this patronizing view also exhibits contempt for the intelligence of those people these "enlightened" progressives pretend to represent. It inherently assumes that those people fully agree with the theory of discrimination and admit that they are not able to make their way to center stage without affirmative action, justified as the latter may be. Furthermore, this approach—presented as an embrace but in reality a smothering—flattens the complex identity of minorities into a summary of gender, ethnicity, or race only, and brands their foreheads with the mark of the eternally helpless victims. At the same time, it discriminates against the powerful, successful groups, since it attributes their success to abuse and theft alone, ignoring other factors which may contribute to such achievements, like high intelligence, persistence, earnestness, creativity and reciprocity (obviously, no one is ignoring the fact that many successes do rely on relative advantages, such as rich parents, preferential treatment, and positive stereotypes).

And what's worse is that this guilt for an injustice already done, the habit of respecting those who are different at any price and under any condition, even when this puts you in danger, alongside the fear of being suspected of patronization, racism, power-drunkenness, or xenophobia, blinds the progressive left—with the support of academia and, in some ways, its leadership—from identifying the new enemies of democracy, and prevents the timely waging of war on them with the degree of force appropriate.[1251] Many respectable people are of the idea that the free world, led by European countries, is committing suicide in the face of a fundamentalist Islamic attack, which openly states that its intent is to eradicate democracy and replace it with sharia law. Despite all the warning lights, many progressively minded people refuse to internalize the fact that the thought process, rationale, and values of radical Islamic fundamentalists are entirely different than those of people in the West, and that the values of equality, liberty, and respect of man, whoever he may be, is not their idea of a proper society.[1252]

In his book, *Ivory Towers on Sand: The Failure of Middle Eastern Studies in America* (2001), Middle East scholar Martin Kramer prepared a grave and well-detailed indictment of this academic discipline, which despite the nurturing of the establishment and enviable funding has failed time and again to understand the reality of the Middle Eastern arena, and was therefore also surprised in light of key events in the latter decades of the 20th century, such as the coordinated attack by Egypt and Syria on Israel in 1973; the Lebanese Civil War, which erupted in 1975; the Islamic Revolution in Iran in 1978; the Iran-Iraq war of the 80s; Iraq's invasion of Kuwait in 1990; the outbreak of the second intifada in Israel in 2000; and Al Qaeda's terrorist attack on the US in 2001.

In his opinion, truth has time and time again smacked these Middle East scholars in the face and spotlighted them with ridicule, because progressive politics have trickled into academic research. Researchers have tended to project their values onto Arab culture, and in their over-enlightenment, have excessively identified with the subjects of their research and abstained from calling it like it is (even the term "fundamentalism" was removed from their terminology, with the reasoning that it was charged with prejudiced assumptions and Western stereotypes, and was replaced with more "positive" terms, such as "Islamic revival" and "Islamic activism").[1253]

It is no coincidence that Kramer, who dared publish such an indictment of the Ivory Tower, was at the time a scholar working outside the academic arena. At the same time, it is no coincidence that his book was sourly received by the heads of the Middle East Studies Association (MESA), and Kramer was tagged as a neoconservative propagandist who had started a McCarthyist campaign of slander.[1254] Incidentally, what has become known as the Arab Spring, which erupted in December 2010 and included coups in Tunisia, Egypt, Libya, and Yemen, and unprecedented protests in nearly every Arab country, was also missed by Middle East scholars in the West, and for the same exact reasons.

- **A culture of bitterness.** The obsessive search for someone to blame under any condition and at any price, and the tendency to attribute any problem or malfunction to circumstantial factors, has created a culture of bitterness, purism, and moralism, which corrupts the relationships between human beings and suppresses their power and happiness. In a culture which blesses whining and self-pity, people lose the courage and determination to deal with difficulty themselves, and instead give in to suffering and await outside assistance.
- **Social chaos.** Forgiveness and inclusion are noble values, but when any punishment or lesson taught is essentially unacceptable, the power of deterrence disappears and the war on evil turns into surrender. Progressive ideology—which has been nurtured by the soft sciences and has radicalized the values of sensitivity—has contributed to the dissolution of authority, wherever it may be, and to the blurring of any boundary. It has led to confusion in the relationships between parents and children, teachers and students, and managers and employees, and to the creation of moral chaos. The destructive combination of overprotectiveness and political correctness (as defined below) have contributed to the molding of a young generation struggling to function in daily life and to find meaning in its existence. As students, they continue to be perceived by senior faculty as delicate children who require protection from what progressives term "offensive ideas." In light of this, it is no surprise that a survey conducted in the U.S. in 2017 found that 58% of students in American colleges were of the opinion that "it's important that the campus not provide a platform for intolerant ideas"—meaning those that contradict my own (53% of liberal students were of this opinion, but so were 45% of conservatives).[1255]

That and more, a discourse focused only on rights (civilian, human, minority, animal, and so on), legitimate as it may be, cancels out a discourse on obligations. It creates a generation of young people who have internalized the fact that they are entitled. In the name of radical individualism, they have been granted a waiver from an obligation to society, and have lost the altruistic impulse to sacrifice on behalf of their fellow man.

- **Social environment is to blame for everything.** The contempt for any hierarchy and any inequality has engendered a scientific Bolshevism—in other words, a thought and idea police which condemns and attempts to silence anyone who dares to claim and prove that differences between individuals and groups are not only a product of discrimination but also, for one, genetics.

  In his renowned book *The Blank Slate: The Modern Denial of Human Nature*, psychologist Steven Pinker, discussed above, describes how the fixation on the "blank slate" doctrine has replaced levelheaded debate with empty slogans, and how denying the nature of humans by birth (DNA) hinders us in understanding politics, violence, the methods by which children should be raised, and even the arts. Pinker depicts and illustrates how the disagreement around the question of nature-nurture has exceeded the bounds of typical academic debate: Instead of attacking ideas, scientists are attacked; instead of arguing the facts, people are blaming, slandering, and distorting, and most of all, not separating verifiable facts from political opinion.

  Pinker demonstrates how the claim that human consciousness is almost entirely molded by culture has become a mantra in liberal intellectual circles. Since the 1980s, they have been fighting a dogmatic war against evolutionary psychology, which claims, using empirical evidence, that human behavior has been formed at least partially by our evolutionary past, including typical gender behaviors. They also reject the idea that humans are shaped by their genes, because it challenges their worldview according to which the human being is nothing but a composite sketch of his or her environment, just as fervent religious types reject the theory of evolution because it challenges the biblical story of creation.[1256]

- **An all-out war on those blasphemous towards ecological beliefs.** No doubt, science has played a crucial part not only in the unveiling of exploited people, but also by exposing an uneducated and unfair abuse of nature. Without scientific research, including that of the soft sciences, the world would never have developed, for example, an awareness of the dangers of overconsumption, of the damage caused to wildlife, plant life, and nature in general, and of the damage humanity has thus eventually brought upon itself. But there's a fly in this ointment: So anxious have we been to expose the crimes of humanity against nature and the environment that legitimate scientific disagreements revolving around topics such as environmental pollution, climate change, and the extinction of plant and wildlife species have trickled out of the pure scientific realm and into political spaces, and polluted research in the field. There is of course nothing wrong with scientists leaving the labs and academic bubbles and taking part in the political debate, but that is not what is happening. Anyone not aligned with the ruling ecological ideology, and who dares claim that humans are not responsible for all that is wrong with the universe, is condemned and censored.[1257]

In an interview with *Globes* magazine, Prof. Nir Shaviv, a physicist at Hebrew University, described how scientists who disagree—as he does—that climate change is necessarily man-made are being thrown out of European and American universities. Shaviv is among those scientists who assume that humans do indeed contribute to global warming, but only to a limited extent. In his opinion, the warmer climate over the last century is related to cyclical changes in the sun's radiation, and there's no cause for concern. He's not alone. The issue of censorship and persecution of blasphemers has been raised on a wide variety of platforms on the web (Shaviv described being sued by an "individual who methodically sues any scientist whose writings go against the classical perceptions in the climate field").

You obviously don't have to agree with Shaviv and others like him, and you may criticize his research and his claims. The trouble is that the response by a significant portion of opponents is not debate, but rather boycott. "It's harder for us to get grants, harder to publish in prominent journals, and when our papers do get published they are pretty much ignored," said Shaviv, and added that "Prof. Henrik Svensmark, the scientist with whom I wrote my last paper, has left the Meteorological Institute in Denmark after people stopped greeting him in the hallway."[1258]

- **When politics penetrate science, the potential for lies grows.** Allegedly, cheating and cutting corners are especially easy in the liberal arts, and in social sciences, art, and education. As we have written, a significant portion of the findings in these fields are based on qualitative methodologies, and it is difficult-to-impossible to retroactively evaluate research objects (such as those observed and interviewed) documented by researchers in the field. In historiographical research, findings are based on an analysis of archived materials which are selective to begin with, since only a small portion of documents are preserved over the years. All a researcher has to do is pick out the documents that fit his desired thesis from a file and take things out of context in order to depict a fabricated reality. Moreover, where there are no quantitative figures, a phenomenon can easily be exaggerated and manipulatively interpreted, especially when the researcher comes to the study with ideological agendas and motivations.

Furthermore, in our time, when political arguments are interwoven with historical claims, the temptation to cheat in this manner (even unconsciously) is higher than ever, and these cons are often discovered only years later.

The Identity Ball

It was only a matter of time until the slippery slope of critical science would sink the humanities to a new low: identity politics. At the foundation of this trend lies the noble idea that the lack in representation of underprivileged groups can and should be corrected through affirmative action. The trend began in the 1980s in the education and teaching fields, and spread to politics and other areas from there.

But in the meantime there was a twist in the narrative: no longer "generous" gestures by the privileged towards those discriminated against, but rather forceful rights of expropriation by those who perceived themselves as exploited. From correcting the present representation, the path was paved to retroactively correcting it—in other words, developing an alternative historical narrative to the one spread by the "hegemonic culture." Not only were the historical canon and pantheon required to update, but also artistic tradition, including books, poetry, and works of art considered classics.

A number of fierce criticisms have been offered against identity politics:

- **Rewriting history.** With so much desire to correct and balance the historical narrative, reality has been "renovated," by hiding, denying, and fabricating facts as well as exaggerating them.[1259] Especially prominent in this field are one-sided and exaggerated descriptions of a social injustice, and of the elements and factors of common stereotypical perceptions in society—as if any unflattering label is false, any stereotype racist, and any discrimination apartheid or genocide. One of the most prominent examples is the study of European colonialism in Africa, which lays the blame for all the major problems of the "Black Continent" at the feet of its white conquerors.

  Furthermore, the urge to rectify the exclusion of minorities from the common ethos has led historiography to fragment and forget the overall balanced picture, and distort history in the other direction, this time in favor of the defeated minorities. This phenomenon is exhibited not only in research but also in teaching. Historian Tony Judt of New York University has termed it an education supermarket in which consumers take whatever they want down from the shelf, not that which is important to study. Jewish students take courses in Jewish studies, the LGBTQ community studies gay-lesbian studies, Black students enroll in African-American studies, and so on. This is no longer a general academic education, which filters out the irrelevant from the relevant and distinguishes between the macro and micro, but rather interest groups who study mostly about themselves while excluding others. The ethnocentricity and narcissism of old have been replaced with a new version.[1260]

- **The flattening of the quality spectrum.** The demand to refresh the old lists of the artistic canon, which for many years included mostly works by the hegemonic class, and along the way to do justice to genres and creators of all types and kinds, is essentially justified. The place and honor of countless groups and individuals have indeed been discriminated against, both because of bias and ignorance and because their identity and the tastes of those who do the winnowing and labeling. However, when the hierarchies of quality are flattened on behalf of such a revision, and some of the older canonical works are removed, a difficult problem is created. This is a sort of reciprocal action in a "what's good for the goose is good for the gander" style. And not only that, these fervent revisers are not simply content with removing the deserving classics from the showcase window and replacing them with monumental creations which had been previously excluded, but rather add from anywhere they can simply for the sake of balance. That's how the entire quality spectrum is flattened, because "everyone is good and successful to the same degree." This disproportional and occasionally extreme reform damages the original, and worthy, goal of correcting an historical injustice, because it makes a mockery of those demanding justice and change and causes conservatives to barricade themselves in the defense of the holiness of older artistic assets (an amusing example from the right on the recoil and barricading of conservatives can be found in Roger Kimball's book *Tenured Radicals: How Politics Has Corrupted Our Higher Education*).[1261]
- **Replacing an old historiographic injustice with a new historiographic injustice.** The claim that supreme national narratives gave exaggerated weight to the work of the leading classes in society and hid their darker sides is true. An autobiography, whether of an individual or group, almost always flatters

the protagonists. Therefore, the idea that these injustices should be corrected in the chronicles is justified in essence. But when the means is the tarnishing of the character of the privileged, the result is that the historical story of victory is replaced with a story of moral failure. Thus a unilateral indictment is created which replaces one injustice with another, and that is how Western culture has worn out its welcome at the very heart of the West.

This phenomenon frequently achieves ridiculous dimensions. Rachel Donadio, a New York Times journalist, described how at a 1998 convention attended by American reverend, politician, and civil rights activist Jesse Jackson, students from Stanford University chanted, "Hey hey, ho ho, Western culture's got to go." They did this in protest of the inclusion of a course on the subject (Western civilization) on the list of required courses. The University quickly replaced the course with one emphasizing women and minorities.[1262]

- **Inclusion that is all exclusion.** Out of a wish to honor the unique origins and culture of the other, identity politics forces people to shut themselves in separate groups and view each other through one-dimensional, superficial, and entirely stereotypical social labels. Joe Schmo is not a human being with a wide range of attributes, preferences, and associations, but first of all a gay man, a black man, a French Jew, a Muslim, and so on. The ideological problem gets tangled in a reality in which demographics have become more and more mixed and an individual is difficult to label as belonging to a homogeneous origin group.

  An extreme demonstration of such progressive insanity, primarily in the U.S., are the "safe spaces" allocated at Princeton University for social gatherings of minorities—each minority and its own space. In other words, racial or ethnic segregation on behalf of a sensitivity that is entirely tyrannical. This reverse privilege has eventually led to African-American students complaining to the administration that white students are invading their safe ethnic space and disturbing their peace.[1263] Apparently, there are no safe spaces for white students.

A Flawed Correctness

Political Correctness is at its foundation an enlightened social idea, based on the assumption that language not only represents reality but also forms and even creates it, including the distorted forces of power rooted in society. Therefore, words that have acquired negative connotations should be replaced with neutral words—for example, African-American instead of Black, Native Americans instead of Indians, my partner instead of my husband, senior citizen instead of old man, disabled instead of handicapped, mentally challenged instead of retarded, full-figured instead of fat.

Epithets with inherent negative ideological, moral, or religious undertones were also deemed worthy of replacement—and especially expressions originally born in sin, with racist, sexist, homophobic, or ageist connotations, such as "babe," "ghetto," or "Indian giver."

But again, what began as a positive process of awareness and sensitivity to an injustice, and a welcome weeding-out of stereotypes and prejudices, has become political tyranny and a farce (the term "political correctness" was originally coined by conservative circles, ironically).[1264] It seems there is no phenomenon which has earned such volumes of ridicule and contempt in recent years as that of political correctness, which was also developed and nurtured primarily among the liberal arts. These are some of the primary criticisms thrown at political correctness:

- **Silencing the truth.** Political correctness undermines the basic foundation of science—truth. When truth is defined as offensive and hurtful (and the offensiveness threshold keeps trending down) it should not be mentioned. And so, those who had previously been at the fore of intellectual openness and encouraged open debate have become censors giving religious fundamentalism a run for their money. And it doesn't end on the campuses: Academia also sets the tone for the media and the arts, which is comprised of thought leaders with a similar profile. Even in Israel, which hates hypocrisy and glorifies directness, many have been stricken with the plague of political correctness.
- **No cultural generalizations.** Political correctness has become a censorship of ideas, facts, and even research fields.[1265] The wish to eradicate prejudice and stereotypes has led to a complete avoidance of any cultural generalization, and especially unflattering generalizations concerning typical sensitivities and habits. And thus, one of the most important research fields in sociology and anthropology was eliminated: the manner in which culture shapes and reinforces common characteristics among its offspring—what is termed a "mentality" or "cultural DNA."[1266]
- **Too sensitive and too easily offended.** In the age of political correctness, it seems that anyone may be offended by anything.[1267] With so much desire not to catalog humans, progressives have created an even thicker catalog of ridiculous resolutions, such as gender-related ones, and, being extremely careful not to step on any toes, have neutered spontaneous discourse and

killed our sense of humor. Even actors and stand-up comedians are now concerned that they cannot express themselves freely. "It's not enough to apologize anymore and move on," said British comedian Ricky Gervais in an interview, and added, "People want blood, people want you ruined, because it's a point-scoring competition now."[1268] The legendary Mel Brooks noted sarcastically: "We have become stupidly politically correct," which is the "death of comedy."[1269]

- **Everyone is a suspect and everyone is tainted.** When even such a common, pedestrian expression as "that's crazy" is considered off-limits, correctness becomes a regulation the public cannot comply with, which spreads anxiety. The most devastating impact is primarily on the education arena. In an age in which everything is recorded and filmed, and where any slip of the tongue leads to mass shaming, lectures on campus have become hell for faculty. You never know what overly sensitive or overly frustrated students will write about you and when you will be taken to task for something politically improper you let loose in class in a momentary loss of concentration.[1270]
- **A war on violence which has turned violent itself.** Protest, and even vehement protest, on campus or outside of it, is not inherently wrong. Quite the opposite—it is an expression of civilian concern and a key to eradicating injustice. The problem starts when the protest is based on radical ideologies, which more than they promote justice, promote injustice.

  Paradoxically, the justified war on stereotypes and prejudice has over time turned kitschy and violent—verbal terrorism against anyone deviating from the code of correctness.[1271] In other words, that which was intended to expand sociological and psychological perspectives and open others' eyes to processes of defamation and exclusion now stifles open discourse and deters people from raising ideas which deviate from the standard. Political correctness has basically become a cruel game of exposing the baddies ("ha, we caught you, you miserable racist, misogynist, and homophobe") and persecution of the "phonies." There have been those who have, due to the fanaticism of its believers, termed this the Religion of Political Correctness.[1272]
- **The ridiculing of academia in general and the soft sciences specifically.** It seems that with regards to anything related to political correctness in academia, comedians are finding it difficult to compete with reality, which exceeds all imagination—especially in the U.S.[1273] Ever since Martin Gross described the thought atrophy enforced by the progressives in his 1997 book *The End of Sanity: Social and Cultural Madness in America*,[1274] things have only grown worse. Reports of strange demands which have become

routine on campus are inundating the media. So, for example, students at the University of Ottawa, Canada, were reported to have demanded the cancellation of yoga classes under the claim that such exercises in a Western university represented insensitivity towards Native American culture, which has been a victim of cultural genocide.[1275]

In the University of Southern California, Los Angeles, students demanded the institution's traditional mascot be replaced because it included a white horse. Not only was the horse white, which they of course found racist, it was even named Traveler, after Confederate General Robert E. Lee's horse.[1276] We're lucky USC's "progressive" students did not ask for the crosses to be removed from all churches and world flags as part of their crusade of purification and vengeance of the symbols of yesteryear.

And here's another rather amazing example: Students of theater at Washington University put on the popular feminist play *The Vagina Monologues* by Eve Ensler, but decided to remove the word "vagina" from the text, so that the play would "be more inclusive towards transgender viewers."[1277]

One individual who has become prominently associated with the exposure of bizarre stories of progressive insanity on American campuses, nicknamed "campus craziness," is FOX News' popular host Tucker Carlson. He ceaselessly beats the leaders of institutions of higher education over their heads, and spreads the message that "this is how liberals are slowly killing colleges."[1278] One can of course claim that Tucker and FOX are conservatively biased (just as CNN is biased towards Democrats) but the very fact that countless such testimonies are being collected indicates a phenomenon prominent in popular culture, with an obvious impact on academia's public image as well (a Google search for "campus political correctness" at the end of 2019 returned approximately 19,000 results, and "campus craziness" nearly 30,000).

Closed Political Club

Are academics leftists?

The debate around the political colors of faculty in higher education is nothing new. It has previously characterized American society due to the central role of academia and because of the traditional binary division into Democrats and Republicans. Over time, this disagreement has branched out to the rest of the world and grown in fervor.

The growing interest in the political affiliations of academia feeds off the growing tensions in Western countries between right and left—especially in light of the refugee crisis and the war of civilizations against fundamentalist Islam. It reflects the growing chasm between the educated secular elite, inclined towards the liberal left, and the less educated and more traditionally religious classes, who tend to be more conservative. The conservative public wishes to slow down the implementation of changes in their lives, especially changes to values and norms, while the educated progressive elite wishes to hurry on forward. There are those who define this tension as a contrast between the "mobile class," which benefits from globalization, and the "immobile class," to which globalization presents a threat to identity, beliefs, and values.[1279]

But the question remains: Are liberal arts departments politically homogeneous? This question has troubled many researchers and journalists, and has already engendered hundreds if not thousands of papers and books. But before we answer it, we will first note that beyond the difficulties related with the ideological distribution between left and right, detailed above, mapping faculty members' political views is also problematic in terms of methodology: most lecturers, especially in the humanities, are not fully tenured faculty members, and are therefore not included in many surveys. Furthermore, it is difficult to estimate the level of political radicalism, because it is very much subjectively defined. What seems extreme to one person is perceived as moderate by another.

Nevertheless, despite all difficulties and caveats, most surveys conducted in the U.S. reveal such a widespread political homogeneity among liberal arts faculties, that there is no doubt that this is an important attribute which should be addressed (although studies focus on American academia, one can assume that similar results would be obtained in other developed democratic nations around the world). In most institutions of higher education in the U.S., the proportion of Democratic faculty (left) is ten times or more that of Republicans (right). In more than a few institutions, it even gets as high as 100 times and more.[1280] Even in regions considered Republican strongholds and institutions with a more conservative image, there are more Democratic faculty members.[1281]

A comparison of the surveys on a timeline presents an unambiguous picture: a consistent and significant increase, beginning in the early 1990s, in the proportion of faculty members self-identifying as leftists,[1282] well beyond the rate of increase in the general population, as represented by elections for Congress and the presidency.[1283] In fact, surveys indicate that most Americans define themselves as conservative or moderate, and only a quarter as liberals.[1284] Furthermore, even when students are compared to their professors, teachers show a distinct inclination towards the left, in contrast to events outside academia. In most Western countries, younger people trend more left, and younger faculty members are also more inclined towards the left than more senior ones.[1285]

As expected, there are significant differences in the share of leftists in the liberal arts compared to their share in the other sciences (and especially engineering and business studies).[1286] A 2018 study of the political identity of faculty members in fifty-one of the sixty-six liberal arts colleges with a leading ranking on the previous year's U.S. News list found that liberals own colleges, with a proportion ranging between 8 to 70 times that of conservatives. Despite the differences between institutions, at none of them did the portion of conservatives exceed that of liberals, and in over one-third of institutions not even one faculty member was found with a Republican worldview.[1287]

History departments distinctly demonstrate this bias: In 1968, the ratio between liberal and conservative faculty members was 2.7. In 2004, there were between 9-15 liberal lecturers (depending on the survey) for each Republican, and by 2016 it was 33.5.[1288] Incidentally, the political imbalance is clarified by an evaluation of the proportion of faculty members identifying themselves, or that may be identified using sociological tools, as radical left. Their share is significantly higher than the relative proportion of radical leftists in the general population, and many departments have already been transformed into a sort of closed political club. Studies show that even administrative staff in American academia is liberal.[1289]

Even once consensus is achieved regarding the political homogeneity—extremely leftist—in academia, opinions are still at odds regarding the causes.

There were those who have claimed that the political shift wasn't among faculty members, but rather political parties. The right simply went further right, which deterred the educated. Many (especially leftists) have attributed this gradual conquest of liberal views mostly to education. The more knowledge an individual obtains, the more pluralist and less conservative he or she becomes (conservatism is one of the identifying features of rightists), which increases his or her bias towards the center, on the way to the left. That is why voters' GPA averages among center and left parties with pluralistic agendas are higher than the average GPA of voters on the right (it should be noted that in the 1950s this correlation went the opposite way, because the blue-collar working-class voted for the left, which they perceived as protectors of the workingman).[1290] It is no coincidence that Generation Y, the most educated generation in history, is also the one most inclined towards the liberal-left in most Western countries, as compared to previous generations.

Generally speaking, one can say that modern education—especially in the humanities—is eye-opening, horizon-expanding, trains students to respond more from the head and less from the heart, encourages non-conformism and independence of thought, and reinforces openness, doubt, criticism, tolerance, and human empathy.[1291]

These are all explanations that may be considered, but the political imbalance in academia is so large and the degree of leftist dogmatism so prominent that the suspicion arises that there is also some sort of professional conformism at work (in courses and faculties), an informal ideological supervision and nepotistic selection: A friend refers a friend and a leftist refers a leftist. And indeed, beyond the political homogeneity of faculty members, evidence of the politicization of the liberal arts has grown in recent years in almost every aspect: publication, conferences, courses and their syllabuses, lectures, and more. A closed-clique aroma is wafting from them all, reflected in the choice of research topics and emphasis, in terminology, in interpretations of findings (identical perceptions regarding gender, hierarchy, authority, political power, property, rights and obligations, punishment, community, nationalism, violence and more), in citations (who is cited and how often), in the identity of researchers and lecturers honored and venerated, and in appointments to senior positions in institutions and outside of them (journal editors, heads of scientific associations, heads of international conferences, and so on).[1292]

It should be emphasized that these are estimates only, since unfortunately the political impact on research has almost never been studied. Scientists do not like to study themselves, especially when the findings might not be flattering. Most of all, any such research is immediately suspected of being a witch-hunt. And yet there were two monumental episodes which managed to grab the bull by the horns and expose progressive bias in the world of scientific publication.

The first study was conducted by French physicist Alan Sokal of New York University. In 1996, Sokal submitted a paper to the journal *Social Text,* published by Duke University and identified as postmodernist. Its title was "Transgressing the Boundaries: Towards a Transformative Hermeneutics of Quantum Gravity," and it comprised a collection of meaningless quotations by postmodernist philosophers, to which Sokal added a few pseudo-scientific blatherings of his own. The overexcited editors fell into the trap and hurried to publish the nonsensical paper, while a delighted Sokal announced the success of his experiment, which exposed the ridiculous yet bitter truth (Sokal called it a parody) of the virus of gibberish spreading through the liberal arts.[1293]

The editors of the journal which had published the foolish paper attempted to defend their decision with the claim that although they understood that this was a bit orchestrated and not their cup of tea, they still decided to publish the paper—because there was logic in the claim presented by the paper, and mostly because they wanted to encourage natural sciences scientists to publish in journals dealing with culture studies.[1294] But their response came off as a lame excuse by someone caught with his hand in the cookie jar.

The hoax, which made headlines and kicked off a stormy debate,[1295] led Sokal to partner with Belgian physicist Jean Bricmont. Within a year, they published a book with the revealing title *Fashionable Nonsense: Postmodern Intellectuals' Abuse of Science*. The book was first published in French and then translated to English (Sokal published another book in 2008 titled *Beyond the Hoax*, which expanded on the affair and its significance).[1296] In their book, Sokal and Bricmont analyzed the manner in which the social sciences make improper use of mathematical and empirical terminology, including artificial and illogical use of terms from the natural and engineering sciences, in order to lend a sophisticated and scientific aura to their papers. For this purpose, they quoted the writings of philosophers and sociologists considered forefathers of the genre and the be-all-end-all for many scholars in the liberal arts. They emphasized that scientific review, similarly to a criminal trial, is always subject to human biases and informational gaps, but rejected the postmodernists' extreme relativist view that modern science is no more than a myth, a narrative, or a Social Construction—a term which, as mentioned, is still very popular among sociologists.

As expected, those exposed and ridiculed claimed that the two physicists did not understand the materials they had analyzed. But there were also many who identified with Sokal's and Bricmont's claims and celebrated the exposure of hypocrisy and charlatanism. Among the articles supporting the researchers was one by ethologist and biologist Professor Richard Dawkins of Oxford, who has authored a number of popular science books and is known as one of the sharpest critics of pseudo-scientists. In his article, under the title of "Postmodernism Disrobed," Dawkins defined Sokal's and Bricmont's book as a revelation, and reinforced their findings. He wrote, among other things, "Suppose you are an intellectual impostor with nothing to say, but with strong ambitions to succeed in academic life, collect a coterie of reverent disciples and have students around the world anoint your pages with respectful yellow highlighter. What kind of literary style would you cultivate? Not a lucid one, surely, for clarity would expose your lack of content."[1297]

The second attempt to expose the progressive agenda's conquest of liberal arts publications was conducted in 2018. Three courageous and mischievous American researchers, mathematician and physicist James Lindsay, historian Helen Pluckrose, and philosopher Peter Boghossian, conceived a prank intended to expose and ridicule not only the typical lingo—sanctimonious and vague—of a not-insignificant number of liberal arts journals, especially in the social sciences, but also the political agenda, and especially the obsessive concern with discrimination and oppression in everything that moves and breathes. The trio submitted twenty fabricated papers, under a pseudonym, to peer-reviewed journals from the "critical" genre. They tied the papers to the "right" titles, created the "right" bibliography, and included the "right" citations. The trick worked. Within a year, seven of the papers were accepted for publication. Four were actually published, while three others awaited their turn. Seven additional papers had made it to the editorial staff's evaluation process at their respective journals when the experiment was halted. Only six were rejected.

The titles themselves could make any reasonable person burst out laughing (and crying), but not members of the progressive cult. For example: "Moon Meetings and the Meaning of Sisterhood: A Poetic Portrayal of Lived Feminist Spirituality"; "Agency as an Elephant Test for Feminist Porn: Impacts on Male Explicit and Implicit Associations about Women in Society by Immersive Pornography Consumption"; "Super-Frankenstein and the Masculine Imaginary: Feminist Epistemology and Superintelligent Artificial Intelligence Safety Research"; "Stars, Planets, and Gender: A Framework for a Feminist Astronomy."

The theses the three came up with were also bizarre. One paper presented a "study" that claimed that if men experimented more with anal penetration, they would be less hostile towards transgender people and more feminist. Another paper, published in a journal which sounds more like the name of a comedy sketch, *Fat Studies*, claimed that oppressive cultural norms lead society to admire muscle development and hold contempt for fat building, and suggested the term Fat Bodybuilding to describe the professional sport of developing body fat. And there was also a paper that claimed that privileged white men in college should undergo correction by being seated on the floor, shackled, and forbidden from speaking.

Other "scientific" claims welcomed by the journals of the cult of bullshit said, for example, that when a man masturbates privately and fantasizes about a woman without her consent and knowledge, he is sexually abusing her; that astronomy is considered a Western masculine science, and therefore should be corrected by the inclusion of feminist and queer astrologies; and that men tend to visit restaurants with a reputation for large-breasted waitresses more frequently, out of nostalgia for an authentic masculinity in which the dominant male enjoyed sexual conquest.

But there is no doubt that the pinnacle of success was the paper on rape culture in dogs, with its claim that dog parks are rape-condoning spaces, rife with the aggressive culture of the "Oppressed Bitch." One conclusion was that in order to stop men from behaving violently, they should be trained with a leash and collar just like dogs. This crazy idea appeared under the name of Helen Wilson, a fictitious scientist from a fictitious research institute, who had never observed 10,000 dogs in public parks in Portland and did not (politely) examine their genitals. The two external reviewers were effusive. One wrote, "This is a wonderful paper—incredibly innovative, rich in analysis, and extremely well-written," and called it an "intellectually and empirically exciting paper." The other was of the impression that the paper would make an "important contribution to feminist animal geography" (whatever that means). They both highly recommended that the paper be published without any correction. Not only that, the paper was named one of the best in the twenty-five years of that journal's existence, and the grateful publication invited Helen Wilson herself to review four other papers submitted to that same journal.

"The Three Musketeers" published the results of their experiment in *Areo*, which was edited by Pluckrose, and uploaded a video presenting the amusing moments in which they dumbfoundedly read sympathetic emails going overboard over the bizarre studies they had made up.[1298]

It did not take long for the story to spread like wildfire in established media and social networks. For a few weeks, the trio became much in-demand for interviews all around the world.[1299] In an interview with Keren Zuriel published in the Israeli *Calcalist*, Lindsay said: "Researchers of the grievance sciences have a tremendous impact on our culture, and the grievance sciences allow these bullies to tell everyone what and how to think, who is racist for thinking improperly, who is sexist because he doesn't agree with you. I think everybody is sick of it.

"Something has gone wrong in the universities, and the grievance sciences force everyone to adopt their worldviews, which are neither scientific nor exacting. Instead of exhibiting intellectual gravity, you need to navigate through a list of rules which steer the discourse towards the offensive. For example, are you referring to transgender people properly? Are you positioning yourself correctly as a white man? The trick is to consistently dehumanize the privileged as much as possible, and lean on a theory which allows us to do it 'academically.'

"Our studies were intentionally mediocre and odd, but integrated almost perfectly with other studies from those same disciplines. [...] The grievance sciences have distorted the creation of knowledge in their fields of research. Flawed research practices have trickled into other fields, such as education, social work, communications, psychology, and sociology, and they may continue spreading, subverting the legitimacy and reputation of universities, and radicalizing the culture war."[1300]

Naturally, in an attempt to minimize the damage, liberal arts researchers attempted to discredit the lessons of the successful prank. Among other claims, it was asserted that there were also journals who had rejected the papers and not fallen for the stunt, that these were not A-list journals, and that the revelation concerned the social sciences and not the liberal arts—and indeed a very specific branch within the social sciences—so that the generalization was exaggerated. There were also those who claimed that the ruse did not prove ideological bias but rather the potential to create fabricated papers.[1301]

But the defenders were missing the point: there was no doubt that these papers were extreme cases, but the extreme of the spectrum indicates the fluctuations of the entire spectrum. In other words, if such papers were accepted, it is probable that many papers—a bit less transparently ridiculous—are accepted on a daily basis. You don't have to be a great scientist to identify the phenomenon. It's enough to look through a random sample of titles in social sciences and liberal arts journals.

It is safe to say that aside from removing the papers from the websites of the incriminated journals, the hoax did not garner an appropriate response among the scientific community. Just the opposite. Lindsay described how editors announced changes in policy intended to minimize the chance that a fictitious author would pass the winnowing process. This was exactly the wrong conclusion, which ignores the real issue. One Israeli responder on a social network wrote: "No gender and criticism department or journal will be shut down following this scandal. [...] The only thing they find holy and never critique is Criticism itself. A critique of them is by definition a homogeneous capitalist conspiracy of the ruling and privileged postcolonial neo-Thatcherist and Reaganist narrative, which serves the rich in their war on the underprivileged."[1302]

Intolerance in the Temple of Pluralism

If, during the 1960s and -70s, Western campuses were leading the charge against the conservative establishment and contributing to the liberation of the oppressed from the throes of discrimination,[1303] today, paradoxically and unfortunately, academia has become a conservative establishment in the sociological meaning of the word (meaning those that are blind to the new reality around them). The rebels are the commoners—laborers who have had enough of the slogans, clichés, hypocrisy, and patronizing of the "new humanities." This is probably also the main reason for increasing voter turnouts for the New Right, which is mostly made up of a moderate group concerned simply with phenomena threatening the West.[1304]

Since progressive scientists tend to hold the view that the negative is greater than the positive in the world, and since they have adopted a value-oriented position for themselves, they have been transformed from researchers with a critical temperament to combative crusaders. From an oasis of freedom of expression and groundbreaking and boundary-expanding ideas, some campuses, mostly in the U.S. but also in other countries, have been transformed into arenas of open propaganda, political censorship, incitement, silencing, and witch-hunts—a phenomenon which in recent years has earned a huge volume of lectures, papers, and books, a few of whom have gone on to become bestsellers (worthy of mention in this regard is Ben Shapiro, whose many publications on the subject have earned him a large fan base, in the U.S. and outside of it).[1305]

Lecturers with conservative outlooks, perceived as promoters of evil, are excluded from conferences and seminars, and those invited to talk on campus are boycotted or more than once violently chased away from the auditorium. Faculty with the "wrong" view of things, and who have dared criticize the progressive "correctness police," are condemned by students, colleagues, and the administration, and some are cast out, ridiculed, delayed in promotion, and in especially extreme situations fired (there have already been some cases of discrimination heard in court).[1306] It should be noted that the more severe cases reported in the media are still the extraordinary ones, and no doubt do not do justice to most institutions around the world, which operate peacefully and are careful to allow open and respectful discourse. Still, this is not some marginal phenomenon. Furthermore, in this case as well, the extreme of the spectrum apparently attests to the entire spectrum, and the open expressions of intolerance hint at what is probably much more prevalent, and no less violent, below the surface (and which is demonstrated on online discussion networks).

The fact that most representatives of higher education remain silent in light of these ugly incidents, or halfheartedly condemn them, indicates the severity of the issue from another direction.[1307]

Towards the end of 2017, the New York Times published an article titled "The Dying Art of Disagreement."[1308] The text was a lecture given by senior journalist and Pulitzer Prize winner Bret Stephens at the Lowy Institute Awards ceremony in Sydney, sponsored by the Australian Center for Communications and Information. Stephens claimed that more and more people in the US are now concerned about making their true opinions heard, due to a new and violent type of intolerance—especially coming from the left side of the map. This is a dictatorship of silencing and slander, he wrote.

Many conservatives, as well as those who do not define themselves as such, look on this on-campus trend with concern and resist it. The mere existence of such an expansive and sharp rebuke of the institutions of higher education is an unprecedented phenomenon in the history of academia. Also concerning to them is that liberal arts courses are converting young students to a progressive worldview.[1309] This is of course a far-reaching claim, devoid of any empirical foundation, especially in light of the fact that studies show that a political view is usually determined at a young age and is very much influenced by one's home. In any case, the important point isn't the degree of political influence, but rather the exposure to a monochrome agenda and the inconvenience caused to some students who feel they are in enemy territory and are wary of freely expressing their opinions.[1310] Even *Nature*, which is mostly read by progressives, published a call to prevent political uniformity and discrimination towards students and lecturers with conservative views.[1311]

It should be noted that the escalating argument has also engendered a fearful radicalism on the other side of the map: rightists and conservatives of all types who see every liberal as an enemy of the people, a traitor, and a derelict. Some of them prepare blacklists in a style that recalls the infamous McCarthyism of the '50s. So, for example, the "Professor Watchlist" website has set a goal for itself to create a list of professors who "discriminate against conservative students, promote anti-American values, and advance leftist propaganda in the classroom." In effect, radicalism on the left, led by academia, not only doesn't prevent the strengthening of the extreme right in the West (a dangerous phenomenon in and of itself), but actually enflames it. In many ways, they feed off each other.[1312]

It should also be noted that public political debates have become much harsher and more superficial on both sides of the political spectrum, due to, among other reasons, the communication revolution. Most attention is paid today to the choice of words and not their content. So any spontaneous expression becomes a potential landmine for the speaker, right or left. It's enough to choose the wrong word, or one that may be interpreted in ways you did not intend, and there will already be those who are offended, who condemn, and who boycott. In such a reality of "canceling" and labeling, it's hard to argue, hard to be educated, hard to advance professionally, and hard to live together.[1313] But it is for this reason especially that science should have been left out of the tempestuous arena of cancel culture. In reality, it has become one of the generators of the phenomenon.

Anti-Semitism and Hatred of Israel as a Test Case

Who would've believed that only a few decades after the greatest mass slaughter in history in general, and of Jews specifically, anti-Semitism would not only rear its ugly head again, but that it would do so from the very heart of the educated elite in the West,[1314] from journalism, the arts, and academia,[1315] and not only from the new extreme right (white supremacists)?

A Google search for "anti-Semitism on campus" returns 36,000 results, including many surveys revealing a consistent rise in incidents of bullying, harassment, vandalism, and verbal and physical violence towards Jewish students and lecturers.[1316]

Anti-Semitic hatemongering—much of which is done under the auspices of supposedly legitimate political criticism of the state of Israel—on the part of students and faculty in universities in the West has become a matter of routine, as have boycotts of Israeli institutions of higher education. A document published in 2018 by the Kantor Center for the Study of Contemporary European Jewry reveals the phenomenon in all its unseemliness. Findings include, among others, verbal and physical assaults against students identifying as Jews, Zionists, or Israelis; the production of conferences and seminars with the purpose of slandering Zionism and the state of Israel; courses and lectures with an anti-Semitic taint; distribution of neo-Nazi propaganda; vandalism and dishonoring of Israeli symbols, such as Israeli flags; calls for the boycott of student organizations associated with Zionism, and calls for the destruction of the state of Israel.[1317] Such a review leaves any conscionable reader afflicted and distressed, not only due to the scope and force of these incidents, but because they occur at institutions of higher education.

The Boycott Divestment Sanctions movement (BDS)—an anti-Semitic movement under the guise of a correction to an injustice—is thriving mostly on American, European, Australian, and South African campuses.[1318] As we can see, the movement's official website lists support from prominent academic organizations around the world, including: the American Studies Association; the National Women's Studies Association; the African Literature Association; the Teachers' Union of Ireland; the Federation of Francophone Students in Belgium; the National Union of Students in the UK; and the Graduate Student Workers' Union at New York University.

Not only that, thousands of academics from South Africa, the US, the UK, India, Sweden, Ireland, Brazil, Belgium, Italy and more have signed petitions supporting an academic boycott of Israel.[1319]

If more proof is needed regarding the ties between anti-Semitism and BDS, a study has disclosed the correlation between faculty members supporting this movement and anti-Semitic incidents on the campus on which they are employed: On a campus with at least one or two professors boycotting Israel, the chances are four times as high, or more, for anti-Semitic incidents.[1320] Various studies also show that extreme anti-Israel stances by faculty members translate to political bias in the content of the courses they teach.[1321]

And as if leftist anti-Semitism was not enough, anti-Semitism from the right, on the part of neo-fascists, is growing on campus, alongside hatred of African-Americans, Hispanics, Muslims and LGBTQ students—mostly in the U.S.[1322]

There are those who attempt to minimize the spread of anti-Semitism in academia with the oft-repeated claim that it represents a small share of all institutions in the world. This claim can be debunked for a number of reasons:

- At issue are more than a few rare incidents, but rather a significant number, including incidents in leading institutions. The AMCHA Initiative is a nonprofit organization founded by Prof. Tammi Rossman-Benjamin and Prof. Leila Beckwith in 2011, with the goal of researching, documenting, and combating anti-Semitism in American colleges and universities. A report published by the organization in 2019 found that since 2015, there were over 2,500 anti-Semitic incidents in the 400 colleges it monitored.[1323] This is an almost inconceivable number which should shock every honorable person.

- As already noted, these are the extreme cases, which have been exposed and reported, and they do not reveal the entire picture, which is undoubtedly much worse.
- The very fact that such incidents can occur on academic campuses is an outrage, and a testament to the moral bankruptcy of one of the institutions most identified with social justice and pluralism throughout history.

Many have already pointed to the relationship between hatred of the state of Israel and anti-Semitism.[1324] In many ways, this is a new type of anti-Semitism in political disguise. Many "scientific" conventions in the humanities are tainted with a distinct political color, and exclude researchers who do not align themselves with the agenda. Lecturers which avoid criticizing Israel, or God forbid, are sympathetic towards it, are showered with contempt.[1325] Israeli experts, Jewish and others, whose thesis does not correspond with the pro-Palestinian narrative (which is, incidentally, mostly made up of lies), are boycotted on many campuses, their lectures torpedoed, and they are greeted with hateful graffiti, threats, and occasionally even physical violence (the Jewish newspaper *Algemeiner* has reported many such incidents).[1326] In contrast, Palestinian experts are warmly invited to present their anti-Israel ideas to students and the public at large.[1327]

An example demonstrating the lows to which more than a few higher education institutions in the US have sunk, is Israel Apartheid Week—an annual event held on thirty-seven campuses, as of 2019. An integral part of this package is demonstrations of hatred, alongside conventions, film screenings, lectures, and activities intended to promote BDS and the idea that Israel is implementing a colonialist apartheid regime, a baseless accusation contradicted in much detail by several researchers.[1328]

The absurdity is that such an anti-Semitic event (as mentioned, under the guise of criticizing Israel) is held with the consent of the distinguished institutions, and at times even their financing. So, for example, the Undergraduate Council's Grant for an Open Harvard College, which subsidizes student initiatives on topics of race, culture, mental health, sexual abuse and its prevention, and more, gave a contribution to the Palestinian Solidarity Committee in 2019 so that the latter could host hatred week on campus.[1329]

Many faculty in Israel and around the world—especially in the liberal arts—have become significant activists in the industry of lies, whose goal it is to demonize Israel.[1330] They produce books, essays, conventions, and curriculums in which Israel is described as a racist monster. More than a few of them are members of anti-Zionist organizations, and do not hesitate to spread their political propaganda in class—all in the name of the war for so-called justice, while grossly distorting historical and contemporary facts, spreading lies, and employing a double standard. Examples include: that Israel was founded as a colonialist imperialist country; that Jewish immigrants conspired to expel its Palestinian residents (in other words, ethnic cleansing), who had been living in Palestine for generations; that Jews emigrating from Arab countries had received a favorable and embracing treatment there, and that refugees existed only on the Palestinian side; that Jews were not willing to compromise on a division of the land; that the 1948 War of Independence, and all the wars that came after it, were acts of aggression and not self-defense, originating from a desire to expand and intended to steal land and property; that genocide and intentional war crimes were inflicted on Palestinians; that the capitalist state of Israel enflames conflict and war around the world, nurtures terrorism, and encourages racism; that the Israeli establishment, including the media, the courts, and academia, are systematically hiding crimes and injustices against Arabs; that the Israeli conflict is the reason for the emigration of Muslims to Europe; that Israel pulls the strings in Arab countries and is responsible for the atrophy, poverty, and suffering of its neighbors; and that Arab Israelis live without basic rights and that their situation—financial, health, education, residential, and more—grows worse.

Israel is compared to the most horrible nations on earth, including Nazi Germany and apartheid South Africa. These comparisons are so absurd, one-sided, and sinister that they sound like a bad joke. If someone came from another planet and read them off the paper, he would assume that Israel had no enemies who openly call for its destruction; that Arab countries and Islam lived in a democratic culture with codes of restraint and equality of rights; that the culture of violence and intolerance was mostly nurtured among Israelis: that realizing the Right of Return did not put Israel at risk; that Israeli leadership and civilians from across the political spectrum were the ones opposing any peaceful arrangement, while Palestinians were peace-seekers open to compromise; and that terrorist organizations were national liberation organizations who would lay down their arms the moment two states were established for two nations.

Legal scholar Alan Dershowitz, in his book *Defending Israel*, followed by journalist Ben-Dror Yemini, in his book, *Industry of Lies: Media, Academia, and the Israeli-Arab Conflict*, and followed by more writers after them,[1331] have published books describing in detail the chronology of incitement against Israel, sponsored by the Western-educated elite, headed by the academia and the media.

Yemini writes: "The industry of lies has engendered one of the biggest frauds of recent decades. A fraud on a hysterical and historical scale. [...] A terrifying, dangerous coalition has been formed, which has nothing at all to do with human rights and healing the world. [...] The addiction to lies requires lie manufacturers to exaggerate, blow things out of proportion, create false presentations, and manufacture events which photograph well for journalists filling the conflict region. All to nurture the myth that Israel is carrying out war crimes or crimes against humanity. And what's true for journalists is also true for academics. [...] We now know how the demonic image of the Jew was created. No facts were needed, all that was required was brainwashing. Today we must ask ourselves the same exact question: How was the demonic image of Israel created? We don't need to wait for the distant future. It used to be done by the anti-Semitic right to Jews, now the anti-Zionist left is doing it to Israel. The difference between them is slowly dissipating."[1332]

The new anti-Semitism in general, and that which is developing in media and on campuses especially, has a number of complementary explanations. Among others, it is a result of the increase in the number of Arab and Muslim students and professors in academia (welcome as that is). Unfortunately, many of them translate their hatred towards Israel into anti-Semitic hate—a common and very prominent phenomenon in the Arab and Muslim worlds.

The financial crisis in academia has also played a part. In 2016, the *Telegraph* published an article on the intensification of anti-Semitism on British campuses. One of the interviewees—Baroness Ruth Deech, who was famously raised in the home of Jewish immigrants and in time became one of the leading legal scholars in the UK and president of St Anne's College at Oxford—argued that some of Britain's leading universities have turned into no-go zones for Jews due to the rise of anti-Semitism, and that the high degree of hostility towards Israel in universities throughout the country at times equals the demonstrations of anti-Semitism of old. She also added that many universities have received or are chasing very large donations from Saudi Arabia and the Gulf States, and maybe they are frightened of offending those who control the financial spigots.[1333]

But above it all, it is the simplistic agenda of the New Left, which places privileged exploiters on the one side and all of the exploited minorities on the other, that plays a central part in the anti-Semitic equation. The Jew is perceived as white, rich, well-connected, and patronizing—which brings back all the old anti-Semitic stereotypes of the Elders of Zion deviously taking over the world by leveraging their control of the economy. That's why only "good Jews," leftists who condemn "Israeli aggression," are allowed in the club. Frequently, they are also the ones dictating the radical anti-Israel tone, so as to prove their allegiance to the group.[1334]

It's true that many who identify with the lies spread about Israel are not acting out of anti-Semitic motives, but out of a desire to support those they perceive as weak. However, that is exactly the problem: the awful superficiality of those who are meant to be entrusted with complex analysis and have coalesced into a herd generating Pavlovian responses.

In his amusing anthropological journey through the U.S., described by Tuvia Tenenbom in his book *The Lies They Tell*, the author meets an environmental activist who "cares very much about climate change." He defines himself as, "pro- a woman's right to her body, pro-gay marriage, pro-environment and pro-Palestine." A few moments later, Tenenbom meets another young man describing himself as a liberal, who tells the author he is pro-gay marriage, pro-a woman's right to her body, and pro-environment. "Are you also pro-Palestine?" asks Tenenbom, to which the former promptly replies: "Yes, how did you know?"[1335]

Anti-Semitism has always been a dormant virus which rears its ugly head from time to time, but it is now being nurtured in the greenhouses of the radical left for another reason. It is, among other reasons, intended to cleanse the consciences of Europeans. The Palestinian-Israeli conflict has allowed many to place Israelis (the new Jews) in the role of the Nazis, and the Palestinians in the role of the Jews—obviously disconnected from the cultural and historical ties and a complete distortion of reality. The motto is: while Europeans are laying down their arms, the Jews are holding on to theirs.

But this motto also hides something more profound: If the victim can, under different circumstances, become a murderer, fascism and Nazism can be viewed as supreme human phenomena, and not a historical event related to a specific culture and society. That is also the reason for the West's obsessive focus on the Middle Eastern conflict. Pascal Bruckner writes that it is as if the future of the planet will be determined in the small space between Tel Aviv, Ramallah, and Gaza.[1336]

Some claim that the academic study of the Israeli-Palestinian conflict is unusual in its biases because of the place of the political interests, strong feelings, and bad blood that this specific conflict generates. But the extent of the malicious lies and the level of the hypocrisy here are so remarkable that they cast aspersions on the entire academic system. If an Industry of Lies can be formed in the Temple of Truth, and accepted by most faculty members around the world in silence or with half-hearted criticism, it is testament to an intellectual and moral bankruptcy.

It's important to emphasize that there is no question that the Israeli-Arab conflict has also caused suffering to Arabs and has also hurt innocents. Israel, like all nations of the globe, is not free of injustice. It is legitimate and even important to criticize it and its leaders for failures and mistakes, including from a moral point of view. But one expects that a responsible scholar, especially one who defines him- or herself as a humanist, will draw a balanced and objective picture and not a manipulative and one-sided indictment—and one under the auspices of academia, to boot—which recalls other dark periods in the annals of Jew-hatred.

Thomas Friedman, one of the most senior journalists at the *New York Times*, has commented on the matter: "Criticism of Israel is not always anti-Semitic, and it is appalling to say that it is. But specifically condemning Israel, and voting on special international sanctions on it—completely disproportional to any other side in the Middle East—these are demonstrations of anti-Semitism, and not saying that directly is being dishonest."[1337]

The Boundaries of Academic Discussion

In 2017, a scandal erupted in Israeli academia. Then-Minister of Education Naftali Bennett, a member of the national-religious Jewish Home party, requested that Prof. Asa Kasher prepare a code of ethics for Israeli academia. The request was made in light of tension following the call by a number of scientific associations and universities around the world to boycott Israeli institutions of higher education, echoed by a number of radical Israeli lecturers. Prof. Kasher, a world-renowned expert on the philosophy of morals, a winner of the Israel Prize, and the writer of the IDF's ethical code at the time, was up for the challenge. Apparently, though, he did not realize that he was stepping into a minefield.[1338] Although he developed an ethical code that was careful and apolitical in spirit, which focused on the general checks and balances of academic discourse (for example, "an institute of higher education will distance itself from the sponsorship of political activity," or "a member of an academic faculty shall be wary of any conduct which may reject, silence, exclude, or discriminate against [students] due to their individual attributes or perspectives, including their political views").[1339] But the response to the initiative was, predictably, sharp and sweeping. Israel's Association of University Heads announced that "the proposal denies institutions of higher education the freedom to determine rules of conduct and behavior for members of academic faculties," and the chairmen of the senior faculty organizations put out their own communiqué, which included the following: "The proposed code threatens to negatively alter the working conditions of faculty members, to terrorize them, and to send them day and night before a thought police."

Within one day of the release of the Kasher document, approximately 1,000 lecturers signed a petition in which they committed to ignoring the ethical code, under the claim that the government had no right to interfere with freedom of expression in academia. Kasher himself was condemned and boycotted. “I have no intention of participating in any conference in which Kasher is a participant,” wrote Prof. Guy Ben-Porat of Ben-Gurion University to members of the Israel Academia network. “There is no reason to grant a seal of approval to anyone who willingly chooses to become a commissar, and there is also no point debating him on the subject. He has made his choice. We should make ours as well.” Theater instructor Prof. Aner Preminger of Hebrew University, traversed all the way to the world of film, by juxtaposing the incident with the movie *Mephisto*, which deals with a theater actor who collaborates with the evil kingdom: “He sold his soul to the Nazi devil with explanations which echo the collaboration of Kasher and Bennett, and raises questions regarding the connection between the film and what we are now witnessing.”[1340]

Obviously, the protests and manifestos didn’t exactly detail what exactly was so illegitimate about the proposal made by Prof. Kasher, and offered no changes or improvements to the version he had come up with, used in countless countries and institutions around the world. Due to the timing (increased tension in Israel between the right and left), to the rightist image and identity of Minister Bennett (who as part of his job served also as head of the Council of Higher Education, and had already found himself butting political heads with academia), and due to the political objective he did not conceal (restricting the exploitation of academic freedom for political propaganda, especially anti-Israel propaganda), the real debate went unnoticed: What are the boundaries of discourse within the framework of academic freedom on campus, if there are any?

One prominent Israeli intellectual who has been asked about this fascinating and touchy subject is Prof. Amnon Rubinstein—a legal scholar, publicist, author, philosopher, and politician, considered one of the individuals most associated with social pluralism in general and civilian rights specifically in Israel (he was among the initiators of the Basic Law for Human Dignity and Liberty, and served as Minister of Education, where he steered important reforms in the education and higher education systems.) In his book *Cracks in the Academy*, written with Yitzhak Pasha, the authors emphasize that despite the fact that boundaries on expression on campus must be as free of restriction as possible, both in conferences and classes, they are not entirely lawless—for moral reasons and especially for reasons of proper conduct, sensitivity, and consideration of the other (in their eyes, these restrictions apply only to lectures heard in public places, and not on academic publications).

One of the (many) examples brought by the duo is an event from 2007, when Columbia University in New York, known for its radical progressive approach, invited the president of Iran to give a guest lecture on campus. It defended itself from criticism for giving a platform to an individual calling for the destruction of a sovereign state—Israel—with the claim that the invitation was part of the academic freedom it enjoyed. "In our opinion," write Rubinstein and Pasha, "this is a false claim, since academic freedom does not require a university to invite and respect everyone who is eligible for freedom of expression."[1341]

An event similar in nature occurred that same year at Tel Aviv University. A conference organized by the Faculty of Law under the name "Security for Political Prisoners" invited a Palestinian terrorist, sentenced to 27 years in prison for throwing Molotov cocktails at buses, to lecture (in an additional irony, he gave his talk in the Hall of Justice). Rubinstein and Pasha comment on this: "Anyone who defends academic liberty in this case must answer the following question: Would he have given an academic platform to Yigal Amir, Yitzhak Rabin's assassin, as part of a conference titled 'Criminal or Political Prisoner'?"[1342]

No doubt restrictions on the contents of lectures and conferences, not to mention classes, are a slippery slope. Rubinstein and Pasha note in this regard: "If we start rummaging through their views and trying to distinguish between a professional statement and a political one, we will open the door for censorship on statements by academics. Such censorship will do harm to the required variety of opinions, and may lead to a "cooling effect" (a fear of voicing opinions that are not a part of the heart of the consensus)."[1343] And still, in their opinion, one should remember that academic liberties do not grant a free ride to political propaganda, because that would abuse the mandate and authority given to a professor. The classroom space—and actually the entire course—grant an advantage to the professor over his or her students. Therefore, even if monitoring lecturers is not desirable, they themselves must be extra-careful to avoid preaching, preferring certain views in classroom discussion, directing students towards a particular stance, and a one-sided presentation of controversial social issues as much as possible.

Prof. Ziva Shamir, previously of the literature department at Tel Aviv University, published a paper in which she came out decisively against the politicization of classes in the liberal arts in Israel. In it, she wrote: "When I served as a member of the university appointment committee, I was given the opportunity to review teaching surveys, and to find, on the margins, protest comments by disgruntled students, secretly decrying political abuse from their teachers. It turns out there are more than a few missionary professors who wish to convert their students to their religion, those who turn even a grammatical analysis or a logical exercise into a sophisticated device for preaching and indoctrination. As we know, gone are the days in which teachers understood that a classroom must not be turned into their party branch, and to avoid political dictates, which encourage discrimination and segregation. [...]

"It would be proper to do away with the improper tradition pervading more than a few faculty members: turning the room or the university office into a branch of the party whose flag they fly, while unfairly using the university's mail, telephone and Internet infrastructure, and occasionally even the services of the teaching assistants placed at their disposal. University regulations and budgets are intended to assist them in their research and the training of their students, and not for any other goal. Faculty members should be prohibited from preaching their personal political views from the podium. An academic faculty member's personal opinion is not more important than that of the man on the street, and is not the reason the university recruited him. Lecturers whose political activism burns in their bones should respectfully request a leave of absence from teaching, or replace their academic career with a political one."[1344]

In order to prevent undesired political bias, Rubinstein and Pasha suggest avoiding as much as possible the production of events which are not distinctly academic and which use the auspices of the university to promote political views. It's true that it's important to challenge society and to raise every question and disagreement without fear, but there is no requirement to initiate pointless provocations, which stilt conversation more than they expand knowledge. There is no requirement not to respect your audience, no requirement to offend your students' demographic groups, and no requirement to slander your country and incite against it—and by the same token, not to incite against those who legitimately criticize it. More than this is a question of content, it is a question of pluralism, tolerance, dosage, and style.

The progressive trend undoubtedly stretches tolerance levels in academia to a maximum, and even beyond. No doubt many lecturers, especially in the liberal arts, cross red ethical lines and make improper use of their classes to promote political agendas. That's why an ethical code which defines boundaries of responsibility (it's exactly as it sounds: a code only, and as Kasher defines it, "an educational document without any legal or disciplinary standing") is desirable, and not necessarily an expression of compulsion, establishment supervision, or silencing your opposition. It is actually those who scream bloody murder at the ethical code prepared by Prof. Kasher who, in their hysterics and aggressiveness, as in the political emphasis they gave to their protest, indicate that they approach the debate with unclean hands.

And after all that, it's doubtful whether the solution is the implementation of regulations or the wording of ethical codes. In our opinion, the discussion revolving around freedom of expression in teaching is practically anachronistic. When the education market is completely open, and any institution or center stands on its own (privately, or subsidized by interested public organizations), the question of political legitimacy will no longer apply. No longer will there be a captive audience of students, and all will choose for themselves where and with whom they want to acquire knowledge. Lecturers will be able to slander whomever they want and make a living off it—or not.

The Cumulative Image Damage from Radicalism

In 2016, an astounding legislation proposal was brought to the Canadian Parliament, symbolic of the spirit of the times, intended to amend the existing law against gender discrimination. It suggested adding a clause determining that refusal to use a gender pronoun according to an individual's personal preference would be considered an "expression of hate." In other words, if a man who identifies as a woman asks you to refer to him as "her," you must accede to the request, and anyone who insists on sticking with the biological classification, as is apparent to them, will be considered a felon.

Consideration of the sensitivities of one's fellow man, not to mention his decision to be defined as male or female even if he wasn't born as such, is obviously a positive and desirable quality. However, defining insensitivity as hatred, and even categorizing it as a hate crime, demonstrates the absurd levels the impact of political correctness can reach, and how the progressive group forces impossible behavioral norms on the public (which is in and of itself an expression of violence) in the name of enlightenment.

Many saw this legislative proposal as a gross exaggeration, but no one expected the sharpest and most eloquent criticism to originate from the academic clique itself, and from a field involved in, and leading, the articulation and promotion of political correctness, to boot. Jordan Peterson, a psychology professor at the University of Toronto, was already recognized as an opponent of the progressive dictatorship, but this step was too much for him. After reading the legislative proposal, Peterson uploaded a clip to his YouTube channel under the title "Fear and the Law." There was nothing typical of viral videos in this clip, but the timing, the identity of the speaker, and the topic itself—forced political correctness, both in academia and the labor market—generated hundreds of thousands of views and countless shares and comments on social networks. Peterson further clarified his views in an article published that year in the *National Post.*[1345] The aggressive wording, decidedly not politically correct, and his brave declaration (rare among his colleagues), that he would refuse to comply with this law, scored him additional points among fans. Predictably, they also gave rise to a wave of protests.

Peterson's main claim was that the new gender-neutral pronouns, the unisex pronouns forced upon us by radical leftists in the name of political correctness (for example, "zhe," which is an asexual expression replacing the distinction between "he" and "she"), were New Speech which recalled the first years of the Marxist age, that same idea in the name of which over 100 million people were murdered in the 20th century. In Peterson's eyes, compelling the use of words and terms was illegal.

Prof. Peterson pulled no punches with his colleagues either, those subjected to political terrorism on campuses and censoring themselves due to fear of students', and the administration's, response. He claimed that such legislation would tie their hands even more, since they would fear that any slip of the tongue would bring public condemnation and shaming and drag them to court.

Predictably, a few days after the video was published, Peterson was attacked—verbally and physically—on campus, and the debate spread to international media. He was accused of persecuting transgender people, or at least being an accomplice to their discrimination.[1346] Soon, these accusations were joined by charges of charlatanism, populism, Nazism, extreme rightism, misogyny, transphobia, "white evil," and toxic masculinity. University administration joined in on the witch-hunt, and sent Peterson two letters of caution, which could easily be interpreted as threatening. Their message was that, despite freedom of expression, he must watch his words and comply with human rights laws. They also stated that refusal to comply with the legislation could be considered discrimination against students and faculty.[1347]

In a decidedly predictable manner, for the first time in Peterson's long career, his research funding request was denied by the Canadian Social Sciences Research Council. In response to the rejection, the conservative news site *Rebel Media* started a fundraising campaign for research which generated no less than $195,000 (approximately a two-year budget from the scientific foundation).[1348]

And it didn't stop there. A twenty-two-year-old teaching assistant named Lindsay Shepherd was forced to undergo a disciplinary process at Wilfrid Laurier University in Canada. Her crime was limited to presenting students, during a discussion on pronouns, with two opposing views by professors from the University of Toronto: one by a professor who supported the progressive language updates, and the other by Peterson (as they were presented during a televised debate on the program "The Agenda" on Canada's public broadcasting channel). The process, a disciplinary hearing before three professors, one of them the director of the University's Center for the Prevention of Gender Violence, was recorded, and made its way to the public realm. Ironically, listening to the disciplinary hearing demonstrates Peterson's criticism of the radical left.

The three professors rejected her claim that proper study of a controversial social issue should at least include a presentation of both sides in neutral fashion, in order to open, and not to close, the debate. In their minds, she should have presented it as "This is a problematic idea that maybe we want to unpack."

Shepherd wondered if rejecting one side wouldn't appear to be taking the other side, and the tribunal responded that they could "understand the position that you're coming from […], but the reality is, that it has created a toxic climate for some of the students."

When the teaching assistant persisted and claimed that it was the university's duty to develop the ability to accommodate and cope with different opinions in students, the response was a blur of attacks on Peterson specifically and the right in general.[1349] In other words, more than the story demonstrates the hatred towards Peterson, it reflects the dogmatism, ignorance, intolerance, and inattention prevalent in some circles in academia—exactly what Peterson was criticizing.

And if you were concerned for Peterson, have no fear. He did not remain outcast and lonely. On the contrary. He became a media star and a culture hero, with hundreds and thousands of followers on Twitter and Facebook—a type of saint among sinners (at least as far as his fans are concerned), a symbol of the war on the progressive agenda in general and especially that which is created by academia. His YouTube lectures have recorded tens of millions of views, and he has been the guest of endless interviews.[1350] His book *12 Rules for Life: An Antidote to Chaos* has become an international bestseller and has been translated into dozens of languages. It includes the message, "don't whine, don't look for excuses and don't victimize yourself even if you belong to the exploited side. Life is a struggle, and you need to know to face it with your head held high and take responsibility for yourself."[1351]

By the way, C-16, the bill with which we began, passed the Canadian Parliament in July 2017, after Peterson was invited, along with another 23 witnesses, to be heard before a Senate committee.[1352] He has since become the most prominent and leading spokesperson against the progressive wave sweeping the world, with a focus on academia. His popularity is based both on the fact that the progressive agenda angers many, and because he is not the typical conservative spokesperson. Similar to legal scholar Prof. Alan Dershowitz, he is not an evangelist or a vulgar extreme nationalist. He is not even a religious neoconservative, perceiving the humanities as a greenhouse which nurtures atheism, anti-patriotism, corruptive relativism, and sexual promiscuity. Neither is he a chauvinist or a homophobe, but rather an enlightened intellectual, who embodies a common perspective in the political center—a comprehensible, reasoned worldview which forces his rivals to think.[1353]

Peterson has become such a popular figure—and so hated at the same time—because many have a bone to pick with leftist academia, because he comes from the very heart of the scientific elite, and because his claims are direct and articulate and attack many aspects of the progressive agenda. So, for example, he has not hesitated to criticize the cheapened use of the term "white privilege,"[1354] and has ridiculed "postmodernist feminism" for stereotyping males and blaming masculinity for most of humanity's sins.[1355] He has also exposed the absurdity inherent in "cultural appropriation theory,"[1356] which claims that European colonialism violated the collective spiritual rights of natives by taking the original works out of their cultural context, for example, using motifs of traditional African wear in French high fashion. In his eyes, when the motto is "the more you label and condemn the West the better," even positive cultural impact is considered a sin.[1357]

Whether you agree with Prof. Peterson's views or not, the immense public sympathy he has accumulated, especially due to his ridicule of the liberal arts, represents a new set of circumstances in which a primary branch of science loses not only the traditional respect and esteem to which it has been accustomed, but also its legitimacy among a not-insignificant portion of the educated public.

The reserved-to-hostile view of academia is reflected in current surveys: for example, Pew's national survey in 2019 had only a third of Republicans with the opinion that universities and colleges have a positive impact on the nation (this is a persistent downward trend over the years from 58% in 2010). This as opposed to Democrats, among whom double that rate were of the opinion that higher education had a positive impact (although recent years have seen a drop of 5% – from 72% in 2016).[1358]

The politicization of the humanities, as well as their problematic conduct, is costing them dearly. Not only are they naturally contributing to a drop in demand for studies in these fields, but they are also influencing the motivation for financial contributions to their institutions. These factors also play a large part in the decisions to close courses, and one can expect that more weight will be given to them in the future, if and when the question of whether to continue to operate the liberal arts in an academic framework arises.

For many, the word "liberal" has such negative connotations by now, in an academic sense, that U.S. colleges have seriously considered removing the word from their professional definition ("liberal arts college") and from official objectives documents in order to avoid alienating donors.[1359] More and more people these days are of the opinion that every individual and every group has a right to preach and educate the values and beliefs they hold, but that they should do so on private platforms and with personal funding, and not within the framework of academic classes.[1360]

Do the Humanities Have a Right to Exist in Their Current Format?

The principle of academic freedom also allows scholars to select the topics of their research. The wide latitude given to them carries obvious benefits, but also disadvantages the price of which is growing steeper. As described in previous chapters, many of the studies deal with esoteric subjects that contribute little to humanity and interest a tiny group of people, if at all.

Nevertheless, science continues to protect the principle of freedom of research, because:

- It's a tradition—and you don't change tradition (especially one that supposedly works).
- Freedom of choice is part of the profession's charm, and motivates creative, independent people to choose an academic career.
- In research, as in art, you can never know what will lead where, what will connect to what, and what will be the benefit in the distant future—including the practical benefit. To demonstrate, a historical study of drug manufacturing in the Middle Ages may indirectly yield an idea for the development of a new medicine.

  The nurturing of human curiosity and the discovery of the secrets of the universe should not be, in theory, conditioned on anything. In this respect, science is similar to sports: society allocates a huge amount in order to develop athletes only so that they may break records. In the breaking of the record there is, as we know, no practical benefit, save for entertainment and individual pride, and yet it is important that people compete, challenge themselves, and expand the boundaries of human abilities and knowledge. One can recall, in this regard, famed mountain climber George Mallory. When asked why he climbed Mount Everest (which is also where he met his demise), he replied simply, "Because it's there."

And yet, science carries considerable expenses, and the funding of one goal must come at the expense of another. As long as academia was a modest institution with no outside competition, the question of funding and subsidies was never fully considered. But in the meantime, conditions have changed. Perhaps it is time to rethink, and maybe even challenge, the principle of absolute research freedom and the generous subsidy it receives. Many assume that the potential of discovery remains steady, and an invention arrives when inspiration falls on a scientist's head like the apple on Newton's. Such inspiration is indeed an important and vital element of science, but in essence, the world of research is much grayer and not nearly as glamorous. And in any case, the percentage of Newtons isn't high, and society does not have the money to fund so many trees and apples and so much free time to think.

Around the corner, and more than that, beyond the horizon, there are indeed endless topics awaiting study and problems awaiting solutions, and the further science progresses the more it becomes clear to us how little we know about the world. But it seems that the old model is close to the limits of its usefulness, and is primed for a change of considerable magnitude. Because the number of scientists consistently grows, because a scientist must innovate with every paper, because the number of papers demanded of him continues to rise, and because most research methods haven't fundamentally changed (in other words, most scientists walk the same old paths and find it difficult to pull rabbits out of their hats)—the field is saturated (temporarily, of course). In other words, scientific research is narrower in its scope today, adding only small drops to the ocean of information, and raising more and more variations on the same theme (similar to what is happening in the world of music).

This phenomenon is especially prominent in the humanities, because unlike the hard sciences, in which technology, especially digital technology, is expanding the operating range of natural sensing tools (eyes, ears, computational abilities), in the liberal arts research methods are pretty much fossilized. The liberal arts and the humanities have always lagged behind anything regarding research technology, and have relied on "manual labor": reading texts, digging in dirt, interviewing, patient observations, and so on. Peak technology came in the form of surveys, which are also based on human labor.

The theoretical realm also appears to be reaching saturation and the end of an era. Theories in the humanities have always had a charm to them, because they explain us to ourselves. That is also the reason why great philosophers and theoreticians—such as Freud, Jung, or Marx—have become historical-cultural heroes, and so many are familiar with their texts, even beyond the realms of academia. But nowadays, just as the great myths and ideologies have dissolved, so are the great theoreticians receding. Most liberal arts and humanities scholars today tend to explain their findings by copy-pasting premade theories and climbing high and distant trees.

It's important to note once again that the scientific journey to discover the secrets of the universe is still in its infancy. However, as the old mechanism creates more and more irrelevant products, the financial investment in science is less likely to provide reward. In order to prevent waste (which is immense in science), a rethinking is required on the manner of funding allocation. In the meantime, there is no doubt that competitors outside academia are in most cases able to conduct better and more efficient research, as you can see:

- Most studies in history are based on derivative paths, left behind by previous generations, and limited in scope: archived files (documents and photos), items remained and preserved, and oral testimony. Public archives are indeed packed to the brink with millions of documents and items that no eye has seen, but they do not materially change the historical landscape, nor are they expected to, but at the most make the existing one more accurate. That's why only a handful of lunatics are interested in the subject. Here and there, a historical finding is discovered that lends a twist to the familiar narrative, but these are rare, and they generally also don't change the supreme narrative on the basis of which social identities have already been created.

  People today read less. They wish to see the panoramic image and not focus on every pixel. At the same time, historical research has become narrow and pedantic. Historical scholarly associations operate as closed circles of fans or obsessive collectors. They collect more and more details on distant events that for most people have disappeared into oblivion, debate and argue matters which appear trivial from the sidelines, and thrill and excite mostly themselves. From an intellectual standpoint there is perhaps beauty in it, but as far as the public wallet is concerned, the waste is egregious. Should the public stop treating academia with such deference, should it understand what it is truly funding, it is highly doubtful that this framework would continue to exist.

  The question of the funding of history departments has become more pressing in light of the development of archives—and the wider public's lack of access to them. It's unpleasant to admit, but nearly anyone can work as a historiographical writer. In essence, the vast majority of papers and books in the field today are written by private researchers, and countless nonprofits and public organizations are busy preserving, documenting, and researching history. Furthermore, while academic historians are shackled by slow and non-interactive journals, independent researchers communicate between themselves on immediate digital platforms.

  History departments in universities, funded by taxpayer money, find it difficult to compete in another arena—the teaching arena. The money, equipment, and manpower at the disposal of large media companies allow them to produce immersive documentary films and series, which put most academically produced learning materials to shame. In any case, most people today prefer watching a movie to reading or listening to a lecture. If by now history departments already seem like a remnant of history, the future is about to retire them. Digitization fundamentally changes documentation and preservation patterns, and is expected to engender a new type of research. The amount of material stored on our smart devices every day is immeasurable. If in the past we used to correspond using a measuring cup and save letters in a drawer or a box, we now all send dozens, and even hundreds, of messages and images every day, and these are saved on memory cards or somewhere on one of the clouds, among the chips, or with another person. No historian will be able to cope with the amount of information using the old methods, which begin with reading. A computer, on the other hand, would be able to generate countless generalizations about the past, and with the click of a button one would be able to know, for example, what people living in the Northern Hemisphere ate for lunch between the years 2000 and 2020, or what was the most popular toy in Barcelona in 2019. In such a reality, the budget and subsidy model of historical research would have to change. Just as preprint software pushed out lead compositions, and just as truck drivers overran donkey riders, so will the computer bury historiographic artists, who spend most of their time reviewing archived documents. The new academic trend, with the amusing nickname of "digital humanities," indeed represents a recognition of the new historiographic reality, but it is doubtful if academia will have the required budget and knowledge to conduct the necessary professional transformation.

It is true that we will always need a human mind at the end of the process—especially to ask the questions—but not an army of historians working full time.

- The science of archaeology demonstrates the dilemma of scientific resolution from another direction. Below the surface, many remnants of ancient lives are still buried, that might never be exposed due to the higher costs of expanded excavations looking deeper underground.

Moreover, excavations must be prioritized, and so it is natural that more recent ancient civilizations, who have left more behind, are given public and scientific priority. The science of archaeology clarifies the question of the public's involvement in setting the priorities for the allocation of funds to scientific research.

There are those who claim that the public at large does not have the appropriate tools to decide where to dig, what to research or what to preserve. That may be true, but the consideration here is not scientific only. Should the public be given the right to influence (alongside scientists) priorities in the allocation of resources to scientific activity, the archaeological map would probably be altered, and for good reason. That's because in reality, what influences the direction of research is primarily academics' random areas of expertise, which do not necessarily align with the interests of the public at large. The result is that library shelves continue to stack papers and books that no one reads, and no one probably ever will.

It's important to note, that similar to history, the basic archaeological maps of the ancient world have already been drawn up, and museums are home to an endless number of items, mostly in dark storage units, like stones unturned. No one means to stop digging, exploring, and locating historical treasures at this point, but a wider scientific list of priorities can be drawn up, and we should mostly stop and ask if we really need so many archaeologists in full-time academic positions. Wouldn't it be better to pool resources by consolidating courses and departments, and be content with a smaller number of research institutes? In any case, a large share of archeological digs are conducted by professional archeologists who are not employed by the higher education institutions.

- The liberal arts challenge the question of subsidy more than any other field. Not only is the research of literature, theater, film, visual arts, and music most distant from the empirical model, but most critics operate outside academia, and at most are employed in part-time positions. Furthermore, if in the past most respectable journalistic mediums included sections for artistic reviews, which also produced authorities in various fields—the analytical discourse today has expanded and decentralized. At a time in which anyone can create a website, Facebook page, or blog, and even publish a book at minimal cost—art criticism and analysis are no longer the property of institutions of higher education. Self-appointed experts and analysts, without any formal degree, publish reviews and analysis at a level and profundity no lower than that of academic experts. And while the latter are conversing mostly with themselves—via journals closed to the public—independent analysts are publishing their pearls of wisdom in the virtual space, and encouraging an open, multi-participant, democratic, and vibrant discussion.

It should be noted that most people cannot manage a significant study in STEM fields for the simple reason that they cannot set up labs, purchase expensive professional equipment and materials, and employ research assistants. In contrast, studying, and particularly critiquing, works of art can be done by anyone. So can teaching. And indeed, while academic courses are dying, outside, these subjects are blossoming: Art schools and courses, previously focused on practical training, now incorporate theoretical study materials into their classes, and demand only rises from year to year.

The study of the human spirit as reflected in artistic works is extremely important, but if society truly wants to educate its citizens, to train them to think in an analytical and critical manner, to make their aesthetic and moral reviewing tools more sophisticated, and improve their sensitivity and ability to enjoy new things– it must take the liberal arts out of the bubble. It also must avoid discrimination: funding one small group of privileged academics, who have no advantage over other analysts.

- If any group of sciences has lost its relevance more than any other discipline, it is the social sciences. Most studies of human society until today have been based on periodical population censuses, on surveys by government agencies, and on questionnaires initiated by academics and funded by research foundations. These databases are severely limited, especially by the scope of the data and its timeliness. In a dynamic society in which trend follows trend, wider databases are required, as well as much quicker and more delicate sensing tools. Such tools do exist in the virtual space. With most of the population connected to the same power grid, when an individual's digital footprints can be tracked in sequence—including movements in the physical space, messages exchanged, Internet habits (how much, when, where, with whom, and so on), purchasing habits, and response to various events—the rules of curation change. Immense computing power alongside artificial intelligence already allow—and will allow even more in the future—the collection and processing of an endless number of variables regarding the people behind these "users," and will be able to display complex profiles at the click of a button.

  The social sciences have grown less and less connected to the field, not only because they are stuck in a political knot and are philosophizing themselves to death, but mainly because their sensing tools have not yet been adapted to the new era, and because private companies in the business of data mining and processing are leaving them in the dust. They cannot compete with these companies, and basically with any private entity working on mining social data—because they don't have the required budgets. In fact, most information about the population is currently held by global media

> corporations, such as Google, Facebook, Netflix, and the like, and not by government or academic entities, and the research significance of this is clear.

It's important to add a caveat: human society will be called on to solve profound ethical questions concerning social science in the age of the Internet. The current state, in which private companies (which are also commercial by definition) possess immense data about their subscribers, and track their movements (covertly or overtly)—is unhealthy, to say the least. Regardless of the solution to these issues, the future of social research is floating in the virtual space, making these old social sciences redundant, which will no doubt lead to attrition and the closing of departments.

9

The Lost Paradise

The Crisis of the Academic Career

Falling in Love with Academia

Some say that choosing a profession is similar to choosing a mate. It's a kind of alchemy that cannot really be explained and whose molecules are hidden and mysterious. However, studies have made it possible to carefully outline basic common characteristics among people who choose academia, with its diverse fields, as a profession: curiosity, scholarliness, critical thinking, high self-esteem, an urge to stand out, competitiveness, creativity, independence, entrepreneurship, a fondness for challenges, mental capability, and in many cases also a love for reading, writing, and teaching. Many academics prefer working with their heads to working with their hands, and their need for spiritual reward is stronger than the need for a material one. This is also the reason why like artists, scientists also tend to become addicted to their work and perceive it as much as a hobby as it is a livelihood.

In contrast to many other professions, people rarely choose an academic career after performing a market search or consultation with placement experts. Towards the end of their undergraduate studies, something just clicks. This may sound like a tired cliché, but it takes passion for someone to choose academia. You need to "fall in love" in order to survive such a long, grueling journey, with high uncertainty and not much leeway. But those who succeed almost never regret it. At least, that's the way it used to be until a few years ago. The explanation lies within a series of advantages that were hard to find in other professions:

- Interesting and wide-ranging work that is not locked in daily routine. Although doing lab work and grading exams can also get tedious after a while, it is still a world away from the monotony that characterizes most professions.
- The academic profession is ranked high on the scale of social prestige.
- The practice of science is very liberating from the shackles of the material life. It allows scientists to engage with theories and ideas of the utmost importance, while living in a sheltered intellectual space. Researchers, much like mountain climbers or explorers, are pioneers who get to be the first ones to encounter a reality beyond the horizons. Though most scientists don't get to make dramatic discoveries or publish papers or books that actually leave a mark, even making a minute contribution to human knowledge provides one with a sense of gratification.
- Scholars (at least by their own definition) are soldiers in the army of truth, while most humans are trapped in the chains of lies and delusions.

  Those who open others' eyes, save lives, improve quality of life, advocate for pluralism, and battle ignorance and deceit are also warriors for justice.
- Scholarly work is done in the company of high-quality peers, and thus challenges and inspires those who engage in it. It is also usually done in young, casual workplaces, in many ways serving as a continuation of student life. Furthermore, some say that those who engage in the life of the mind age more slowly (even after retirement), so at least in this respect, it is worth being an academic.
- The academic career is unique because it develops in a less hierarchical environment, allowing for significant autonomy (for instance, when choosing research topics or lab and/or office working hours)—certainly when compared to most organizations. This is also a job with a more flexible schedule, which enables taking breaks in order to recharge (semester breaks, end-of-year vacations, sabbaticals, and so on)—a benefit most people can only dream of.
- The academic campus has a great deal of charm. Firstly, this is usually an aesthetically pleasing work environment, at times with a monumental-historical nature, which makes one feel as though they are walking in the footsteps of giants. Secondly, new students and associates fill up campuses every year—creating a sense of rejuvenation and of turning over a new leaf.

- Students in institutions of higher education come to study of their own free will. There's great satisfaction in opening their eyes, exposing them to worlds they are unfamiliar with, arousing their curiosity, and encouraging them to think and to doubt. Teaching also gives the lecturer the privilege of getting to discover new talents, shape worldviews, become a mentor, and sometimes even be a guide for life who will be engraved on the hearts of students.
- Academics get to speak before diverse crowds and stand in the spotlight at center stage, just like theater actors.
- A position in an institution of higher education guarantees a reasonable salary with a variety of additional benefits—through research foundations, consultancy jobs, commercial entrepreneurship, off-campus lectures, overseas conference travel grants, discounted services (sports club, healthcare etc.), and a private office. Tenure, which still exist in some institutions, grants job security, and the personal promotion track enables (at least in theory) faculty to attain a high pay grade at a young age.

  Retirement arrangements also provide a considerable advantage to the scientific profession (most retirees enjoy a good pension). And even more significant: this profession allows scientists to age slowly and with dignity. They can keep researching, publishing and advising students, thus softening the retirement crisis.

Unfortunately, these traditional advantages have been gnawed away in recent years, which begs the question: Is a career in academia still worth the investment, risks, and tolls it takes?

In order to answer this critical question, we will expose and delve into the current reality of the academic field—a far less glamorous reality than the common myth and the illusions prevalent among many young folks.

The Illusion of Discovery

People tend to set realistic aspirations for themselves. Yet, deep in your heart, there is always the hope of spreading your wings and surprising yourself and the people around you. Science deals with discoveries and innovations, and all scientists dream of making a breakthrough and getting to touch the everlasting. In the distant past, when science and research were reserved for a select few, and human knowledge was limited, the potential for innovation was relatively high. Nowadays, in a world where millions of scientists live and operate (including in industry), and where dozens of papers are published every hour—the marginal professional contribution of each scientist diminishes. In fact, as we have described in previous chapters, many scientists recycle studies and publications and add very little to existing knowledge, if at all.

Tightening control over outputs further reduces the likelihood of a lone scientist embarking on a daring research adventure. This is the reason why many researchers in academia only feel the freedom to engage in topics that actually challenge and interest them towards the end of their careers, or after they retire. Tragically, the private industrial market is much more open nowadays to creativity and entrepreneurship, and (broadly speaking) is more inclined to allow scientists to break new ground and fulfill their intellectual fantasies. The major potential for innovation, as well as the technological resources, incentives and rewards, can be found there rather than in academia.

The Illusion of a Job

Advanced Studies

The traditional model of academia drew inspiration from the Christian Church, and has birthed education systems with various tracks and degrees over the centuries. For example, several countries (Netherlands, Italy and more) introduced a post-secondary education system as a precondition for academic studies. Countries influenced by German tradition did not distinguish between a B.A. and an M.A., which made up a single degree known as a "diploma" or "magister."

The Americans—known for their talent to simplify and streamline processes—perfected the European education model, which allowed them to garner success for many years. And as the American influence on science grew, many other countries embraced this model or made modifications to their traditional model following its example.

Globalization narrowed the gaps even further. The Bologna Process, for example, produced a series of agreements between European Union member countries in 1999-2015. They manifested, among other things, in the creation of similar study tracks and the establishment of international coordination and regulatory bodies (led by the European Higher Education Area).[1361]

The differences have yet to completely disappear, but there is already a broad common denominator among systems of higher education around the world that includes the following elements:

- The education defined as "higher" includes three levels of degrees: a bachelor's degree (known in the U.S. as "undergraduate studies"), which takes three to four years to complete, and advanced degrees (known in the U.S. as "graduate studies"): a master's degree, which takes between one and three years to achieve, and a PhD, which varies from field to field but usually requires at least three years. Excelling at every level is a condition for qualifying for the higher level.

- Many countries have non-academic tertiary education tracks, mainly to train technicians and practical engineers. These professions are studied (for a period of one to two years) in institutions of higher education or specialized schools, and their graduates receive professional certification after a practical exam. These studies are recognized in some countries as academic credits.
- Different types of academic degrees are commonly distinguished by the use of different titles: degrees in the exact sciences, for instance, include the word "science" rather than "art," and there are also Bachelor of Business Administration (BBA); Master of Business Administration (MBA); Bachelor of Engineering (B.E.); Bachelor of Education (B.Ed); and Bachelor of Laws (LL.B). Doctors of Medicine receive a Medical Doctor degree, or MD for short, which is fundamentally different from research doctors (in some countries, medical doctors receive a different title than other doctors. For example, in the Netherlands, a medical doctor is known as "dokter" rather than "doctor").
- Usually, advanced degrees require fewer courses and credits.
- Admission requirements for advanced degrees are usually a high GPA (grade point average) in previous degrees, as well as recommendations from your class's professor. In several countries, the requirements for admission to graduate school include exams and occasionally another school year. Students who wish to study toward an MA in a different field than what they majored in for their BA studies are usually required to take introductory courses (in order to catch up). In some countries, the PhD track skips MA studies, while others also have a fast track for outstanding students (known in Israel as a "Direct PhD").
- MA and PhD studies usually also include gaining experience in research, but there are some graduate degrees on a non-research track, which do not lead to a career in academia.
- Most counties distinguish between professional degrees (engineering, medicine, therapy, teaching, law, and sometimes economics as well) and purely general degrees. In most cases, professional degrees have stricter admission requirements, are longer, offer a less flexible curriculum, and include a mandatory internship. This distinction is particularly significant in countries with

a tradition of craftsmanship, such as France, Germany, and Italy. Another difference is that the professional degree is studied consecutively, without interim degrees, and grants students the degree of Master (for instance in engineering) and Doctor (mostly in medicine). There are some countries, such as the U.S., where studies towards a major only begin after two to three years of general core studies.

- The use of the terms "Master" and "Doctor" was born in the Middle Ages, and their original meanings were similar: license to teach Christianity. Artists and craftsmen used to be associated with the same group, and since acquiring knowledge is the foundation for acquiring professional skills, it is only natural that a basic (undergraduate) academic degree was known as a Bachelor of Arts (B.A.) and an advanced (graduate) degree was known as Master of Arts (M.A.). "Bachelor" was a nickname in the Middle Ages for young knights, and later for new members of professional guilds.

  The origin of Doctor of Philosophy (PhD) – which nowadays is given in a variety of scientific fields (not just philosophy)—lies in the distinction between two groups: medicine, law, and theology, which were considered Christian degrees, and the modern and secular degrees which were included under "philosophy" (the Greek word lent to this degree due to its meaning: "love of wisdom").

Between Student and Advisor

Alongside academic courses, the research track in graduate studies requires students to design and carry out original and independent research that innovates and makes a contribution to the advancement of knowledge in the fields they chose. They must also write a concluding academic essay. Every "research student" is attached to an advisor (also known as a mentor or supervisor); however, this is not an inherent right, and it depends on a faculty member's willingness to take the student under their professional wing. Such willingness requires a meeting of interests—in other words, a research topic that interests both the student and the faculty member, as well as interpersonal chemistry. The idea usually comes from the student, but it's not uncommon for the advisor to be the one to suggest the topic, usually as part of a large-scale research project that he or she is involved in.

Students usually start looking for an advisor after the first year of their master's studies, whereas in doctoral studies, finding an advisor is a precondition for admission. Many departments hold introductory days with potential advisors. Faculty members introduce themselves and their research interests, and students may then approach whomever seems like a good fit for them with regard to their area of interest, the budget at their disposal, and their personality. Sometimes, mainly when it comes to interdisciplinary topics, advising is conducted by two advisors, and in even rarer cases three or more (they are referred to as an "advisory committee").

The advisor plays a crucial role not only because the student's acceptance to doctoral studies is contingent on his or her consent in the first place, but also because he or she outlines the course of the research and accompanies the student for its entirety. There is a significant difference in this sense between hard and soft sciences, since laboratory work is daily, and research students in chemistry, biology, or physics actually often become part of the researcher's laboratory staff. In the soft sciences, advising nowadays is mostly conducted by correspondence, with the occasional fine-tuning sessions.

In most cases, the advisor is also one of the final assessors of the thesis, alongside other reviewers, and can affect who is chosen for this role. Intrigue, personal vendettas, battles of ego, and heavy workloads, which are typical in the academic review world in all of its shapes and forms, place an extra burden on advisors' shoulders—both because they hope that their students will succeed and because the advisor will also get the credit or blame for the students' success or failure. It is not uncommon for students to receive a brutal review that was actually aimed at the advisor. Similarly, it is not uncommon for advisors to try to solicit their colleagues to review a student's research, or spring to their defense when confronted with an un-objective reviewer.

Since graduate studies extend over the course of several years and have their ups and downs, one of the advisor's roles is to provide mental support and encouragement. Success or failure, including the decision to quit, in many cases depends on the relationship that has developed between the advisor and the student. It might be a friendly relationship, in which they operate as a team united to achieve a mutual goal, but in other cases both parties might be longing for the day they'll never have to see each other again. The advisor also has an important role after the degree's completion—in recommendation letters, professional connections, and co-authored papers.

In the distant past, when a graduate student was the advisor's apprentice, the advisor's identity served as a status symbol, because the young student was considered his or her successor. Nowadays, many faculty members have an army of apprentices, and their personal bond is usually weak.

The Thesis and Its Review

The academic essay, which is submitted at the end of MA and PhD studies, is rooted in German culture, and is known as a thesis or dissertation. Its scope varies depending on the field, department, and advisor. While a doctoral thesis in math can be a dozen pages long, a history thesis can spread across hundreds of pages. Many institutions limit the scope due to the faculty members' shortage of time and the growing number of research students.

As aforementioned, in recent years some institutions have offered master's degree programs without a thesis, in which case the student isn't qualified to continue to doctoral studies. The students don't submit a final research paper, and instead are required to take more courses. In most cases, they also have to submit a practical dissertation with a narrower scope. Concurrently, more and more institutions have replaced the doctoral thesis with a number of papers in peer-reviewed journals ("papers' format of PhD"). This format is particularly common in the natural sciences, engineering, and medicine. In some cases, students are required to summarize the papers they have published in a thesis-like essay.

Before their work can start, students have to submit a research proposal, which is reviewed and approved by faculty members from the department or institution where they learn or by external readers. PhD students usually also need to submit regular progress reports (usually at the end of each academic year). The deadline for submitting the final thesis used to be flexible, which caused the process to linger. Nowadays, it is customary to restrict the duration of the studies and the writing of the thesis, and urge procrastinators to submit their work on time (in several countries, institutions are fined by government funding bodies for degrees that are not completed on time).

After the thesis is approved by the advisor, it is sent for final review. Though the model varies across all countries and fields, the following two models are the most common: In the first model, an ad hoc review committee is established, comprised of the advisor and two to four other faculty members. In some countries (like the U.S.) the committee is made up solely of faculty members from within the institution, and in others (such as France), it also includes faculty members from other institutions—sometimes even from abroad. The reviewers read the thesis and summon the author for a "thesis defense" session. The student briefly presents the research, and the committee members ask questions that serve as an oral exam of sorts. After that, the committee debates and reaches an agreed-upon decision. In master's studies there is usually a grade, whereas in doctoral studies the decision is usually binary—rejected or accepted. Some institutions also grant a "doctorate with honors.

According to the second model, the advisor proposes a list of potential reviewers from other institutions. An internal committee, of which the advisor is not a member, selects reviewers from the list (two to three in master's studies and three to five in doctoral studies), and occasionally pick someone who's not on the list.

The reviewers compose detailed reviews, and recommend to the university whether to approve the thesis and degree or not. As is customary in science, the review is usually anonymous. The student and advisor don't know who the reviewers are (in some institutions the reviewers' identity is known only to the advisor), unless they agree to reveal their identity.

Similar to the publication of papers, here too the student is almost always required to conduct a round or two of revision, in accordance with the reviewers' notes and under the supervision of the advisor and university committees. The amended work is reviewed by the advisor and sometimes again by the reviewers. The degree is usually approved only after all of the reviewers are in agreement that the paper is worthy.

Is It Worth the Effort?

Previously, only a small percentage of B.A. graduates continued on to graduate studies in general and to a PhD in particular, but in recent years their numbers have grown considerably. To illustrate, between 1995 and 2014, the number of doctoral graduates in OECD countries had nearly doubled, way beyond the population growth rate.[1362]

Master's and doctoral studies used to be so prestigious that no one dared to question their worth. Anyone who chose to study an advanced degree and was accepted received wall-to-wall praise. Even nowadays, there are supposedly good reasons to continue to graduate studies, the most important of which is that in-depth studying challenges the mind, expands the horizons, nurtures the soul, and raises self-esteem. This is an opportunity for students to devote most of their time to research, become immersed in an unparalleled educational and intellectual atmosphere, learn about fascinating worlds, meet interesting people, invent and create. For many, working independently on an intellectual project which is also supposed to discover and innovate in and of itself is a unique and exciting situation—not to mention the close guidance which forces you to modify, polish, improve, and mainly rise to the intellectual challenge and meet the expectations of smart and knowledgeable people. Many students, mostly those who come from families without an academic degree, highly admire professors well beyond what they really deserve.

If we were to pass around a questionnaire among all doctoral graduates that ever lived, the vast majority would have probably noted that the effort paid off and that this was a meaningful period in their lives. However, we mustn't ignore the fact that the times have changed. Currently, it's becoming increasingly clear that the value for effort of academic degrees is diminishing, whereas the alternatives are more worthwhile. Let us elaborate:

- **A long and grueling process**. The average duration from the beginning of one's M.A. studies to the moment of receiving one's doctorate is six (mainly in "hard" disciplines) to ten years (mainly in "soft" disciplines). When also taking the duration of B.A. studies into account, this is a long chapter of a person's life.[1363] So it is no coincidence that about a third of PhD students drop out before reaching their goal (the rate in the life sciences is even higher).[1364]

  The process's length has become a prominent disadvantage in recent years, for several reasons:
  - In the age of instant gratification, people have less patience for long, grueling tracks.
  - Prolonged studies were previously suitable for people who sought a scientific career and were in no rush to get there. Many PhD students in those days came from wealthy families that supported them in their studies. Nowadays, most doctoral students do not have the financial means, and yet they have to sacrifice some of their earning capacity for years.
  - Graduate studies keep students out of the real world, while their friends climb up the career ladder, achieve financial stability, and raise families.
  - In the information age, the slow publication of the PhD (particularly in the humanities and social sciences) endangers innovation and the pioneering sensibility. By the time you do your research, write the thesis, and get it reviewed—the topic is often no longer interesting, and in many cases irrelevant.
- **Uncertainty**. Students these days prefer to know what kind of adventure they're embarking on and what exactly it requires of them. Graduate studies have very little certainty. When the thesis is sent to external reviewers—whose considerations are not transparent—the chances of being rejected and/or delayed are hard to predict. Furthermore, in a "papers track PhD," which is based on publishing in peer-reviewed journals, another element of uncertainty is introduced: the journal's editor and external reviewers, on whom neither the advisor nor the educational institution has any influence. The result is that research students enter a trajectory in which their hosting institutions are unable to present clear terms for success, and may end up getting slapped hard in the face.
- **Struggling to make ends meet.** Graduate studies, and particularly doctoral studies, don't just take a long time, they are also quite costly. The studies

may be subsidized in part or in full by many governments, but the degree's overall costs come into play in more than just tuition. Studying toward a doctorate used to enable a reasonable existence thanks to generous scholarships as well as research and teaching assistant jobs. Nowadays, due to the financial plight of institutions of higher education, most research students are employed as contract laborers, earning a student's salary on an hourly rate.

In the U.S., for instance, a doctoral student's average salary is less than $15 an hour—less than what you'd normally pay a babysitter. In only a handful of countries (such as Netherlands and Norway), as well as in a few wealthy institutions, are doctoral students employed as junior faculty members, earning a fixed monthly salary.[1365]

The supply of scholarships has also declined, as have the sums, since many social organizations prefer to donate to the needy who are much worse off. In the US, for example, only a low percentage of doctoral students receive an annual scholarship, barely managing to scrape by.[1366] Furthermore, those who receive a scholarship are unable to supplement their income, as what academia calls a "part-time job" is translated in many cases into never-ending work hours, and because institutions of higher education do not encourage and sometimes even flat-out prohibit research students to get another job, supposedly in order to force them to focus on their studies. The result is that the period of advanced studies becomes an economic nightmare and produces a heavy financial burden.[1367]

And the cherry on top: One of the most significant financial advantages of doctoral studies in the United States, Europe, and Australia used to be getting a work visa, which would hopefully open the door to citizenship in the future. But nowadays, as Western countries place restrictions on immigration and on imported workforce, the chances of turning one's work and study visa into citizenship are much lower. To illustrate, the current waiting period for American citizenship for an immigrant scientist from India is eight years, and getting the long-awaited document is dependent on his/her publication list.

- **Exploited workforce.** Criticism of the manner in which advisors exploit their students and research assistants has grown stronger in the past few years. This exploitation includes a variety of problematic behaviors: "grey" and "black" theft of data, copyrights, and ideas; insufficient credit to students on research author lists (if at all); unfair wages; abuse of power (such as tasks that are unrelated to the research) and more. Most institutions have clear ethical rules on this issue, but many researchers know how to cut corners and stay in the shadows.[1368]

And as if that were not enough, studies and articles have revealed that sexual harassment is not uncommon in academia (both towards students and towards associates). Most institutions may have bodies that are supposed to deal with the phenomenon, but there is broad agreement among experts that most offenses go unreported or are silenced.[1369] A symbolic event took place in Chile in May 2018, when a wave of protests against sexual violence in campuses broke out, following the mishandling of explicit sexual harassment revealed in the Faculty of Law at Austral University. The protest led thousands of women to march down the streets of Santiago, and protests quickly spread across the nation.[1370]

It should be noted that academia is fertile ground in which such weeds can grow, for two reasons: One, because the unique personal bond created between advisor and advisee increases the potential for abuse by power-hungry, ego-driven faculty members. Two, because students' total dependency on the advisor makes it harder on students to respond with the necessary resolve and file a complaint. Beyond the unpleasantness of such a complaint, it could force students to drop out of their studies, after putting so much effort and money into them.[1371]

- **Intellectual challenge is not guaranteed.** Academia used to be the main provider of intellectual innovations, employing the best minds. Thus, higher education was an unmatched, unique, and enriching experience. But these days, a great portion of faculty members are far from being great scholars and are not innovative either. Most of them actually serve as "science clerks," whose primary occupation is paperwork. Even the more talented ones find it hard to invest in their students, because as we've shown, the institutions do not reward them for that.

Moreover, when the PhD degree depends on publishing in journals, it's only natural for advisors and students to pick topics that are supposedly guaranteed to be published. This means that at the most critical point in a scientist's life, when their mind is fresh, motivation is high, and creativity is blossoming, talented people have to produce predictable and conforming papers.

Doctoral studies are also less challenging these days because of the decline of reading culture. Prominent theses used to be published as books. Nowadays, it's harder to get any book published at all, let alone via academic publishers. And even when something does get published—the readership is miniscule.

Doctoral studies also used to be attractive because they allowed outstanding students to study with others of his or her level. But these days, the PhD is an incubator for young scientists of various kinds.

Lax screening and the shrinking requirements (even the requirement for foreign languages has diminished or disappeared in some humanities departments), except in a number of selective and prestigious schools, produces big, heterogenetic classes, which include talented young people alongside some real numbskulls. Many dissertations are presented sloppily, badly written, and include embarrassing methodological errors, not to mention the lack of any creative interpretation (it is no coincidence that there are more and more private companies offering assistance in formulating the thesis, including material collection, processing it, and even writing the final work—in short, everything). When this is the norm, reviewers are forced to give unworthy essays a passing grade. The result is that many people who boast of having a PhD are far from meeting the criteria you would expect of a scientist.

And indeed, studies have found that many doctoral students discover, much to their surprise and disappointment, that they are not part of a vibrant, intellectual scientific community.[1372] Consequently, it comes as no surprise that a study conducted in the United States found that no less than 40% of research students in life sciences and engineering reported being indifferent to or unsatisfied with the experience of their doctoral studies.[1373]

- **It ain't over even when it's over.** A doctorate serves as a necessary yet insufficient condition for an academic career. In the past, young people who received their doctoral diploma chose to do a one to three-year-long internship at the most prestigious institution possible before applying for an academic position. This used to be the most obvious route for gaining experience in independent research, as well as accumulating research grants, publications, and recommendations. This stage is known as "post-doctorate" in the U.S. and other countries, and "habilitation" in Europe and Asia. One major difference is that the post-doctoral period usually comes before starting work in an official academic position, whereas habilitation is already part of the academic job, serving as a period of candidacy prior to getting tenure. Another difference is that the product of a post-doctorate is scientific publication, whereas the product of habilitation is usually a doctorate-size research thesis.

  However, what used to be merely a recommendation has in recent years become standard procedure in most institutions around the world. This means that the period of training and the trials that come before one can apply for a permanent position have gotten longer. This uncertainty becomes a chronic condition, which also includes financial hardship. Unfortunately, studies have shown that not only are the chances of getting a job in academia after a post-doctorate slim (only a few percentages), but the additional period does not train the holder of the coveted degree for work outside of academia.[1374]

Incidentally, it has recently been suggested to split doctoral studies into two separate tracks: academic and professional. In several countries, such as the United Kingdom, the United States, France and Germany—this split actually already exists in engineering fields, albeit partially: In addition to the regular academic track, institutions also offer an engineering track (EngD), tailored for industry and co-led by an academic and an industrialist.[1375]

- **High toll on mental health.** Studies have shown that doctoral students are at high risk of developing mental fatigue, anxiety, depression, and even suicidal thoughts.[1376] *Nature* conducts a poll every two years among 6,000 doctoral students from around the world in order to put a finger on the pulse of the future generation of science. The findings paint a troubling and depressing picture. Over a third of doctoral students cite their mental state as source for concern, and half are forced to seek out psychological care in order to survive (mostly due to the pressure to publish).[1377]

  Another study conducted in Belgium, in which thousands of doctoral students in the exact sciences and the humanities participated, found that no fewer than half of the respondents experienced mental distress. One out of three were found at risk of developing psychiatric disorders—twice the norm among a "highly educated" population.[1378] Even the mental state of students in prestigious universities is not exactly glowing. A study conducted among doctoral students in economics at eight such institutions in the U.S. found that 18% experienced anxiety and depression to varying degrees. What's worse is that one out of ten in this survey reported having suicidal thoughts.[1379]

  Generally speaking, many doctoral students find themselves trapped in a dead-end learning alley. On the one hand, they have lost their motivation to complete their studies, and on the other hand, they feel it would be a shame to throw away what they've already achieved with money, sweat, and tears.
- **Slim chances of getting a job.** Although it may be possible to somehow manage a temporary depression that eventually leads to redemption, or at the very least to getting the dream job, even this illusion is being shattered. Polls from around the world present the same picture: The gap between supply

and demand of positions in academia is consistently expanding, and the miniscule chances of getting a job are turning advanced studies into a dangerous gamble.[1380]

A taste of the statistics:

- Only 12% of doctoral graduates in the U.S. and Canada will get a permanent position in academia.[1381] In the U.K. and Australia the situation is even more dire, and less than 5% of graduates will get a job.[1382]
- Every professor of engineering in the US mentors an average of 7.8 doctoral students over the course of his or her career, but upon retirement vacates just one position.[1383]
- From 1982 to 2011, 800,000 students in the US received a PhD in the exact sciences and engineering, while institutions of higher education during that same period only added 100,000 jobs.[1384]
- In the popular field of biomedicine, only one out of six doctoral graduates in the U.S. gets the chance to contend for an academic position.[1385]
- In the humanities, the chances of finding a job are close to zero due to major cutbacks. English departments in the United States, for example, cut over 40% of permanent jobs within six years (2008-2014). The number of doctoral students grew during this period by 10%.[1386]

Doctoral studies, which are prerequisite for an academic career, are kind of misleading for another reason: Most people who choose this path aren't aware of the fact that, contrary to the external image that institutions of higher education project, the admission process for new faculty members in many institutions is far from being objective, fair, or professional, as is customary in the for-profit labor market, and is rife with protectionism, nepotism, political, and other biases (every single one of our interviewees mentioned this). One of the reasons for that is the fact that many institutions grant departments too much autonomy to select new faculty members. Though it is customary to publish announcements for new or recently vacated positions, in practice it is the senior faculty members who are usually pulling the strings, in an attempt to bring in their own people or to block others.

Furthermore, whereas many departments used to offer jobs to their highest-performing doctoral students, nowadays they tend to prefer to hire "ringers" from the outside. This is supposedly intended to prevent "inbreeding," but this perception has become extreme to the point that most institutions avoid even hiring their most prominent graduates.

One study, which reviewed 19,000 scientists with permanent positions in business administration, computers, and history in 461 leading institutions in North

America, found that most of them (about 80%) attended only 115 institutions.[1387] Similar findings arose from studies on staffing in other disciplines.[1388] This trend is troubling for several reasons:

First, the chances of finding a position after getting a PhD are low not just because of the limited supply of jobs, but also because there's an *a priori* preference for graduates from prestigious institutions.[1389] In other words, competition for jobs is both unequal and inefficient (because it's not equally open to everyone).

Second, it turns out that even when it comes to staffing, academia prefers style (the graduate's institution) over substance (the quality of the researcher).

Third, academia gives an extra bonus to privileged individuals (affluent white men)—i.e., those with the financial means and the free time to go to a prestigious university.

And if the fact that a doctoral graduate's chances of getting a position in institutions of higher education are slim isn't enough, it turns out that things aren't that great outside of academia either. One study showed that though the chance of finding work in the general employment market rises in relation to the level of one's academic degree, the difference between getting the desired job with an M.A. and the chance of getting it with a PhD is rather negligible. And as we've already noted in the chapter on education, many young PhDs struggle to find a job that can both allow them to make ends meet and fulfill their expectations, among other things because they're perceived by employers as overqualified. Many also hold a professional specialization that has no value outside of academia, and end up with a sputtering career as research assistants and temporary professors.

Why Are Moths Attracted to the Flame?

The problems we described beg the question: why do so many young people continue to knock on the doors of academia anyway? The following explanations come to mind:

- The soaring demand for a B.A. decreases the degree's socioeconomic worth and pushes many to differentiate themselves by attaining a less common status symbol. Accordingly, the growth rate of graduate students in the US in 1990-2015 surpassed the growth rate of B.A. students.[1390] In 2015, 12% of American 25-year-olds and above held advanced degrees. These are 25.4 million people who made up 37% of all B.A. graduates in the country.[1391]
- The PhD still has an aura and serves as a desirable status symbol for young people and parents alike—especially in classes that strive for social mobility.

Higher education in general, let alone advanced degrees, are a family dream come true for them.

- M.A.s and PhDs still guarantee a promotion and pay increases, at least among some employers.
- Graduate studies, much like any other intellectual devotion, expands one's horizons. For some people, the desire to learn overcomes any other consideration.
- Millennials are in no rush to settle down, and choosing graduate studies delays their entrance to the constricting adult world. It's even easier to fall back on studies when it's the parents that pick up the tab.
- Unlike other professions, the academic world is still uncharted territory, which is why many expectations are set that are not based in reality. A survey conducted among 3,400 doctoral students from across the world demonstrated this disconnect, as it found high (and excessive) optimism regarding the chances of finding an academic job: 78% responded that it was "likely" to "highly likely" that they would find work in academia, whereas in practice only about a quarter—26%—actually get hired.[1392]

The Social Price of the Surplus of Doctoral Students

Society also pays a heavy price for the surplus of doctoral students. Young, talented, and driven people are told to put their best years into studies that lead to nothing, and in many cases end up deeply in debt. They wander from one temp job to another in hopes of getting a permanent position—which most of them, as mentioned, will never get. This means that young, clever, and ambitious people, with huge budgets dedicated to their training, are doomed to a life of vagrancy and frustration.

One success story that serves as an exception that proves the rule is the story of Emmanuelle Charpentier, who in 2015 was appointed director of the prestigious Max Planck Institute in Germany, after 25 years of wandering across nine institutions in five countries. She got the job after a series of important discoveries in the field of DNA, which she (and her partners) made without holding a steady job.[1393]

Had institutions of higher education conducted themselves transparently and fairly, they would have presented students with reality as it truly is before sending them off to the obstacle course. In practice, not only do the heads of these institutions not admit the bleak reality, they actually continue to encourage and even seduce B.A. graduates to continue to M.A. and PhD studies through improper marketing means, primarily to justify the institution's continued existence and to get government funding.

Of course, you could argue that every person is responsible for his or her own destiny, and that young people should plan their lives properly. After all, the chances of succeeding in the art world are also very low, and yet many choose to follow their dreams. But this argument is sanctimonious and misleading: First of all, big public money is invested in training these youths, when the benefit is questionable. Second, these "dream peddlers" are taking advantage of the innocence of hundreds of thousands of families that dream of climbing up the social ladder.

It is an indisputable fact that free competition under fair conditions, including competition over academic jobs, is healthy for society. It challenges, improves performance, and creates natural selection. As we know, the most developed countries are the ones that have nurtured ambitiousness and allowed more people to compete over more resources in more fields. On the other hand, humanity may be approaching a historic turning point at which the marginal benefit of unrestrained competition over certain jobs is diminishing:

- When the bottleneck becomes too narrow, when competition isn't actually open and equal for everyone, and when it adopts a "winner-take-all" approach, too many losers are kicked to the curb. Society may benefit from the ability to pick the best candidates from a very wide selection, but the price is an increase in frustrated and disgruntled people—which doesn't just affect them (by hurting their personal happiness and sense of self-worth) but also affects the social climate. This might not be a good social deal.
- Western society has nurtured the myth that if you just work hard enough, you'll succeed. On the one hand, this myth presents everyone with a challenging horizon to aspire to, driving them to do their best. On the other hand, it creates the illusion of achievable success, which too often crashes and burns. As we know, an entire generation of young people has been raised in many parts of the world by parents and teachers that instilled them with unrealistic expectations, and they end up feeling as if they have been deceived. It should be noted: an academic career isn't the only career in which the top of the pyramid is narrow and competition over any job is rough, but it is unique in two respects: a) the supply of jobs is diminishing while the demand is increasing sharply; b) the level of flexibility and the ability to change tracks in many scientific fields are low compared to other competitive professions, as the opportunities for working as a scholar outside of academia in these fields are scarce.

The myth of advanced degrees has been exposed in recent years to its full, unflattering extent. Typing "is it worth doing a PhD" into Google produces no fewer than 15,000 results—many of which are negative. It's easy to deduce the content of the following examples just by reading the headlines: "100 reasons NOT to go to graduate school," "Is getting a PhD a waste of time?" "Is a master's degree worth it?," "Is a PhD Worth It?," "Academia is built on exploitation. We must break this vicious cycle," "The Expendable PhD," "Millennials, please don't waste your money on graduate school," and so on.

Social media and blogs have quite a few stories about disappointed young doctoral students and PhDs who recommend completely abandoning the idea of advanced degrees. Even some of the old-timers dare to tell the truth here and there. In 2014, one of these blogs published a letter by a tenured full professor of philosophy from the University of Florida. Its title: "Why you should (probably) not be a professor." The message: let's all stop fooling ourselves and others.[1394]

One can therefore expect that a reckoning will come in the not-too-distant future, and a drop in the demand for advanced degrees will be recorded. A sign of what's to come can be found in the apparent drop that has already occurred in the rate of PhDs in the natural sciences who continue on to a postdoc. Over time, more and more institutions will probably rethink whether it's worthwhile for them to encourage and seduce young people to do a doctorate with them. Doctoral students may be a financial source for now, but this is a problematic and probably temporary source. It is uncertain whether governments will continue to be generous and subsidize higher education in general and reward institutions for the number of master's and doctoral graduates in particular. Furthermore, the payment doesn't always cover the expenses. Already today, private institutions don't allow faculty members to advise doctoral students unless they manage to obtain a grant that would enable their employment. Sometimes it's the department that gets the budget for graduate students, and it spends the funds according to its own priorities (which, incidentally, creates another source of friction between faculty members and the institution that employs them).

The Illusion of Stability

All or Nothing

Tenure, which practically means having job security until the age of retirement, has granted a "lifetime membership card" to those who have managed to squeeze into the prestigious academic club, and for years has been one of the profession's most significant benefits.

This tradition started in the 1940s in the U.S., formulated by the American Association of University Professors (AAUP),[1395] and later spread to many other countries. Its purpose was to protect scientists' academic freedom, providing them with a research and teaching environment free of economic, political, and other pressures, as well as maximum protection from dismissal.[1396] The message was: Research anything that comes to mind, and no one will interfere with your choices. It was no coincidence that all of this happened in developed countries, where academic institutions are perceived as more than just institutions of education and science, but also anchors of democracy and morality.

Tenure was also important from an organizational point of view, as it gave faculty members a shared identity and prevented excessive turnover of researchers and lecturers within the departments.

There are differences between countries when it comes to the requirements and trial period on the road to tenure. In Germany, for example, scientists can only get tenure in the institution where they got their doctorate after a two-year cooling-off period in another university. In all of the countries and all of the institutions, tenure is awarded at the end of a trial or candidacy period, which lasts between three to six years, in a process that reviews the candidate's scientific achievements as well as his/her social compatibility with the department and institution. Members of the committee that grants tenure (which in many cases is the same committee that grants promotion, and is usually comprised of senior professors from all of the university's departments) receive judicial immunity, which makes the decision's reasoning confidential.

The trial period is particularly stressful, since the candidates are under extreme scrutiny. They're supposed to produce a rich performance portfolio, while knowing that a negative decision could means a professional death sentence for them. Not only did you fail to get the desired position, now you also need to find an alternative institution from a disadvantaged position, as someone who failed and was rejected, in a market saturated with candidates but with limited opportunities. The pressure is also massive because, as in the promotion procedure, there are no clearly stated requirements and expectations, but rather "do the best you can."[1397]

In 2019, *Nature* tried to conduct a survey among faculty members in North America regarding the experience of tenure denial—both among those who were rejected and didn't try again and among those who tried a second time in another institution and were accepted. Unsurprisingly, most respondents refused to share their feelings with the journal, and most of those who agreed did it on the condition that their names would be kept anonymous. The massive tension that this process creates, at times even coupled with depression, is a hidden secret. Those who get rejected usually feel a waste of time, betrayal by their colleagues, despair, and injustice. This remains an open wound for many faculty members, even after decades have passed.[1398]

An extreme case that can illustrate the insult of rejection can be seen in the story of Amy Bishop. She shot and killed her colleagues in February 2010, after her tenure application was denied by the University of Alabama. Bishop was probably mentally unstable, and it would be indecent to attribute her outrageous burst of rage and violence only to the community that turned its back on her, but her story demonstrates the level of despair, humiliation, helplessness, and hopelessness following her tenure denial.[1399] It also indirectly illustrates the academic system's indifference to the emotional overload it creates among its faculty due to traditional procedures which could easily be amended. For example, most institutions don't have a procedure that requires a reasoned rejection letter—which increases the potential for frustration and claims of injustice. There may be common templates, one of which is proposed by the AAUP, but even then, they are too general and dry and don't require any explanations to the candidates. Furthermore, some institutions offer researchers who were rejected an extension of several months to "pack their things" and search for another job, but many others don't even offer this much to the miserable reject.

The fortunate ones who get the long-awaited tenure experience immense relief, but many develop symptoms of post-trauma later on.[1400] It's hard to recover from not just because of its severity, but rather because further down the line—nowadays probably more than in the past—they will have to deal with the equally bothersome promotion procedure (more on this later in the chapter). In 2012, the results of a national survey conducted by Harvard University researchers were published. The survey, answered by some 15,000 faculty members with tenure or on tenure track, from 69 colleges and universities in the U.S., uncovered a supposedly surprising finding: Associate professors, the first degree of tenured professor, are the least happy with their jobs.

Why? The respondents noted several factors:[1401]

- At the beginning of their careers, when the objective is mainly to get tenure, young faculty members are surrounded by supportive and encouraging colleagues. After the objective has been achieved, they find themselves dealing with the difficulties virtually by themselves.
- Before tenure is granted, most institutions try to ease up on young faculty members by giving them fewer administrative tasks. Afterwards, the situation is reversed. Not only do they not find satisfaction and peace, the workload actually grows. A post in one forum dealing with this issue stated: "When you're a doctoral student you run around like a mouse, when you're in post-doc you run around like a mouse, when you're on tenure track you run

around like a mouse, and when you get tenure you've already become a mouse, so naturally you'll keep running around."

- The race towards tenure focuses more on the goal and less on the environment. After achieving their target, people look to their left and to their right, and often discover that the department they were accepted to is far from a family or a close-knit community. At the end of the day, everyone in academia works by themselves and for themselves, and in any case, in such a stressful job, there's barely any time or energy for casual talks over coffee in the cafeteria or weekend hangouts.
- The journey of getting tenure is so long, tiring, and anxiety-inducing that it does not allow young faculty members to occasionally stop and ask themselves whether they're even in the right profession. Only after getting tenure do people have time to wonder: Is this really what I want to do with my life, and why? This question is depressing, because it illustrates the gilded cage that is the academic career. All of the sudden you realize the price you paid and will continue to pay for the career. You start to understand that the marathon you just finished is only the beginning, and in order to achieve the ultimate goal (full professor) you will have to continue to work just as intensely as before.[1402]

The pressure and anxiety involved in getting tenure may seem illogical and odd, considering the fact that in practice only a small percentage of candidates fail. There may not be a comprehensive study of candidates' tenure denial rates around the world, but there have been some surveys and data published on a local level. For example, a survey conducted in the United States in 2001 found that the rate of young faculty who completed their trial period and received tenure was approximately 75%.[1403] But this picture is misleading, and the truth is that the indirect rate of failures is much higher:

First, in most cases young researchers get an indication of their chances during the candidacy. They can read the writing on the wall in advance, and probably prefer to leave voluntarily if their chances are low (to increase their chances in another institution before their resume is tainted by the mark of rejection).

Second, in the past few years, departments have started to recruit young researchers with a record of raising budgets and multiple publications from the onset. In other words, the racehorse enters the ring when it's already trained and experienced. Furthermore, the tenure decision is so fatal that committee members disqualify candidates only in extreme cases—mainly when the department head or dean objects to the appointment.

Third, in European, Asian, and South American universities, in which university employees are also civil servants, there is a strong aspect of protectionism. In many cases, the decision of whether or not to give tenure is settled behind the scenes, between the top functionaries, as part of the general wheeling and dealing. The desirable people who have already gotten the position (the majority) will also get tenure, regardless of their accomplishments and abilities.

Nevertheless, the statistics are not helpful nor comforting to the "eager mice," as anxiety and fear do not just depend on the levels of risk and chance, but also, and usually primarily, on the repercussions of failure (in this case: dropping out at the end of a long and grueling journey of studying and tests, along with the shattering of the dream).

Abolishing Tenure

Given the tension and anxiety, and in light of the fact that the vast majority of tenure candidates eventually get it, the question must be asked: Why is the process so long and cumbersome, and why not just follow the professional decision made by the department in which the scientist is supposed to be employed?

First of all, as per usual, it is due to conservativism and closed-mindedness. Second, as in many other procedures in academia, traditional rituals and symbols are extremely important. Third, the trial period for getting tenure is like boot camp, which is intended to instill the code of workaholism into young scientists. The message is: Work your ass off around the clock, and build relationships with the right people.

Beyond these explanations, there's a much more prosaic reason: There's no point in fixing a method that's about to fade away anyway.

Criticism over the concept of tenure and its arrangements—not just in academia—has been around since the 1980s, and voices calling to abolish it have become stronger in recent years, mostly for the sake of economic efficiency.[1404] Headlines such as "The Problem with Tenure," "Is It Time to Abolish Tenure for Professors?," "Is Tenure Dead? Does It Matter?" and "Tenure Should Not Be an Option" are only a few examples of the trend and tone that are leading the way.

Many believe that tenure has an adverse effect on the efficiency of the free market, because it does not offer employers any leeway in choosing their own employees, creates organizations that are stuck with "rusty nails," limits competition, and creates grating class differences between tenured and temporary employees, who don't just have to prove themselves time and time again, but also have to struggle, suck up, and beg to ensure their livelihood for another year.[1405]

Many are also calling to abolish tenure on the basis of the claim that it reduces the employee's motivation to show diligence and get better. Studies that have tried to examine this claim empirically have produced contradictory findings. Some have found that scientific productivity and quality of accomplishments decrease in the period after getting tenure, while others have proved the opposite.[1406] In any case, in today's reality, tenure is no longer a significant bonus for employees, as we'll demonstrate shortly.[1407]

It should be noted that not all countries and not all academic institutions have tenure arrangements. In some places there has never been tenure, and in others it has been abolished—at times by the institution's own initiative, and at times through government intervention. For example, in 2016, Wisconsin Governor Scott Walker abolished state guarantees for the tenure arrangements of faculty members across the state, under the pretext of budget cuts.[1408]

Japan is a particularly prominent example. Following increasing criticism by the business and industrial sector of the low quality of university graduates, in 2004 the government declared an overall reform on institutions of higher education. Under this reform, 230,000 faculty members lost their status as civil servants, which granted them tenure from the day they were hired. Japanese university presidents were given new power for setting budgets and curriculums, hiring and firing employees, and adjusting salaries.[1409]

As of this writing, the tenure method does not exist in the United Kingdom, Austria, Australia, and most of Eastern Europe. At best, these places have long-term employment contracts, rather than temporary contracts that need to be renewed annually. In France, Spain, and Germany, as well as other Western European countries, in which universities are owned by the state, faculty members are considered civil servants and hold full-time positions for life. But even in these countries, the arrangement is gradually disappearing, replaced by temporary contracts. Back in 2010, only 9% of faculty members in Germany were tenured professors. That same year, the tenure track for lower ranks was abolished in Italy, and today only exists among professorial ranks. In Portugal, the rate of tenured employees in institutions of higher education dropped to some 40% of all lecturers and researchers, and in the U.S., only a quarter of all academic positions nowadays include tenure.[1410]

The academic position's stability has been undermined in recent years, not just due to the gradual abolishing of tenure arrangements, but also due to the institutions' less compromising attitude towards "permanent" faculty members who fail to deliver the goods. It should be noted that a faculty member's tenure can only be terminated under extreme circumstances—usually following a serious violation such as embezzlement, sexual harassment, negligence in teaching, grade selling, or plagiarism—and even then it's a long and tedious process.[1411] However, due to the growing economic pressure, many institutions manage to find loopholes that allow them to get rid of older and/or unproductive faculty members, and even encourage voluntary early retirement.[1412] Meanwhile, more and more institutions are offering long-term employment contracts that are conditioned on recruiting external budgets. When the dry period arrives, the salary wanes and pushes scientists to leave.

There are also more indirect and violent ways to push out unwanted faculty members, in an aggressive process that signals to them that they are no longer wanted, because they're not bringing in enough grants, their studies are controversial and negatively impact the institution's image, students are displeased with their classes, their conduct is "inappropriate," etc.[1413] Such faculty members are subject to constant badgering and humiliation, such as messing with their benefits, transferring them from a private office to a shared office space, exiling them to remote campuses or common courses on general subjects—in short, mafia-like methods that hand the victim the hara-kiri sword.

Recently, a much more focused and draconian procedure has been introduced in most major American institutions, known as a "post-tenure review."[1414] All faculty members, including veteran and senior members, are required to submit regularly (every three years for associate professors and every five years for full professors) a list of their accomplishments for thorough examination by the department head and by colleagues, and are ranked accordingly: outstanding, satisfactory, or below expectations. Those whose output is insufficient may find themselves out the door, under the pretext that they failed to fulfill their contractual obligations.[1415]

In short, a job that used to be seen as stable and safe has over time turned into a job just like any other, and is losing one of its most unique advantages in this regard. Either way, the younger generation doesn't give the same weight to stability and longevity in employment anyway, and the motivation to "bust your ass" to gain this advantage is diminishing. In fact, all of the concepts of labor are changing nowadays, and even if young people these days were offered a lifetime position, they would leave in a few years' time due to boredom, cumulative fatigue, frivolity (living for today and the hell with tomorrow), and the habit of "channel-surfing" (changing jobs and even professions every few years).

The Illusion of Sabbatical Leave

Sabbatical leave is a paid time-out from work that lasts for several months to a year. Its purpose is to allow scientists to catch up on professional developments, focus and devote themselves to projects that aren't possible in their usual routine, recharge, build professional acquaintances and relationships, and simply get some rest. In many cases, this benefit includes a prolonged stay abroad, which provides a different workplace, advanced equipment, and collaborations with colleagues from around the world. It is also common to use the sabbatical year to teach part-time in another institution, in order to expand one's horizons, improve language skills, and occasionally also for the extra paycheck. When the spouse and children come along for the ride, it's also a formative and empowering family experience, which allows them to break down familiar boundaries, open up to foreign cultures, and learn new languages.

Institutions of higher education in the U.S. were first to include the sabbatical in employment agreements, about a century ago, and it has since become prevalent in many countries.[1416] In some institutions this benefit is only given to the upper echelon, while others include it in all employment contracts, and sometimes it's just an option. In some countries the sabbatical is not funded by the institution but rather by external funding. Sometimes the approval is nearly automatic, when it's time for the scientist's turn, and sometimes it involves negotiations between the scientist and the administration. Even the frequency is inconsistent: Some institutions offer a sabbatical every six years, and there are some where the intervals are even longer. The length of the sabbatical also varies, and sometimes the year gets shortened to one semester or even less. There are also differences in the scope of funding—from generous funding, which even includes family members, to mere unpaid leave.

But like the other traditional advantages that we've covered, the sabbatical arrangement is also gradually disappearing from the map of academia. While in the private market more and more companies offer their employees the option of unpaid leave (for example, in the United Kingdom, 20% of companies were already offering a mid-career hiatus back in 2003),[1417] institutions of higher education are limiting the benefit, and in many countries and institutions the sabbatical has simply been abolished. There are institutions that haven't terminated this option, but have tightened the requirements for eligibility. In the U.K., for instance, the sabbatical is dependent on the researcher's output and whether or not they have met the institution's objectives—and/or a commitment to meet a certain level of output during the sabbatical year. There are also institutions that require researchers to get external funding as well as find a replacement.[1418]

This is due to several reasons:

- In the past, when flights were much more expensive and staying abroad was almost unattainable, the sabbatical was perceived as the ultimate experience and treat. In the age of open skies and globalization, a long stay abroad is no longer an exciting benefit.
- Most of the advantages of researching in another country can nowadays be achieved in your own country. The digital revolution enables online

communication between researchers, as well as reading papers and books on the Internet.

- Fewer institutions can afford to accommodate scientists on a sabbatical year, due to their poor financial state.
- As the parenting ethos grows stronger, scientists are less prone to drag their children to another country.
- The fact that these days, unlike in the past, in many cases both spouses have an independent career makes moving to another country more complicated.

The Illusion of Wages

Faculty members' wage conditions are undisclosed in most countries. In some countries, such as the U.S. and the U.K., it is customary to publish an annual report about the average salaries on the market, which also includes the salaries of faculty members, in contrast to countries where wage is a discreet matter and official data about it isn't readily available.[1419]

Moreover, even when there are official numbers, they might be "dirty," as rich countries such as Saudi Arabia and China lure in science stars with financial temptations. The salaries of these star scientists raise the average, but have no impact on the salaries of their local colleagues.[1420] Naturally, there are also pay gaps between faculty members in private institutions and those who work for public institutions, which distorts the general picture (in the U.S., the gap is about 30%).[1421] The pay gaps between scientists from different countries are extremely high.[1422] For comparison, the average monthly salary of faculty members in Russia in 2012 was some $600, compared to $7,000 in Canada and Italy and $20,000 in Switzerland (even graduate students get generous salaries in this wealthy country with a planned economy).[1423]

However, it should be noted that the nominal wage level isn't the only benchmark for assessing faculty members' remuneration and financial status, because different countries have different differential benefits (for example, pension benefits). Furthermore, the raw number doesn't mean much unless you compare it to the local purchasing power and the country's total wage distribution/average.[1424]

There are actually three basic models for scientist wages in the world:

- The salary is dictated to public institutions by the state (usually in a collective agreement between the government, faculty organizations, and the institutions). The salary is supposed to be uniform in this case, but there are still some differences. In Israel, there is a considerable gap in salaries and other benefits between faculty members at research universities and faculty members at colleges.

- The salary is determined by the institutions. Usually, these are private institutions and personal contracts, and there are obviously considerable gaps between prestigious and peripheral institutions[1425] and between the different fields. Professors of medicine or computers in the U.S., for instance, make 50% more than history, education, or literature professors on average. This is due to the fact that the latter are also in demand outside of academia, and because they're more "profitable" to the institution (they produce more research budgets and patent applications).[1426]
- Faculty members do not receive their salaries from the institution, or receive merely a basic salary, while most of their income comes from the research budgets they manage to recruit (known as "soft money"). This model exists mainly in private prestigious universities, taking academic slavery to an entirely new and terrifying level. These faculty members already live in constant fear and work around the clock, doing their regular work as well as writing grant proposals, in order to preserve their salary and mostly to keep their jobs.[1427]

Across all methods, the salary is of course derived from rank and seniority.[1428] In France, for example, wage differences vary between junior and senior faculty members at a massive range of 25 to 73 thousand euros (nearly three times as much), and 50 to 80 thousand euros a year in Germany.[1429]

A 2012 study that examined wage differences between ranks in 28 countries found that the salary for the highest position was twice as high as the lowest junior salary on average. The biggest gap was recorded in China (4.3 times higher) and the lowest in Norway (1.3 times higher).[1430] The pay increase that comes with every promotion varies, and the biggest leap usually comes hand in hand when one reaches the rank of the full professor.

Faculty members usually get various pay increases in most institutions, for example for getting research budgets, filling an administrative role or taking on a greater teaching workload than usual. In Israel, for instance, it is customary for research universities to set aside an annual fund for every faculty member in order to help build scientific relationships (also known as an "international science relations fund"): in other words, to pay membership fees for professional associations, travel to conferences to present research findings, travel to meet research partners abroad, and more. The fund practically serves as an indirect benefit, accumulating till retirement. In addition, many faculty members receive additional payments for consultancy, lectures, royalties, and so on.

Though material benefits have never been the primary motivation for most scientists to choose this career, academia has certainly provided a handsome salary and nice benefits, as we've noted. However, the financial attractiveness has eroded in recent years, due to a series of changes:

- Most lecturers nowadays work without a permanent position, as temporary and/or part-time employees, and are essentially low-paid contract workers. The growing pressure to produce research output limits the ability to take on more work outside of academia, which has a negative impact on the bottom line. New faculty members get more or less the same basic salary as faculty members from a few generations back, but they have much less free time, their work is more tense, and their opportunities for promotion are less generous. Moreover, in many universities and colleges, faculty members only receive a salary for nine months of teaching a year. Most of them used to be able to find an alternative source of income in the remaining three months, but it has become problematic nowadays, not only due to output inflation but because the supply of available professors has grown and the competition for each job has escalated.
- Standard wage levels in academia (for permanent faculty members) are struggling to compete with the standard wage levels in the expanding private market, which have grown immensely in the past few years in most countries (particularly among the educated, entrepreneurial, and managerial group). The average salary for professors in several developed countries (such as Germany and France) isn't particularly high, and is closer to the average salary on the market. There are even some countries where professors' salary is lower than the average (such as Norway).[1431] Even in countries where the average salary of professors is higher than the average salary on the market, in many cases it is still lower than professions with a similar reputation, such as managers and engineers (such is the case in Israel and in Japan).[1432] The average income of top professors in the U.S. is at the bottom half of the upper decile,[1433] but in most countries around the world, it's only in the second and even third decile. In quite a few countries, including the nations of Eastern Europe, the salary of faculty members is so low that it forces scientists to take on random jobs just to make ends meet.

  The economic crisis in institutions of higher education has naturally also hurt faculty members' financial compensation. In the U.K., for example, academic wages were cut by 13% between 2008 and 2013 – a cut described by the *Guardian* as "one of the largest sustained wage cuts any profession has suffered since the Second World War."[1434] The damage doesn't just apply to wages, but also to the many material benefits that have been canceled in many countries and institutions around the world. It is expected to continue to rattle the academic career for another important reason: As long as differential remuneration and high wage gaps were only relevant to private universities and personal contracts, no one batted an eye. Nowadays, the gaps have started to permeate into public institutions as well, since as mentioned before, along with the basic wage (which still hasn't changed in most institutions), faculty members receive personal benefits for raising research funds.[1435] This is a cause of great tension within the institutions: On the one hand, the "productive" faculty members resent not getting a large enough reward compared to other members who don't produce revenue for the institution, and on the other hand, members who are rewarded less complain about the inherent injustice and inequality in the mere idea of measuring scientific output and in the manner in which it is measured. Tension between institutions has also grown against the backdrop of wage gaps between research universities and colleges. These tensions may serve as another catalyst for the separation of the university conglomerate into independent units, which will have to carry their own financial weight (more on this in the conclusion).

- Given that online courses will lead to fewer jobs in the not-too-distant future, the level of risk that comes with choosing an academic profession will grow accordingly. As a matter of fact, in light of the economic turmoil higher education is currently undergoing, such a choice is borderline-suicidal and may lead to a drop in demand for academic careers in the near future.

The Illusion of Promotion

Non-Hierarchical Hierarchy

Doctor and Professor are more of an honorary title than an executive job title or an occupation. They are also among the only titles that people attach to their names outside of work as part of their identity. Many plaques on doors proclaim that this is where a doctor lives/works, and some tombstones even note that a doctor or professor is buried there. But the hierarchy of ranks in academia has several other unusual properties:

- Most countries have four academic career stages:
  - Candidate - Postdoctoral fellow in search for open faculty position.
  - Junior faculty member, who is usually under a trial period for receiving tenure (in the U.S. they are sometimes referred to as "assistant professor").

- Associate Professor (Reader in the UK), which is considered the first senior rank, with all that it entails in the academic world and in the public eye. Everyone calls you "professor," and it's flattering, but you know that the journey to the top of the pyramid is still long and taxing.
- Full Professor (Chair Professor in Hong Kong), who has finally made it to the House of Lords of academia (the highest rank), gets all the benefits and perks, and can serve in the highest positions.
- Upon retirement, professors receive the title Professor Emeritus (Emerita if they're female) or in plain English, "esteemed professor." In many institutions, this title is only given to full professors and/or faculty members that still actively engage in research, at least partially. Sometimes these veterans receive benefits such as an office, access to the library, committee membership, and budgets.
- Since academia is a private club, even guests are given an honorary title on occasion: "guest professor." It is given mostly to faculty members from another institution who come to teach or conduct research for a limited time (for instance, during their sabbatical) or to people whose main activities are outside of academia, and who are invited as guest professors thanks to their outstanding achievements.
- In addition to the research track, the margins of academia also have companion tracks in which the emphasis is on teaching or on other specialties (such as the therapeutic, medical, legal, and artistic fields). The requirements for these tracks are a bit different, but of course that should not detract from the respect they deserve. Their designated titles are "expert professor" or "adjunct professor"—a faculty member whose appointment is based on unmatched expertise in their field, and not necessarily on excellence in research.[1436]

  In other professions, first and foremost in medicine, there is a clinical track that grants the title "clinical professor."[1437] This is mainly intended for active doctors with a high professional status. The emphasis in this track is on therapeutic and teaching skills (mainly the training of young doctors), as well as on conducting and publishing practical research based on observations of patients and their diseases.

- The hierarchy of ranks in academia rarely translates to authority and subordination, because the pyramid is wide and short. With the exception of several senior positions such as dean, rector, or a member of the appointments and promotions committee, academic rank has no executive significance within the organization.

- In most workplaces, employees move up to a more senior role when the higher position is vacated. In academia, however, there are two models of employment and promotion:
  - Scientists as civil servants (for example in Spain, Germany, France, and Italy): Every position has a designated rank, so receiving the position means receiving the rank.
  - Scientists as employees of institutions of higher education (for example, the United Kingdom, United States, and Israel): Getting a higher rank is neither dependent on receiving a certain role or position nor on seniority, but rather on the scientist's professional achievements (everyone moves at their own pace).
- In most organizations, employees are promoted when their superior or superiors decide that they should be promoted. The promotion procedure in an academic organization, however, is long and complex. It involves many people, both inside and outside the institution, and usually several committees as well.
- There is no defined quota for achievements and output for every field and rank, but rather general conventions, which vary from country to country and from institution to institution.
- Every promotion opens up a brand-new procedure which does not rely on its predecessors. Many institutions even appoint an entirely new set of external reviewers for each promotion (in any case, the reviewers' academic rank must be higher than the candidate's).
- The candidate's case is usually judged solely on his or her resume and publications, without any face-to-face encounters or interviews.
- The promotion procedure is not transparent to candidates. They don't know who sealed the fate of their promotion and what was written in their case, only the bottom line.

The Bureaucracy of Rank

Promotion procedures are not uniform across all institutions, but there are some typical properties (this overview refers mostly to the British-American model, which has been embraced by many countries around the world with some variations):

- The procedure begins when the faculty member—after consulting with the department head and/or the dean and getting their approval—feels that their case is ready, i.e., they have a real chance of surviving the long journey of assessment (in most cases, they need to have seniority of at least three years in order to produce the minimal output required for a promotion).

- Officially starting the procedure requires approval from senior members of the department or faculty (usually only those whose rank is higher). The recommendation is passed on to the dean; in some countries, the candidates may read the department head's recommendation letter and even add clarification notes. Provided the dean supports the promotion, the recommendation is forwarded to the approval of the rector, who is the highest academic authority.
- In order to assess the candidate's achievements, output, pedagogical abilities, and their contributions to the department, to the community, and to science, as well as their suitability for the next rank up, the rector forms an ad hoc "professional committee" comprised of senior faculty members from the candidate's fields of specialty, from within and without the institution. The committee's job is to locate suitable reviewers to assess the candidate, and get them to agree to review the case (in Israel, this procedure is known as an "outside referendum"). The higher the rank, the more reviewers there are on the committee (between three and eight). Each reviewer writes a comprehensive and reasoned opinion with a bottom line: suitable or not suitable for promotion. Assessors are occasionally asked to rate the candidate on a scale (excellent, very good, good, poor, etc.). The professional committee examines the case in light of the external review and issues a summary report. All of the reports are sent to the institution's supreme appointments and promotions committee. In some countries, no committee is formed, and the dean or rector is the one who requests (and directly receives) opinions from external reviewers. The appointments and promotions committee, which is the supreme tribunal, usually includes ten of the institution's top members, representing all faculties (in some institutions, promotion cases, particularly from the lower ranks, are discussed by committees inside a particular faculty). The committee's members are usually appointed by the Senate for a limited period. It is led by the rector, and may also include an HR representative. Some institutions, as is the case for colleges in Israel, do not have an independent committee, and the appointments and promotions are set by a national promotion committee, which is comprised of senior representatives from several institutions. In countries where faculty members are civil servants (who are formally appointed by the state rather than the institution), the state forms a committee of senior scientists from the relevant discipline.

- The appointments committee discusses the candidate's case and makes its ruling: Should the candidate be promoted based on all of the recommendations and opinions collected for the case, including opinions by colleagues? The contents of its discussions are confidential, and the decision (approval, rejection, or an extension to allow for improvements) is usually made through a secret ballot. In most cases, the candidate's advocate in the committee's closed sessions is a senior faculty member and/or his or her faculty dean. In this sense, the advocate's role is similar to that of a defense attorney in a courtroom, with the difference being that the "defendant" is not allowed to be present at his or her own hearing. The advocate is expected to highlight the case's strengths and try to convince the committee members that the candidate is worthy of promotion, but in many cases, he or she actually has to defend the candidate from those who wish to do them harm. The dean will usually support the promotion if the procedure has reached this point, because while a university president's success is measured mainly by the funds raised for the institutions, a dean's success is measured mainly by the rate of cases that have successfully gone through promotion committees.

The entire promotion procedure, with its many stages, usually takes several months, since it involves many people, and they do it for little to no pay. If an application is denied, the faculty member will usually have to wait two years before he or she can apply for a promotion again.

Donning Wigs, Raising Eyebrows, and Arguing Over Nothing

On the face of it, it seems that the academic promotion model is professional, objective, and fair. Not only do faculty members not compete with others, their promotion does not depend on one person's judgment, and the decision is made by experts. Furthermore, when external opinions are involved in the decisions, the potential for bias supposedly decreases. Except things are not as they seem. The whole procedure is actually inefficient, mostly unnecessary, opaque, manipulative, bias-ridden, aggressive, and anachronistic, as we shall now demonstrate:

- **The discussion is over before it begins.** There is no conclusive evidence, but the unrepresentative data that we've collected from different institutions from around the world indicates that the vast majority of promotion procedures end successfully. This is due to three reasons: First, the case is submitted for official judgment only after the department head, dean and rector have found that its chances of success are high. Second, as we'll describe in detail later, it's not uncommon for the procedure to be completely rigged behind the scenes (from the selection of the professional committee's members, through the selection of judges, to wheeling and dealing within the uppermost committee).

Third, because department heads and deans see promotions as a measure of their own success, and because failure also hurts the institution's image, pressure is applied to candidates to fill their output quota above and beyond. As they say in academia, half-jokingly, the formula for starting a promotion procedure is N+2, whereas N is the outputs accumulated by the candidate and 2 is the extra output that is always required of them, just in case, regardless of how high N actually is. Incidentally, since the "tariff" is unofficial, in many cases backroom deals are made between the department head and the dean or between the dean and the rector over how much additional output it would take to approve the candidate. This indecent custom is known to all, and the result is that candidates for promotion manipulate their publications in order to have some papers in their back pockets just in case (e.g., putting off the submission of manuscripts for review or delaying the publication of a book).[1438]

This means that the people who decide the candidate's fate in practice, for better or for worse, are not the committees but rather the dean and the rector. As stated before, they decide whether or not to start the procedure, they're involved in the selection of the professional committee's members, and they are also present and active in the promotion committee's discussions. All of this leaves a lot of room for ulterior motives, such as personal relationships, affection, jealousy, or resentment between the department head, dean, and rector, as well as between them and the candidate.

The crucial involvement of these three functionaries makes the long, expensive, and cumbersome procedure of external committees and reviewers redundant. What's even more absurd is that these are political functionaries, who are not experts in the fields of most of the candidates they're supposed to judge. Once again, we'll reiterate that many of the department heads, deans, and rectors are not appointed for their outstanding academic skills, and are basically just faculty members who nominated themselves based on an administrative platform and by making promises to close associates.

- **Multiple, pointless controls.** An outsider looking at the long and convoluted promotion track is probably wondering: What is all of this for? What's the point, for instance, of a higher appointments committee, when the department and faculty have already approved the rank, the rector has given his or her blessing, and a comprehensive report has been issued by a wide professional committee of experts?

When an organization operates multiple controls, it is usually because the decision is very sensitive and important. But as we've noted, a promotion in academia is not related to the expansion of administrative or other authorities, and in most cases don't even grant the candidate permission to engage in sensitive matters. If the promotion of a faculty member warranted extreme caution, as when certifying a doctor, engineer, teacher, or psychologist, the infinite filters might have been understandable. But what is so sensitive and potentially fatal about the promotion of a biologist, archeologist, sociologist, or medieval historian from "lecturer" to "senior lecturer" or from "senior lecturer" to "associate professor"? Why hassle so many people, spend so much time deliberating, and stress candidates out when all of this is essentially just about honorary titles and pay raises? Assuming that most candidates for promotion have tenure or are signed on a long-term contract, they will stay on as faculty members for many more years anyway—albeit maybe more disgruntled.

Why the pedantry, then? Probably because of the "law of suspicion": As more parties are involved, as the procedure becomes more bureaucratic, as more means of circumvention are required, and as more means of enforcement are applied—thus, mutual suspicion increases and bypasses are created. In short, instead of ensuring professional competence, the controls reflect a system that does not trust itself or its members.

Next to all of this, the multiple controls also have a ritualistic and symbolic role: confirmation for members of the professorial order and those who wish to join it that it and they are important. The complex selection procedures and the exclusive decision-making power granted to the most senior members are supposed to achieve this goal.

An amusing illustration of this psychological aspect can be found in the attempt by the heads of the Technion in Haifa to replace the title "senior lecturer" (the first rank of tenure) with the title used in the United States—assistant professor. They were met with furious opposition by the Israel Lecturers Association, which argued that attaching the word "professor" to a person's name requires a longer professional journey. According to them, it is inconceivable for junior employees to flaunt the title of professor at such a low rank.

Another amusing story that demonstrates the insanity of ranks and promotion in academia was told to us by one of the deans in Israel. He said: "The rector told me in one of our meetings that he was considering applying promotion procedures to the rank of professor emeritus [as you may recall, this is a title that professors receive upon retirement, which more or less means "retired professor"]. He justified it by saying that it was inconceivable for retirees to get the title automatically. I smiled and said, 'why don't we add another rank to the procedures—Late Professor?' And added: 'Obviously, not everyone would be able to qualify.' I was sure he'd get the joke, but I was met with a blank expression."

- **The nerve-wracking delay of justice.** The promotion procedure stretches over many long months, and almost always involves delays and extensions. This happens because it's hard to find and recruit judges, and because opinions involve a lot of reading, prolonged deliberations, and the writing of elaborate reports.
- **People who really know the candidate are barred from testifying.** Selecting external reviewers to give opinions is the professional committee's toughest job. On the one hand, it needs to convince the appointments committee that the reviewers it has chosen are top experts and will be unbiased. On the other hand, it (usually) finds it important to ensure that the reviewers are sympathetic to the candidate. Things get even more complicated because colleagues who work with the candidate, and are therefore the most aware of their abilities, are disqualified in order to prevent a conflict of interests. People who work in the same field as the faculty member in question and have collaborated with him or her at one point or another in conferences or in the writing of papers and books are also barred from testifying. Even people who have reviewed them for previous ranks are usually disqualified (because that's the law). So how do you square the circle? By recruiting judges from a more distant professional circle. The result is that in trying so hard to appear impartial, the candidate isn't evaluated by people who really know his or her field, skills, and professional achievements.
- **Making fateful decisions without any training.** Members of the appointments committee, which has the power to decide people's fates, are usually ordinary faculty members who have never received any professional training in the discussion of personal cases. It is not uncommon for them to be appointed shortly after having received the rank of full professor themselves. Additionally, no one checks if they have the right judicial temperament or if they have any direct or indirect connections or scores to settle with the candidate at hand. Furthermore, the committee's members rotate at a rapid

pace (usually serving a three-year term), so they don't gain a lot of experience or improve their reviewing skills.

- **Voiceless "defendants."** In almost all countries, the judges are given silent documents. They don't interview the candidate, receive spoken recommendations from people who work or have worked with them, or listen to the candidate's explanations. As a result, the candidate has no way to offer a defense, clarify issues, or explain things that will determine their fate. Even the people who are supposed to advocate for them (such as the dean) don't always know them or their specific field of research; because of the high volume of files that the dean receives, he or she almost certainly does not have the time to delve deeply into every case.
- **No appeals.** Unlike court rulings, an academic committee's ruling cannot be appealed for a number of reasons:
  - The chances of overturning the committee's decision are close to zero, as its deliberations are confidential. The few attempts by faculty members who have felt that they were wronged to uncover committee deliberations on their affairs and the reviewers' opinions have usually hit a wall. There have been a few exceptions in which candidates were allowed to read the opinions written about them, without the authors' names. There have been a few cases in courts from around the world in which, following appeals (which, it should be stressed, are very rare), the institution was required to allow faculty members to appear in a hearing before the committee, release documents and protocols, examine testimonies, comment on the committee's remarks, and get legal advice (mainly if there was suspicion of discrimination).[1439] However, in general, the court systems tend not to intervene in the decisions of higher education institutions on grounds of confidentiality and academic freedom.
  - In any case, the appeal procedure is so complicated and expensive (including a direct conflict with the employing institutions, which often use every trick in the book to cover up information), that very few people dare get into this mess.
  - Even the protection offered by trade unions and civil rights associations is ineffective in this regard.
  - Appealing the committee's decision involves great risk, because the appealer could end up being marked as an "enemy of the institution" and pay for it in the future. Remember that leaving the academic institution is rarely an option, both because the faculty member would lose their tenure and because there aren't that many alternatives in the market

(institutions also tend to avoid hiring people who have had quarrels with their previous department, faculty, or institution).

- **That's what friends are for.** The confidential procedure contaminates the academic workplace, as it encourages leaks and gossip. There will always be friends or "friends" who whisper into the candidate's ear about who vigorously defended them, who acted against them, and who kept quiet—which opens the door to sycophancy, suspiciousness, vindictiveness, and unrest. You never know who judged you and who's going to judge you, what's coming next and why. Generally speaking, although the academic environment has many productive professional collaborations, it is still replete with jealousy and hatred between peers, anxieties, and paranoia. Most faculty members prefer to stay safe within their own niche, are afraid of expressing open criticism, and tend to gossip about one another behind their backs in order to unload tensions and make alliances and backups just in case. An illustration of this culture of fear can be found in the fact that the *Chronicle of Higher Education*—the newspaper with the most articles about academic culture—has more anonymous authors than any other newspaper.[1440]

  There are virtually no scientists that haven't been hazed at one point or another of their career, causing them to become bitter. They have all learned to endure, stay quiet, and move on. What's worse: Since the hierarchy is horizontal—the victims become the victimizers, all in service of the system, and those who once served as the hangman are quick to whine when the rope is tied around their own necks.

- **Vague criteria.** Broad professional achievements are supposed to be the basis for the decision of whether to promote a faculty member: publishing studies, attending conferences, excelling in teaching, mentoring graduate students, off-campus scientific activity, winning research grants, performing administrative functions in the institution, and contributing to the wider community. But these criteria are phrased in extremely vague terms, and even the calculation and rationale behind them do not appear in any official document (e.g., how many papers are the equivalent of a book, or what's more important: the number of research grants earned or the volume of the budgets obtained).

  A demonstration of this—which almost feels like a sketch—can be found in the policy document of the appointments department in one of the Israeli universities:

  "One published original science book shall count as several papers—based on the quality of publishing, the book's scope, its reviews and the extent of its uniqueness and how it adds to other publications by the candidate."

"Independent publications (sole author) indicate individual research work and independent thinking, and joint publications also indicate the ability to work with a team. [...] Therefore, the exact desirable ratio between joint and individual publications will be determined by the rector, in consultation with the dean of the relevant faculty, and if necessary, in joint consultation with the relevant department head."

"The significance of editing is rather small, although it does serve as proof of contribution to the scientific community and to the editor's reputation. If the book includes a scientific introduction by the author, or a paper by the author in the book, it should be considered half a paper.

"A review of a book published by a peer-reviewed journal is considered less significant than a scientific article, but is usually an indication of status in the scientific community as well as a professional reputation. However, an extensive review of a book, which presents a different perception, argues with the book's core theses, and is backed up by comprehensive scientific documentation, is considered a review article."

The official explanation for this nonsensical vagueness includes the typical argument that not every component can be quantified, and either way every case needs to be weighed uniquely—both due to the divergence between scientific disciplines and due to the divergence between researchers. For example, some researchers have outstanding achievements in teaching, while others stand out in research; some publish in large quantities but on less prestigious platforms and vice versa; some are good at teamwork, others are soloists.

In reality, this vagueness serves entirely different purposes:

- Senior faculty members fear that were they required to present a scoring index, they would also have to explain and justify its underlying rationale (there is actually no plausible explanation for why one rank requires X number of publications while another rank requires Y number of publications). This is liable to expose the distorted system that they serve so faithfully. They also fear reform, after which their successors will be required to publish less than they did.
- Institutions use this vagueness as a whip against faculty members, allowing them to sneakily raise the quotas required for a promotion without any in-depth discussions or democratic vote—and basically without anyone noticing. When you don't know the quota that's expected of you to

get ahead, it's best to produce as much as possible. Prof. Mike Fainzilber of the Weizmann Institute in Rehovot cited his mentor, who used to say: "In academia, quality is more important than quantity, but they really love to have a lot of that quality."[1441]

- Vagueness is a political tool, enabling cliques and functionaries to form their own power centers among people who were promoted and are grateful, hinder competitors, reward their allies, and settle scores with their enemies.

As a matter of fact, not only does vagueness not benefit the academic institution, it actually causes serious damage to the institution and its employees, for a number of reasons:

- People who work around the clock are humiliated when they're told "this isn't enough" or "do more," essentially ruining the joy they take in work—not to mention egging on a useless industry of academic papers.
- Studies (as well as common sense) show that employees find it hard to empathize with an organization that doesn't operate fairly or transparently. Paradoxically, academia, which has discovered this reality, chooses to ignore it. A satisfaction survey was conducted in Israel in 2015 among some 600 young researchers with an average age of 40 (most had completed their post-doctorate in the U.S. and were on track toward tenure). Most felt that promotion procedures in their institutions were problematic because of their slowness and lack of transparency. One of the respondents wrote: "You asked about the objective foundation for promotions and tenure. I have no idea. It's as transparent as concrete."[1442]
- Faculty members across all ranks feel surprised, disappointed, insulted, and mistreated whenever the department, dean, or rector refuse to launch a promotion procedure for them without providing any convincing arguments, or when committees reject or delay their promotion for reasons unknown to them. Even if the process eventually ends with a positive result, the wound remains open and damages the faculty members' emotional attachment to their institution.

It should be stressed: Feelings of frustration among people whose expectations and hopes have been dashed are obviously not unique to academia, and exist in every competitive field. However, there are two unique components in academic culture: a) there is no individual competition here, because in most cases, promotion of one faculty member does not come at the expense of another faculty member; b) there may be financial significance to the promotion (a salary increase), but most people who are involved in the promotion procedure (including members of the appointments committee) are not aware of the institution's strategic planning, and no one is asking them to take that into consideration when discussing the case. Furthermore, if the financial consideration was actually important (as in other workplaces), institutions would have limited the number of jobs for each rank from the get-go (this is only done in some countries, such as Germany, Spain, or Italy) and wouldn't have made the promotion procedure strictly dependent on an output quota, regardless of the institution's financial resources.

- The feeling of injustice is very common among faculty members, not only due to the procedure's arbitrariness and the delay of justice, but also because many of them do not agree with the informal output threshold—both because it is unrealistic, and because meeting this requirement often isn't up to them but rather depends on external factors (the nature of the research, funding limitations, and the like). Many of them feel like less worthy colleagues got ahead faster thanks to luck or favoritism. These hard feelings have grown intense in recent years, since the financial consideration has become more central to the promotion procedure, while raising research budgets grows ever more difficult.[1443]

■ **Incessant nitpicking.** It goes without saying that the official vagueness is nothing more than a façade, and in practice there are unwritten quotas (which are updated in secret). Even the claim that all professional achievements are weighed according to the researcher and their field of research is incorrect, because in practice, the determining factor is the number of publications, their prestige (statistical impact), and research grants. Everything else is lip service or an excuse that can be used whenever a committee member wishes to thwart a promotion or support a dubious promotion. In practice, there is a ridiculous gap between the vague definitions and the meticulous manner in which components of the resume are examined and weighed—as if the committee is inspecting diamonds before purchase or overseeing security measures.

Since the promotion procedure is perceived in academia in near-sacred terms, and since the instructions for assessing a candidate are strictly general (e.g., "is their research at the forefront of their scientific field?," "does their contribution meet high competitive standards?," "have they published quality papers at a reasonable and continuous rate?," "have they taken on administrative duties or made any contributions to the university and scientific community?")—they can argue about everything and agree on nothing. In most institutions, discussions about the resume's quality and the reviews' quality have turned into futile hair-splitting, similar to the constant debates around religious texts (Sayre's Law, named after Wallace Stanley Sayre, a political scientist and professor at Columbia University, states that in any dispute the intensity of feeling is inversely proportional to the value of the issues at stake). The committee picks apart every single detail and interprets the reviewer's phrasing, tone, register, and above all subtext. This way, a supposedly professional discussion in many cases becomes a linguistic and psychological discussion (what was the real message of the reviewer?).

In 1996, psychology professors Ofra and Baruch Nevo of Haifa University published an amusing yet sad article about "the promotion game," i.e., the interpretive judgment procedure and its subjective element. They showed, based on committee protocols collected over the years, how each of the 12 assessment scales are interpreted by the appointments and promotions committee as an advantage in some cases and a disadvantage in others, based on the committee member's point of view. Here are some examples:

- "A low number of papers," for example, was sometimes described as a virtue: "few papers but relevant/promising/with meaningful content," and sometimes as a fault: "weak/slow/unproductive researcher."
- "Diverse publications" was presented positively as "an impressive body of work," "adds another dimension to the department," and "points to an open mind and variety," and on the other hand was perceived negatively as "indicates superficiality," "lacks research focus," and "tendency to chase research trends."
- "Publishes alone" was interpreted as "an independent and original researcher" and "a researcher who can develop and execute ideas," and on the other hand as "a lone wolf," "doesn't cooperate or share information with colleagues," and "doesn't promote students."
- "Steady output over time" is considered an advantage: "a consistent, hard-working researcher unaffected by outside noises and productivity crises," but also a flaw: "the researcher works on an assembly line and only cares about serial publishing while neglecting other academic duties."
- And finally, the indication of "theoretical studies" is sometimes seen as a positive: "a leading researcher with a broad view of reality, laying the foundations for groundbreaking discoveries," and at other times seen

as a negative: "the researcher doesn't produce enough empirical data," and "esoteric, inaccessible writing."[1444]

The mutual suspicion is so great that in many institutions, faculty members are required to note the minute details of every single publication or grant received, not to mention their relative contribution to each, to ensure that every achievement can indeed be counted to their credit. Many institutions also publish pages of instructions and ethical codes to remind faculty members, or more accurately, to warn them: "Don't try to pull one over on us, because we will catch you."

This approach can be seen in the internal document published a few years ago by Ben-Gurion University of the Negev (it's not alone, of course). This document is called "credit rules," and here are some selected excerpts:

"The ethical code refers to various types of academic fraud, including: forged studies, partial or inaccurate reports of research findings and plagiarism. […] Credit for academic publications leads to many social rewards (such as reputation and status) as well as economic rewards (such as promotions and tenure). These rewards may seduce researchers to make ethical violations. […] For example: Credit for authority – in cases where institutions, or authority figures within the institution, abuse their status in order to get credit for a publication without having been involved in the work related to the publication's contents. […] Gift, courtesy or honorary credit – no individual shall be credited as an author, unless he or she added a meaningful academic contribution to the research and writing. […] Crediting esteemed or socially 'beneficial' colleagues who were not involved in the work is academic fraud, since the alleged author creates a false pretense of research activity that never took place. […] Political credit – […] Out of concern that important colleagues or authority figures will be angry, hurt, or disappointed by not being included in the author list, even when they weren't involved in the relevant work. Ghostwriting (or uncredited writing) – a particularly troubling deception, as it relates to a case in which someone made a substantial contribution to the publication and is not credited as an author against his or her will (making this plagiarism), or appears on the list of authors in a place that does not represent his or her true contribution. […] The latter case may be due to the esteemed colleagues' desire to bolster their status at the expense of the ghostwriter."[1445]

This document leaves the reader speechless not just from the ridiculous pedantry, but also from the fact that with all of their concern for obstruction of procedures, the document's authors fail to notice that they indirectly suspect their colleagues of shady deals and dishonesty, and thus dishonor them and themselves (as it takes one to know one).

- **Group dynamics.** Social and behavioral scientists research and analyze countless social phenomena, including ones that take place behind closed doors. Surprisingly, or not, when it comes to their own backyard and matters relating to their own fate, they all stick their heads in the sand. As absurd and hypocritical as it may sound, to this day no one has ever investigated what truly goes on inside appointments and promotions committees in institutions of higher education. The first who dares to set foot on this holy ground will undoubtedly expose a unique and extremely problematic culture.

  Promotions committee discussions are concluded with a collective decision, by voting. Obviously, most scientists would claim that their judgment is entirely practical and objective, and in many cases this is true, but if you ask them quietly one-on-one (and this is what we have done with an unrepresentative group of some 30 faculty members from across the world with significant mileage in these committees), they will awkwardly tell you about what goes on behind closed doors. Not to them, of course, but to the colleagues sitting next to them. For example, disagreements and arguments are not uncommon in these committees, but all it takes is for one authoritative member to set the tone in either direction—and everyone falls in line. The committee's composition therefore has a crucial impact on the decision-making, particularly the loud, petty, and condescending members.

  Another attribute that nearly everyone noted to us was the gap between the life-changing significance of the decision and the actual attention devoted to reading the case. Committees are required to discuss a huge number of cases in one sitting, each containing reviews that spread over dozens of pages. Most members reluctantly skim through the material (read the summary and conclusion) and base their opinions on random signs and external clues.

  As expected, the session's order also has an effect. If the committee has too many approvals or rejections in a row, it inevitably leads to a "balancing" decision, and someone will either hit the jackpot or bite the dust, regardless of their actual case. To these external influences, add cumulative fatigue to the mix (the deliberations are always more thorough in the beginning than towards the end), as well as the human tendency to converge around the average.

Professional Bribery, Intrigue and Shady deals
It's hard, or rather impossible, to change the traditional promotions system, and therefore the scientific mind is also forced to come up with workarounds in this field. For instance, some institutions allow candidates to submit a list of supporters and detractors—i.e., people they would prefer to be judged by and ones they'd rather not be judged by. This supposedly helps prevent the appointment of reviewers with a conflict of interest or ones whose improper motives are unknown to the committees, but in practice this allows the candidates and/or people who have their best interests at heart (the department head, dean, professional committee chairperson, rector etc.) to appoint the "right" reviewers.

It's not uncommon for candidates to cook up opinions under the "you scratch my back and I'll scratch yours" principle, or opinions that are retroactively improved or even filtered. Some institutions have created a formal walkaround that allows them to have their cake and eat it, too. In Israel, it is called a "preliminary referendum": The dean sends the candidate's case to external reviewers, allegedly in order to get a response whether or not to launch the promotion procedure, but later these opinions (which in many cases are precooked) are incorporated into the official procedure (occasionally, just the good ones). The late Prof. Dan Caspi, who had served on promotions committees over the years, wrote about the sham behind the "professional and objective promotion procedure": "If someone is welcomed, they get it. And if they're not welcomed, they don't get it. Research achievements are important, but not always relevant. […] The rhetorical reservoir is rich enough to turn even the most mediocre candidate into a prodigy, and vice versa—to dwarf the achievements of a talented yet unwanted candidate."[1446]

Since everybody knows all the tricks and everyone suspects everyone—a culture of "spot the cheater" has evolved. The result is that the appointments committee spends the vast majority of its time searching for clues and hints of clues of illicit acts. A Technion professor described it thus: "The letters are always full of praise, and based on these letters, 90% of the researchers are among the top 10%. The purpose of committees is to find out which choir boys are singing out of tune."[1447]

Incidentally, sometimes rigging the procedure could end up working against the candidate. It is not uncommon for a committee member who got up on the wrong side of the bed, or someone with a grudge, to protest an un-objective opinion (too positive or too negative) or a reviewer's lack of professionalism—thus complicating the procedure. In order to preemptively avoid such problems, the department head, dean, and professional committee chair often take preventive measures and ensure that opinions are not too positive or too negative, and that there are enough opinions in the basket that, if one gets rejected, the others will do.

The result is that hypocrisy abounds. Professors often criticize the political and economic systems in their countries for corruption, demand commissions of inquiry, and badmouth politicians, but none of them dare expose or criticize what's happening right under their own noses.

When in Rome, everyone covers for one another as though in the mafia, backs each other, conceals information, and shakes off personal responsibility. This silence is particularly deafening due to the fact that so many people get hurt by the system and walk around with a silent grudge. Most faculty members are too exhausted and scared to rebel and too afraid to lose what they already have, and so they fall in line with the evil regime.

In the dozens of interviews that we conducted, we heard spine-tingling stories from abused faculty members, but we haven't seen even one public document that calls to abolish this inefficient and immoral system. We did get our hands on one brave letter. It was written by a dean and sent to the university administration. Among others, it stated:

"The promotion issue was part of the agenda for which I was elected dean. During the election period, I spoke to some 130 faculty members. These were fascinating conversations that taught me a lot about my colleagues' many research fields. As I was well aware of the issue, I was not surprised to discover that many faculty members carried some resentment, anger, and frustration over the handling of their promotion, but I certainly was surprised by the intensity of their emotions. Their backs are scarred, and they expressed harsh criticism about the exiting promotion method, noting that the metrics for promotion are unclear, biased, and un-transparent.

I recently became aware of the findings of the recent survey by the Israel Young Academy, which clearly showed that untenured faculty members in our institution are displeased with the procedure and have no faith in it. These faculty members are already very resentful of this procedure, and it becomes weightier and more irksome as the years go by. Of course, we can dismiss their accusations by saying that they're wrong and their claims are baseless, but when so many are complaining about the current system, perhaps they are right and there's something that's actually wrong with the system?

The typical discussions that take place in the promotions committees, which I've seen with my own eyes, are also very problematic and make it difficult for candidates to get ahead. Ten committee members discuss the candidate's case without sufficient training, knowledge, or understanding to assess the case. A member of the faculty of health sciences, for instance, could never study the case of a humanities researcher, and vice versa. I was often surprised by the questions that members of the committee asked me when I presented the candidate's case. Some were proof of complete ignorance on the part of the committee members of various issues related to studies in my faculty.

Since the members of the appointment committee do not read the promotion candidate's studies, one might expect them to base their arguments on the opinions of external reviewers and the professional committee. Much to my surprise, I discover that quite a few committee members even question the professional committee's decision, the letters written by experts in the field, and the dean's recommendation. In the eyes of the committee's members everyone, including the dean, are suspects, since they are supposedly rooting for the candidate and are therefore not 'objective'. This approach is fundamentally wrong and problematic, professionally and ethically.

Some nights I simply could not sleep. I felt like a faculty member had been wronged—that the decisions trampled their dignity and called their research work into question. Many times I found myself in a situation where I simply did not understand how the rector and committee members came to make those decisions. I also often asked myself, how can we do such things to our colleagues? And for what? What do we have to gain by this? Is this system really taking us forward to a good scientific and moral space? With our own hands we've created and continue to create bitter, disgruntled faculty members, who consider the university an enemy that wants to do them harm. Many of them receive recognition from colleagues around the world, while at home they feel alienated.

In the name of so-called 'academic excellence,' we're cutting off the branch we're sitting on, and turning a large proportion of our faculty members into researchers who want to avoid any activity that benefits the university. I have no doubt that if the system was different, less centralized, more humane, more embracing, open, and transparent, we'd see other results in both faculty members' commitments to the university—and the quality of the research. The current system undermines the imagination of nonconformist researchers, compromises research, and turns faculty members into cogs in an assembly line that doesn't allow them to spread their wings and fly to uncharted territories."

The Illusion of Gender Equality

The Feminist Revolution Gears Down

Many have been, and continue to be, attracted to the academic profession on the assumption that it is a more equal and democratic workplace than others. This is mostly true. Though academic institutions were clearly dominated by men until the 1960s (a veteran professor told us that when she completed her doctorate at John

Hopkins University in 1967, there weren't even parchment papers of diplomas for women, and they had to add the letter S to the word "he" for her), but academia has since led the feminist struggle, exposed the mechanisms of male chauvinist oppression and discrimination, and made the public space more inclusive and tolerant towards women. The glass ceiling may have not been shattered in all fields, but significant steps to close the gender gap have been made:[1448]

- The rate of female students is close to that of male students in most countries, and in some countries, it is even higher. In the United States, for example, just 50 years ago the rate of female students was 36%, while in 2019 it reached 57%, and all three degrees—B.A., M.A., and PhD—have a higher rate of women than men.[1449] The rate of female B.A. and M.A. recipients has been over 50% in most OECD countries since 1995, climbing to 60% in the following two decades. There has also been a significant growth among female PhD recipients in these countries, and in 2017 more women received their PhDs than men.[1450]
- The rate of female faculty members in universities and colleges is increasing over time. For example, in 2010 the rate of full-time female lecturers in institutions of higher education in Canada was 37.6%, and in 2017 it reached 40.2%.[1451] In Japan, half a century ago only a few women worked in institutions of higher education, while in 2016 they made up 52.2% of full-time teaching staff in colleges and 23.7% in universities.[1452]
- Women are also gradually closing the gap of senior academic ranks. To illustrate, the rate of female professors in the U.K. in 2003 was 15%; exactly one decade later, it has grown by nearly 50%, reaching 22%.[1453] However, the higher the rank, the wider the gender gap, because of barriers that have not been lifted yet.[1454] In Australia, for example, the rate of women in junior ranks is 53.3%, but the rate among senior lecturers is 45%. Female professors made up only 30% of all professors in 2016 in the Land of Kangaroos.[1455] In the U.S., women make up 40% of full-time faculty members, but only a quarter of full professors.[1456] In Israel, women make up 36% of the senior lecturer staff—and only 16% of full professors.[1457] A similar picture can be seen in the European Union: Women hold slightly over 40% of all academic positions (the average in 28 countries), but their rate drops by 12%-15% the higher you climb up the ladder. In many European countries—including ones that are very progressive when it comes to gender equality, such as Sweden, the Netherlands, and Germany—women make up less than a fifth of senior faculty members (Grade A).[1458] In the U.K., although women

make up 45% of the academic workforce, only 20% of hold the rank of professor.[1459]

- Incidentally, in countries where one would expect deep gender gaps, the picture is surprisingly positive (in relative terms, of course). In India, for instance, the percentage of women in the highest rank in academia in 2016 was 25.8%, and 34.8% in intermediate ranks.[1460]

  When it comes to senior administrative positions (department heads, deans, rectors, and presidents) the picture is even less bright, and the road to equality is still ahead of us. Only a fifth of the heads of institutions of higher education in the European Union's 28 countries in 2014 were women,[1461] and just 30% of institutions of higher education in the U.S. in 2016 had female presidents.[1462] But again, if you compare the state of women in academia nowadays to what it was in years past—this is a significant, perhaps even dramatic improvement (on a historic scale).

A fly in the ointment: whereas once there was hope that academia would in time become a completely gender-equal arena, the financial crisis has shuffled the cards here as well. In the past few years, the flow of data has indicated that the gender equality revolution is gearing down and perhaps even turning around: Women publish fewer papers on average than men (who only publish fewer papers in the therapeutic, education, and library sciences), and the prestige of the platforms in which they publish is far lower on average than that of men. Women also get fewer research budgets, and even the ones they get are lower on average than the budgets given to men. Women contend less for positions and tenure than men, are promoted more slowly and less often, and are also less satisfied (can you blame them?) with the common promotion procedures.[1463]

Hidden Gaps

The announcement of Prof. Donna Strickland's 2018 Nobel Prize victory in Physics was followed by the disclosure of information that surprised and angered many (mostly people who weren't familiar with the academic system): While the Royal Swedish Academy of Sciences had found the Canadian scientist worthy of the world's most prestigious award, the institution where she worked, the University of Waterloo, still hadn't granted her the rank of "full professor." Keen Internet users discovered that a Wikipedia entry hadn't even been written about her before she received the award (Wikipedia has been heavily criticized for the absence of entries on women). One respondent on the Q&A site Quora offered a convincing and amusing explanation: Strickland's resume probably just didn't meet the promotions committee's standards. It was comprised of 94 papers "overall," published over the course of 33 years, compared to the 1,400 and 2,000 papers that her two Nobel Prize co-winners had published respectively.[1464]

Strickland tried to defend her university with the odd claim that she didn't care about the promotion, as it did not include a significant pay raise. And in any case, she had tenure, and didn't have time to fill out the paperwork involved in the application.[1465] Most Internet users were not convinced by this explanation, because why would she need to ask for a promotion at all? Shouldn't the institution take initiative and give this accomplished laser researcher what she deserves? After all, if it were so natural and obvious to her employers, they wouldn't have rushed to give her the rank (probably without the necessary paperwork) shortly after she received the Nobel Prize.

Strickland is obviously not the first talented scientist to be shortchanged by his or her institution nor the last, but it's doubtful whether the heads of Waterloo would have made such a laughingstock of themselves if this outstanding scientist were a man.

Poetic symbolism of the status of women in academia can also be found in the story of renowned sociologist Debbie Bernstein, one of the founders and leaders of women's studies and the development of feminism in Israel. In 2019, Prof. Bernstein received the Israel Prize for her outstanding achievements. At the time she was already retired, but the University of Haifa, in which she worked for many years, felt left out. The university's president, rector, and dean of research published a jubilant public statement, which read, inter alia: "Dear Prof. Deborah Bernstein, your excellent and valuable research, your incredible and inspiring life's work, is a shining example of diligence, courage, and original thought. All of us—the women and men of the university's faculty—feel immensely proud of your well-deserved win. […] We thank you for your longstanding contribution to the University of Haifa, to science, and to the State of Israel. Please accept our warmest congratulations on behalf of the university's entire community—which applauds you."

Shortly after, the Dean of the Faculty of Humanities, Prof. Gur Alroey, tore the mask of hypocrisy off their faces when he sent a brave letter to the faculty members. Among other things, he wrote: "Friends, we received word yesterday of Debbie's winning of the Israel Prize. […] The problem is that the University of Haifa, where her studies were written, never acknowledged their importance. The opposite is true: the 'university' only hurt Debbie, held her back, and insulted her. […] We can hope, just hope, that we will learn to appreciate and give credit to our faculty members not only when they receive the Israel Prize."

The main reason that the feminist revolution in academia has come to a halt and even started to regress is, as mentioned before, the financial crisis. In order to survive and get ahead, all faculty members are required to increase their output and work longer hours. This is harder for women, for two reasons: a) chauvinism never actually left academia; b) women are less willing to pay the personal prices (as mothers and as wives) that institutions of higher education demand—from all faculty members and sometimes just from women. To elaborate:

- Research shows that women are treated less tolerantly than men in negotiations for employment conditions.
- This is probably one of the reasons why they suffer wage discrimination. Studies have shown that women make less than men on average across all faculty ranks and across all types of academic institutions. The pay gaps grow as the rank grows higher.[1466] Female full-time professors in Canada, for example, earned only 86.4% of what same-rank men earned in 2014 on average.[1467] The salary of female faculty members in the UK was 12% lower than their male counterparts (as of 2017).[1468] In the US, women earn 18% less than men on average, although female professors are in a better situation, earning 94.3% of what of same-rank men earn.[1469] This may be close, but it is still not equal.
- Studies have shown that women struggle to climb up the ladder at the same rate as men because they are discriminated against in the academic workplace.[1470] In an extensive study at Columbia University in New York, which included interviews with faculty members of natural sciences, social sciences, and the humanities, 55% of female faculty members reported being mistreated by colleagues (three times as many as men). Female interviewees also claimed that their departments had unwritten rules requiring them to work harder than their male counterparts in order to get recognition. Among other things, they are assigned many more administrative tasks and have to advise many more research students, which makes it harder for them to clear time for research.[1471]
- The level of chauvinism in some countries is still very high and also comes into play in academic institutions (mainly in places where the bottleneck is narrow and positions of power are dominated by men).[1472]
- Much like most fields in society, men are prioritized in academia when it comes to awards and certificates of appreciation.[1473] This hurts female scientists twice: It's harder for them to get promoted (as previously noted, awards and certificates of appreciation are among the criteria for promotion), and thereby reinforces the stereotype that women can't succeed as much as men.
- Women's chances of getting research grants, let alone large grants, are lower

than men's for three reasons: a) they are underrepresented in the administrations of research and funding bodies;[1474] b) they usually do not appear as lead researchers (women are registered as lead authors in only a third of all co-papers);[1475] c) the phrase "high-quality researcher" is more common when it comes to men.[1476]

- Studies have shown that men get much more praise in both quality and quantity in letters of recommendation. A man will be described as "exceptional," "brilliant," or "original," whereas a woman will receive bland descriptions such as "does her best," "hardworking," and of course "sociable."[1477]
- Women struggle to keep up with men's rates of publication,[1478] among other reasons because they're judged more severely in the review procedure.[1479] Women are also underrepresented in journals (particularly the prestigious ones) and on promotions committees.[1480]
- Male scientists tend to reference studies performed by men more than studies performed by women. Studies in which the primary author is a man are referenced more than papers in which the primary author is a woman (this preference also exists in papers published in prestigious journals). The problem is worsened by the fact that women tend to put themselves at the front less often than men, and therefore also don't reference themselves as much.[1481] And on top of it all, even when a group of men and women put their names to a study, the achievement is usually attributed more to the men rather than the women in the group. This bias, known as the Matilda Effect (named after American women's rights activist Matilda Joslyn Gage), doesn't just hurt women's reputation, but also has a negative practical effect, since, as we have explained in detail, references are the most important metric of "impact" in science.[1482]
- Women collaborate with colleagues in research and publications less than men, probably because they are not invited as much to participate (one study found that women make up only 30% of all authors who collaborate in publishing papers).[1483] Female scientists who did collaborate did it mostly on the local level, and were rarely involved in an international collaboration, which has higher rating potential.[1484]
- Women are also discriminated against in scientific conferences, which impairs their ability to leverage their professional relationships and reputation.[1485] This happens because many feel restricted as mothers when going to conferences abroad, because women's papers often get lower ratings in admissions committees,[1486] because women don't receive (or take) the right to speak in discussions as much as men, and because they get interrupted

more often.[1487] Women are also not invited as much to speak as guest lecturers in conference openings, nor to informal meetings over coffee or lunch after the lectures, which are excellent forums for creating beneficial professional relationships.[1488]

- The media also tends to interview male scientists more than female scientists.[1489]
- On top of all that, studies have shown that students tend to give more positive feedback to male lecturers than female lecturers.[1490]

Research is Fun. Kids—Not as Much

Behind every male scientist in the past was a housewife, who cleared his schedule so he could have a career. Even nowadays, due to the masculine nature of academic culture, the price of a career for many men is the professional, familial, and personal concessions made by their wives. Cases where men sacrifice their professional career so that their wives can blossom and break records in academia are few and far between.

Already at the start of their career, the system takes a heavy toll on female scientists, as the candidacy period for an academic position is also when their biological clock starts ticking. Although studies have shown that women would love to take on a permanent part-time job during these years, this option does not exist.[1491] A small number of universities have tried to make it easier for women with laws that extend the candidacy period for tenure, but in many cases these laws are not implemented.

In recent years, the discourse over the price that women in academia pay has expanded. Some are bold enough to call this what it is: the Baby Penalty.[1492] Indeed, a study conducted in the US in 2017 found that 70% of permanent male faculty members in institutions of higher education were fathers, while only 44% of the women were mothers.[1493] American academia, which prides itself on its gender sensitivity and which publishes countless poignant articles about discrimination against women in the workplace, once again fails to see its own hump.

A mother's chances of getting a permanent job in institutions of higher education in the US are three times lower than a woman without any children.[1494] And as if the fact that women in academia are more often than not forced to choose between raising children or having fewer of them and a career weren't enough, when they do become mothers, their unique needs are not taken into account—for example, by making the criteria for promotion more flexible. In the official documents on the criteria for promotion in academic institutions, it is rare to find any kind of acknowledgment of the need (or more accurately, requirement) to consider the objective limitations of female faculty members when weighing their professional achievements in committees.[1495] Even a time-out isn't possible for women with small children. Mary Ann Mason, head of the Institute of Law and Public Policy at the University of Berkeley in California, phrased it very bluntly: "For men, having children is a career advantage. For women, it's a career killer."[1496]

Millions of women around the world may have built academic careers over the years, but up until recently, no one ever conducted a thorough and extensive (global) examination of the personal price they paid. Unfortunately, it's not just that women in academia are not making a true effort to change the employment and promotion model so that it will fit people with families who wish to be involved in their children's upbringing. In many cases, they actually become advocates of the old way, perpetuating the false message: If you really want it, you'll succeed.[1497]

Two researchers published data that supposedly corroborate the thesis that a woman can succeed in academia just as much as a man even under the current conditions. Hundreds of faculty members (men and women) were surveyed in five countries—Germany, Finland, the U.S., Hong Kong, and Japan[1498]—and found a gap in the average research output level between men and women. Surprisingly enough, it turned out that the familial factors were not the cause. Married women published significantly more than unmarried women; mothers were more productive than their childless friends (except in the U.S., which has the worst maternity leave conditions among the surveyed countries); even the number of children did not affect the number of studies and papers published by their mothers. The researchers pinned the blame for the gap in productivity on prejudice towards women and the much higher volume of administrative and teaching tasks assigned to them as compared to their male counterparts.

The "small" problem that the researchers did not note was the percentage of those super-successful female scientists out of the total female scientists in the sample. They also didn't look into why married women and mothers managed to publish more than single and childless women. The explanation may lie in the fact that women who can successfully juggle a demanding career and family life belong to a very certain breed of highly energetic, ambitious, and efficient women, or in short, wonder women (under the assumption, which obviously wasn't examined in this study, that they are equally successful mothers and wives). It goes without saying that the minority that survives the boot of oppression has always been used to justify oppressive systems.

Even more significantly: Their study did not check how many women gave up on an academic career from the get-go because of the price it would demand, how many dropped out along the way, and how many are successful but regret their choice. Other studies do answer these questions, showing that women are less likely to choose an academic career at the end of their doctoral studies than men, less likely to continue to a post-doc, less likely to contend for permanent positions, and more prone to apply for temporary positions (adjunct professors).[1499]

The voices calling to fight gender inequality in academia are growing and intensifying, causing many institutions to take various measures towards closing the gap, such as doctorate and post-doctorate scholarships for outstanding female students, internship programs for young female lecturers, or an extended trial period for tenure due to childbirth or adoption. There have also been more meaningful attempts: In 2018, the government of Iceland initiated a program that designated professorial jobs for women only, with the goal that at least 40% of faculty members would be women by 2024. Similar initiatives, albeit not as broad, were tried in the Netherlands and in France.[1500]

There were some who objected to these initiatives, labeling them as illegal and even immoral discrimination, i.e. unfair to men. There was also resistance from a feminist perspective: Patricia Casey, for example, the first female professor of psychiatry in Ireland, described the initiative as embarrassing and condescending. According to her, it set a bad example, as if women needed leniencies to be able to compete with men.[1501] It hadn't occurred to her—nor to the leaders of academia and the government—that the real problem was not prejudices, but rather the fact that academia itself was designed in the image of the "old men."

This ultra-masculine model doesn't just hurt women, but also the new generation of men, whose masculinity is not measured by how much they work or how big their muscles are. They, much like their wives, want to be involved in their children's upbringing. In other words, leniencies and campaigns won't bring about the long-awaited change, only replacing the old model of employment with a new model more attuned to the spirit of the times.

The Illusion of Peace of Mind

The growing sensitivity to a person's needs and family in the Western world, alongside the fast-paced technological development which reduces the need for working hands, were supposed to lead to less working hours and more time devoted to relationships, parenting, leisure, and entertainment. In reality, however, this has not happened. Official working hours may have decreased over the years, particularly in Europe, but in practice people are working more, and with fewer breaks in between. Burnout syndrome and its consequent fatigue are not identical in volume and in nature across all countries and all professions, but they are very common in the Western world. In the U.S., which is known for its high work ethic as well as for extreme materialism, hedonism, and individualism, it has already been labeled a pandemic or "modern slavery."[1502]

Experts have identified several factors that have escalated the burnout epidemic in the past few years:[1503]

- The smartphone, which has made everyone available 24/7, has allowed work tasks to invade people's private space and free time, and is blurring the line between leisure and work.
- The global business environment is reducing sleep and rest hours due to time differences between continents.
- The culture of long-term job loyalty has been replaced with a culture of goals and achievements, while increasing expectations from employees.
- Many people have been living life to the extreme in recent years—living on the edge and even getting addicted to work. This phenomenon is particularly common in international and competitive fields, producing a particularly vicious strain of workaholism.[1504]
- Demanding and competitive workplaces have turned into convenient social centers. They have cafeterias, daycare centers, gyms, and play and rest areas—all to give employees a sense of fun and keep them from rushing back home.
- The entrepreneurial world has a growing need for brainstorming and mutual inspiration, i.e. teamwork, which creates a hidden peer group pressure to work more and more. After all, you're not going to abandon all your friends and be the only one who gets to go home.
- As competition for jobs grows (and the threat of unemployment along with it), as the incentivization and temptation to consume more and more (which requires higher pay) grow, and as the propaganda of success becomes more sophisticated (the "big score" is just around the corner)—so the motivation to work more and more increases.
- Many people have grown accustomed to an extravagant lifestyle, and are no longer able to cut down on their expenses. They are reluctantly stuck in gilded cages of exhausting high-paid jobs.
- The increased divorce rate further enlarges the burden of livelihood, as well as many young people's growing chronic dependency on their parents.

It should be noted that most workers and managers are not sufficiently aware (or don't sufficiently deal with) the heavy tolls that they and society as a whole are paying for the broken work-life balance (enlightenment usually comes only after layoffs, an illness, or retirement). Studies leave no room for doubt: Overwork leads to higher rates of absence from work, higher voluntary resignation rates, and higher rates of dissatisfied and unhappy employees (an annual survey which has reviewed American job satisfaction since 1987 has shown a consistent drop. In 2014, nearly half of respondents reported being unhappy at work);[1505] It hurts physical and mental health and contaminates interorganizational relationships (including a rise in internal expressions of violence and compensation claims); it also hurts gender equality, marital life, and parenting.

Australian nurse Bronnie Ware, who treated patients on their deathbed, recorded her conversations with them in her blog and book. She wrote that all (!) of the men, when looking back at their lives and pouring their hearts out to her, gave the same answer when asked about what they regretted or what they would have done differently had they been given the chance. All of them (!) responded "I wish I hadn't worked so hard… I missed my children's childhood and youth and quality time with my spouse, and wasted too much time on working and on my career." (Another "popular" regret expressed which is relevant to our book was: "I wish I had the courage to be faithful to myself, not to other people's expectations of me.")[1506]

The academic profession is a competitive one, and as such it has always demanded an unlimited time investment.[1507] According to a well-known joke in academia, "the greatest thing about being a professor is the flexibility—you can do whatever you want during your 80-hour work week." However, dozens of surveys conducted in the past few years have indicated an increase in the level of stress among faculty members, as well as its mental and physical expressions.[1508]

A study that examined 26 competitive professions in the US found that the risk of developing mental illnesses in academia due to stress was at the top of the list.[1509] Another study showed that the level of stress and distress among British academics was even higher than among emergency workers (doctors, nurses, etc.).[1510] Women in academia in particular suffer from physical and mental problems originating from mental stress.[1511] In this regard, we can compare academics to the builders of the pyramids in Ancient Egypt: They built marvelous constructions that advanced humanity, but paid a terrible price.

What brought about this massive gap between the laid-back atmosphere projected by the campus and what goes on inside the offices and labs, as well as within the faculty members' very souls? The answer is scattered throughout the chapters of this book, in which we have described in great detail how and why the work environment in institutions of higher education has been increasingly contaminated, becoming more demanding and alienating year in and year out (there have even been extreme cases in which the pressure to publish has driven lecturers to suicide).[1512]

The Illusion of Reputation

There isn't a single institution in the world where etiquette plays as significant a role as in academia.[1513] Scientists never stop glorifying one another in public, praising one another, and giving out mutual compliments—in many cases, for no good reason. Every academic event opens with a series of praises for the speaker, chronicling their titles and achievements in great detail.

But in the age of transparency and directness, people have less patience for tedious protocol. The world is becoming more casual, and academia has to gradually fall in line. Faculty dorms have long disappeared from campuses, and faculty clubs for card-carrying members are also going extinct. Academia is no longer a closed club for a privileged few, among other things because the profile for scientists has become more diverse when it comes to gender, race, ethnicity, and age. The marvelous cathedrals and fancy offices are becoming smaller and less impressive, and even the tradition of students addressing their lecturer as "professor" is fading away, as are other obsolete rituals.

The image of professors is shrinking, as is the profession's reputation, for several other reasons:

- Hordes of magisters, doctors, and even professors every year have made degrees that used to be considered special a common occurrence. Furthermore, as we've described throughout this book, most of these degree-holders are nothing more than book-carrying donkeys, and sometimes even donkeys without cargo. It's not uncommon to find PhDs with narrow one-track minds at best and uncreative PhDs with no basic intellectual skills, limited generalization and abstraction abilities, and poor language skills at worst. Some even lack any writing or teaching skills. All of this adds to the degradation of the traditional reputation of the advanced degree.
- Smartphones have made information about virtually everything accessible with the click of a button—on the train, in a restaurant, in class, and even in the bathroom—and the traditional authority of knowledge is dissolving.
- Constant reports about immoral and even criminal acts performed on campuses—from overblown salaries through the exploitation of adjunct professors and students to sexual harassment and the sale of degrees, even in prestigious institutions—are gradually erasing academia's enlightened and pure image.

- The obsolete teaching methods and emptying classrooms are killing the myth of the charismatic lecturer. Academic lectures pale in comparison to their online counterparts, and many lecturers look like yesterday's news.
- The public is sick and tired of the scientific studies constantly published in the media, warning and calling to consume or throw away, do this or avoid that—then saying the exact opposite the next day.
- The politicization of the humanities and social sciences (which we discussed in the previous chapter) is making scientists look like shallow, manipulative people, whose scientific objectivity is nothing but a façade. Many of them are perceived (and not just by the conservative right) as radical and dogmatic, and most of all as delusional loudmouths, who have made a career out of turning society against themselves and their students, as well as naively supporting the enemies of society.
- Scientists and professors used to be the protagonists of books, plays, films, and TV series, becoming part of the folklore of Western society.[1514] Matthew Nisbet, a professor of Communication, Public Policy, and Urban Affairs at Northeastern University in Boston, outlined four archetypes of scientists in the world of fiction:
  - Scientists as Dr. Frankenstein—a fiendish, evil, and violent scientist, and thus doomed to fail. For example, in *The Boys from Brazil*, *The Island of Doctor Moreau*, and *The Fly*.
  - Scientists as powerless pawns—scientists who are manipulated by greedy businesspeople, generals, and other villains. For example, in *The 6th Day* and *Jurassic Park*.
  - Scientists as geeks—a socially awkward scientist who has a sloppy appearance and is addicted to computers and the lab, spending most of his time at work alone. For example, in *Back to the Future*, *Weird Science*, and *Real Genius*.
  - Scientists as heroes—the scientist is a heroic figure, also serving as a moral compass. For example, in *Star Trek*, *Contact*, *Avatar*, *The Day After Tomorrow*, *Batman*, and *Iron Man*.[1515]

Which of these archetypes are more dominant in media? It's difficult to tell. What we can say is that science and scientists have long stopped being sacred cows in the art and entertainment world.[1516] More and more people understand that alongside positive character traits such as wisdom, high IQ, creativity, and self-expression, many scientists also have some traits that are not as positive, such as obsessiveness, megalomania, narcissism, narrowmindedness, jealousy, and various other quirks.[1517]

Ridicule isn't the only thing that is breaking down the scientist myth—it has also been reduced by humanization. Whereas works of art used to mostly deal with stereotypes of scientists, nowadays media tends to expose the world of academia as it truly is—a human arena filled with ego and intrigue. Fresh examples from Israel can be found in Joseph Cedar's film *Footnote*, as well as books such as *Seven Moral Failings* by Maya Arad and *Spielvogel, Spielvogel* by Matan Hermoni.[1518]

It should be stressed that scientist characters are still an unusual occurrence in the tapestry of typical characters that star in the entertainment and art world (businesspeople, detectives, politicians, and so on). Perhaps this is yet another sign of the crisis in academia and its growing difficulty in improving its reputation.

The Future of the Academic Career

As we've shown throughout this chapter, many of the academic profession's advantages are eroding, as is the attractiveness of the academic career. Things aren't likely to stop, let alone improve, because:

- The financial state of institutions of higher education is only getting worse, while governments increase their demands for cutbacks.
- When the demand for jobs is higher than the supply, it's easy to recruit new faculty members under worse conditions.
- A great many benefits are only given to permanent, full-time faculty members, who are becoming increasingly rare, while the proportion of temporary and part-time employees grows.
- Whereas once, the hiring process in academia was similar to the admission process to a kibbutz or local community, nowadays it is more like the hiring process for a commercial company. The question is how much money you're going to produce for us, i.e., are you rentable? In this reality, it's also preferable to attract the right candidate with money rather than employment conditions. This will allow the institution to get rid of them if and when their output rate drops.
- The significant benefits of an academic career were achieved in an age where academia was a closed, exclusive club. Most of the public wasn't yet aware of the privileges received by scientists, and therefore couldn't criticize them. This was a naïve age, in which people accepted the social hierarchy as a given, and believed that some classes deserved more. Nowadays people are not as naïve and demand justice and social equality, especially when it comes to taxpayer money.
- In competitive market conditions, the bargaining power of trade unions and workers' organizations (including academic faculty organizations) decreases.

Many young people still dream of an academic career and are knocking on the doors of institutions of higher education, mainly due to naivety, blindness, and ignorance. However, as the academic world is exposed (including the declining quality of students and the diminished joy of teaching), and as the chances of getting a job with good conditions drop—the charm of what used to be considered a "dream job" will evaporate.[1519]

Surveys that polled the job satisfaction of faculty members from around the world (mainly in Europe and the U.S.) have found that a high percentage of them are satisfied by the intellectual challenge, are proud of their achievements, and do not regret their professional choice. But at the same time, there is a considerable downward trend in their job satisfaction over time. Many complain about the time they spend working (the average in European institutions is 47 hours; Germany takes the lead with 52 hours a week), ongoing stress (41% of professors in Europe described their work as a source of stress), deteriorating working conditions, and the growing pressure to increase output.[1520]

We can therefore expect that in the future, fewer and fewer scientists will recommend to their students and family members to walk the path that they have chosen. This is actually already happening. An online sweep shows that there have been more voices recently that describe the academic career as opaque, dangerous, disappointing, frustrating, deceptive, and simply not worth the effort.[1521] Recent surveys have shown that more scientists are leaving the profession (mainly in favor of the commercial market) or are considering leaving, and that the longevity of a career in academia is becoming shorter and shorter.[1522]

There has also been a recent boom of articles by scientists and professors who talk about why they chose to leave the field. The phenomenon has become so widespread that it has given birth to a new literary genre known as Quit Lit.[1523] The authors are in many cases disillusioned doctoral graduates, as well as some who managed to find a job and decided to quit. The message is: "Don't come here!" It is being shouted in headlines such as "Goodbye Academia, I Have a Life," "Is Being a Professor Worth It?", "I got one of the most desirable jobs in academia—here's why I'm quitting," and so forth.

Stopping the decline in the attractiveness of a career in academia will therefore require a fundamental change.

10

The End of the Age of Academia

A General Diagnosis and Prognosis

The Lies and Denial

The title of our book, "Academia: All the Lies," may be a little hard to swallow. People might deem it provocative, perhaps even blasphemous. But alas, it is what it is: Academia is lying, and lying in spades. As we've shown throughout the book, academia has deceived governments, the public, and even itself. It is terribly sad that what was for so many years considered the pinnacle of truth, virtue, and integrity has, in recent years, become deaf and blind, in denial of reality, stagnant, and spineless.

This wasn't a conscious decision—made by hundreds of thousands of scientists across thousands of institutions in dozens of countries—to stray from the truth. Academia wound up in this situation mainly because it is struggling to adapt to the changes around it and fighting for its life. This isn't about the continued existence of science or education—which are eternal—but rather about the end of the centuries-old academic model, whose roots can be traced back to the Middle Ages. This model was immensely successful for many years, until the economic, demographic, cultural, and technological reality changed.

Academia is not alone. Most social institutions that have served as the backbone of civilization in the past few hundred years are now experiencing functional distress, convulsing between the analog and digital ages. Nevertheless, the existential crisis in academia is particularly problematic, because science and education are sacred myths. It is hard to move columns and knock down walls in the old ivory tower, let alone offer alternatives. This fact has made the process of writing this book both an elevating and frustrating experience—because on the one hand, it casts us in the role of the child in "The Emperor's New Clothes," but on the other hand, it is quite unpleasant to learn that most of your colleagues continue to shut their eyes to the truth.

On the Verge of Financial Bankruptcy

At the end of the day, academia has become a "white elephant," i.e., a possession that requires costly maintenance while its value constantly decreases, until it becomes a burden.

Attaining financial independence and stability is well-nigh impossible at this stage, because governments, the public, and the heads of academia have yet to determine the status of institutions of higher education. On the one hand, they are expected to follow economic principles (supply and demand, profit and loss, and so on), while on the other hand, they are expected to fulfill social purposes such as providing education to a wide population and developing the sciences, regardless of the cost. The tension between these expectations has turned institutions into a hybrid body which is both profitable and costly, at once subject to the earthy laws of fiscal sustainability and striving to climb the spiritual heights.

Many different solutions have been attempted, but have so far failed to mend this crisis, only managing to buy some time at the very most. But just like giving painkillers to the terminally ill, it's only delaying the inevitable. In fact, not only have these actions not solved the crisis, they have actually exacerbated it. Academia is acting like it's drowning at sea. As we all know, most people drown because of rip currents, which pull the swimmer into the sea. The typical reaction of people who are afraid of being swept away into the deep end is to swim vigorously (often hysterically) back to shore. But the solution actually lies in a completely opposite approach, which defies intuition and habit: Let yourself be swept away until the current dissipates, and then swim in the other direction to shore. Ironically and tragically, the hopeless effort to save themselves by persistently swimming against the current is what causes swimmers to drown.

It's ironic, because philosophically and sociologically speaking, the irrational behavior demonstrated by institutions of higher education is guided by an invisible, deterministic-evolutionary intelligence: When a social institution no longer serves its function, it performs actions that only hasten its inevitable end and clear the path for its successors. This isn't actually death, more like a social and structural rebirth.

The academic system is finding it increasingly difficult to carry its own financial weight. As we have shown throughout the book, despite all of its attempts at stabilization, the main sources of funding for institutions of higher education—governmental support, donations, and tuition—are dwindling.

If the global economic crisis of 2008 sent institutions into a desperate struggle for survival, the 2020 economic crisis is likely to expedite its course on the unavoidable path to demise. Even now, before life has gotten back on track and before it is possible to gauge the scale of economic damage the global disaster has left and is expected to leave in its wake, it is already clear to all the experts that academia is facing a financial catastrophe, perhaps the largest in its history. There are a number of contributing factors to this:

- The economic crisis is expected to impair both the prevalence and breadth of donations to institutions of higher education.
- The budgets of governments across the world have waned significantly, and widespread budget cuts in all offices and fields will be required. The subsidization of higher education and the funding of scientific research has always been among the first victims of policies of budgetary restraint, and there is no reason to assume that now will be any different.[1524]

  It is not only that institutions are expected to receive less government funding, but that it will also be conditioned on more draconian belt-tightening measures. Faculty positions, wages, teaching, research—all will surely be cut down. The demand for cutbacks across the board will be bolstered not only because public funds are dwindling, but also because the COVID-19 crisis has proven that online instruction can save countless overhead costs that were previously taken as given facts in the administrative, educational, and even research fields. One example of this is the funding allocated for production and participation in scientific conferences. Interestingly, and emblematically of current times, not only did the number of conferences and symposiums during the crisis not diminish, but it even increased. The physical mingling was replaced by webinar mingling, which turned out to be not only more cost-efficient but also more effective in many aspects.[1525] Many government officials will tell scientists with a smile, and perhaps even gloatingly: Don't request funding from us for things you can do online. And in a time of deep economic crisis, it will be harder for institutions of higher education to attain a strong bargaining position and threaten with sanctions. They will have to bow their heads and say "thank you" for whatever they can get.

- A factor that is already causing many heads of institutions to lose sleep is the expected depletion of tuition-derived funding. Many young people work in casual and random jobs while paying the high rent that often characterizes big cities. As a result of the crisis, many of them have lost their jobs, have gone into debt, and are facing mental distress. The financial situation of the parents who once supported them has also deteriorated. Surveys are already suggesting that a significant proportion of young people will quit, postpone, or give up altogether on their studies, not only because of their financial situation but for other reasons as well—for example, the feeling that if everyone is already studying online, it is better to do so with the help of courses built by professionals (commercial companies or private entrepreneurs) and not by amateurs (academia).[1526] It is important to remember that institutions of higher education have always enjoyed an image as the vanguard of scholarship and teaching. But then came COVID-19, and demonstrated to many young people that even many professors are lacking in computer literacy and fumble over even a simple software such as Zoom.

Many young people are also expected to postpone or completely abandon their academic studies because of a psychological effect that is intensified in times of existential crisis: the feeling that life is treacherous, fragile, and short, and that therefore one is better off living in the present and avoiding investment in far-off goals like a lengthy college degree.

Moreover, the rapid transition coerced by COVID-19 concerning new behavioral patterns in medicine, communication, work, and services has illustrated to many just how quickly the old conventions regarding the normative course of life are changing, thus making it nonsensical to invest in studies that are aimed at a one track career.

But it seems that the most severe blow that institutions in the leading countries are about to receive with regards to tuition is the expected plummet in demand for international overseas students. Because they pay full tuition (without discounts) or higher, this constitutes a significant source of income that will at least in part evaporate—both because of the global economic crisis, and because of restrictions on mobility and the entrance of foreigners into the state[1527] (For British universities, on average, overseas students make up around 60% of student fees and about 14% of overall income).[1528]

It is already abundantly clear to institutions that they will have to reduce tuition costs, not only because of the financial distress faced by current and prospective customers, but also because the expected transition to a larger number of online academic courses is triggering such a demand on the part of students. Already, voices of students around the world have been heard in this context, and class action lawsuits for reimbursement have even been filed due to the "COVID-19 semester," on the grounds that students failed to receive the full campus experience they paid for: accommodation, meal vouchers, sports facilities, security and safety services, electricity, maintenance, welfare, parking, and more.

And more importantly, COVID-19 has already inflamed and is expected to even further magnify the critical discourse regarding academia. This will likely affect young people's motivation to try and consider alternative learning channels—especially job-oriented ones that do not require paying steep tuition and long-term studies, and which increase their chances of finding work.

On the Verge of Moral Bankruptcy

As we have described throughout the book, institutions of higher education, once considered the knights of social justice, have become morally twisted: Nowadays, they rely mainly on employees who are discriminated against and exploited (in both teaching and research), maintain and at times even expand inequality (between tenured and temporary faculty members, the old and the young, men and women, universities and colleges, rich and poor institutions, and so on), fudge the numbers (indexes, rankings, budgets, studies, and more), waste public funds, market phony programs and degrees, dumb down the intellectual discourse, and aggressively trample values of openness and tolerance.

Biological contamination poisons the body, while moral contamination poisons the mind. Disgruntled employees are like acid that eats away at the social tissue. The wave of protests and strikes that has washed over institutions of higher education around the world in recent years is an outburst of pain, indicating a malignant disease. It is expected to grow stronger in the next few years, mainly due to the COVID-19 crisis, which is expected to further rattle the academic job market. Tens of thousands of adjunct lecturers are about to find themselves unemployed, both because institutions will have less money to pay their salaries—even taking into account today's poor employment conditions—and because of the expected shift to a greater volume of online learning (some of which will be outsourced). The expulsion of such a broad and educated group to the ranks of the unemployed will intensify public criticism of the academy's employment culture and strengthen the question marks concerning the commitment to subsidize institutions with public money.

On the Verge of Scientific Bankruptcy

Scientific publishing is based on methods and tools that may have worked very well in the past, but have become corrupt over the years. The old model of individual journals, based on voluntary peer review, does not fit the zeitgeist nor the new digital options. Not only is this model unable to handle the workload, it is also based on one of the biggest and weirdest distortions in the history of modern science: the hold global publishing corporations have over scientific publishing. These corporations don't just inflict financial damage onto science, they also hinder healthy processes of change in order to ensure the continuation of their greed.

The pressure for quantification and the ranking culture are poisoning science from another direction: When the means becomes an end, quantity becomes quality, and competition loses all restraint—the system wears itself down, loses its balance, and loses its way. Most scientists don't need to be incessantly prodded along and measured. The natural desire to research and write burns inside of them. Even after achieving the highest rank and even after retiring, many of them don't slow down. Science can progress even without quantitative Indexes, or at least with a lower, more reasonable dose of statistics and rankings.

The traditional funding model for scientific research is locked in a dead end. Competition over budgets has become unbearable, and the growing demands from faculty members to get funds for the institution severely compromises the credibility of science. Even the screening method used by research funds is no longer effective, leaving many competent researchers behind—not to mention the outrageously wasteful spending.

The COVID-19 crisis has once again provided a painful illustration of the problem of public funding in science. It could have been easily speculated that in light of the development of previous epidemics (e.g., SARS), coupled with the development of rapid and mass means of transportation—a global epidemic was only a matter of time. But science dropped the ball and failed to outline the appropriate scenarios and prepare mankind for the inevitable disaster, not only in the medical but also in the organizational-economic aspect.[1529] This debacle is one of the reasons that the ongoing COVID-19 crisis was managed according to a trial-and-error method, with improvisations and mistakes that cost everyone dearly. Thus, it turned out that at the end of the day, despite the vast public budgets allocated to science, the world behaved in this crisis like an army going to war without first gathering intelligence, without contingency plans, and without well-stocked warehouses of emergency supplies.

Therefore, humanity faced COVID-19 unprepared partly because governments gave too much credit to the barons of academia in setting the priorities of scientific research (with the result that the budget for epidemiological research was insufficient) and deprived the public of the right to help distribute the slices of the scientific funding cake. In a world where every professor is centered on his or her own CV and every academic institution aims to obtain funding at all costs to ensure its survival—what matters most is getting money (writing research proposals with immediate funding potential) and not the benefit to humanity.

Prof. Emmanuelle Charpentier, a winner of the Wolf Prize in Medicine, said in an interview with the Israeli newspaper *Globes*: "The world has utterly failed to prepare for this threat, which we all knew existed." She stated, "As a researcher of infectious disease, I was second-rate, my grants were second-rate, and I published in second-rate journals […] I did not receive a grant to research and discover the CRISPR. I shifted some of the grants I received in other fields to study a bacterium that didn't interest anyone, despite its deadliness."[1530]

The fact that only an emergency forced journals to allow the quick publication of findings while bypassing the usual bureaucratic process, alongside the fact that most of the scientific discourse around solutions to the COVID-19 problem was conducted in preprint or ad-hoc open-source emergency platforms, illustrated the anachronism and ineffectiveness of the traditional scientific publication process—as we have discussed extensively throughout the book. The world today needs rapid publishing, with minimum barriers and minimum compartmentalization and supervision.[1531]

This crisis has also illustrated the great complexity of the global world and its challenges, and the need for an appropriate, multifaceted response that combines different approaches and multiple fields of knowledge. Not coincidentally, the fastest and most extensive mobilization to find practical solutions to the pandemic's burning scientific problems has been in the business world (partly because it has more resources, more motivation, and more talent). For example, dozens of groups around the world—comprised of engineers, entrepreneurs, intensive care physicians, executives of medical device companies, hospital representatives, regulators, diplomats, geeks, makers, and more—quickly gathered and attempted to try and solve the issue of ventilator shortages. The only one almost completely left out of the game was academia.

On the Verge of Managerial Bankruptcy

The academic management model is nothing short of outrageous. The limited authority of an institution's leaders, the internal and external dependency on an infinite number of factors, and the short-lived job terms of department heads, deans, rectors, and presidents make it impossible for any administrator, talented as he or she may be, to lead any significant change.

The tradition of senior administrative appointments in academia allows professors to run a powerful, affluent institution with multiple employees and "customers," despite not necessarily having the skills, know-how or experience required.

It is difficult, perhaps even impossible, to run science and higher education effectively these days, because all institutions are subject, more or less, to the same global organizational model and rules of the game—and are forced to maneuver under these excessively tight restraints. This interdependency makes it difficult for institutions to independently produce alternative management models, turning any external national or international economic crisis into a bowling ball that simultaneously knocks down all of the institutions on the track.

International academic organizations are also a bad example for leading changes. They produce a myriad of declarations, conferences, and position papers—with little to no influence. Heaps upon heaps of hogwash, which very few actually read, if at all. The majority of these documents are written in clerical, vague jargon. They are full of clichés, overloaded, pointless, and gutless.

Furthermore, the academic career is based on an obsolete method of promotion. It relies on defective conventions that create a contemptuous, hostile work environment, which in turn causes many faculty members to be alienated from the institution that employs them.

On the Verge of Educational Bankruptcy

In the past, academic studies were worth the toll they took on the students (time, money, and mental effort), because they provided graduates with life-changing rewards: an enriching, empowering intellectual experience; more employment opportunities; the guarantee of a relatively high salary; improved self-esteem and reputation; a challenging, maturing, and formative period in one's life; a fun, lively social experience; fertile ground for dating; and for top performers—the first step towards an academic career.

The tables have yet to be turned completely, because there is still no alternative to an academic degree in many fields. Yet, as more and more people fulfill the dream of higher education, its personal and social value actually decreases. If in the past, having a B.A., let alone an M.A. or Ph.D., significantly improved a person's salary and his or her chances of finding a meaningful, stable job, nowadays the value of the academic degree regularly diminishes. More and more graduates today find themselves unemployed or working a job that does not meet their expectations, and that in many cases doesn't even require an academic degree. They lose precious years during which they could have made money, gained professional experience, and gotten ahead in life. Employers are also less satisfied with the knowledge and skills that these graduates possess. They are forced to resort to other methods of screening the candidates who are banging on their doors and provide those who are hired with on-the-job training.

Many believe that academia's main role is to provide graduates with a general knowledge toolbox and basic cognitive and mental skills. Except it can't even do that, because the skillset provided by the academic institutions is basically random, partial, and not always up-to-date. And as if that were not enough, the humanities, which used to take pride in their open-minded education and fertile intellectual discourse, have in recent years been teaching political alignment and conformism, at times even going so far as to apply indirect and direct violence against anyone who doesn't toe the line.

Even when it comes to social life, institutions of higher education have lost their traditional advantages. At the end of the second decade of the 21st century, young people are less likely to attend class and would rather hang out with people their age in other arenas. Dating and the dating market have long reigned supreme mainly in the digital environment, in bars, restaurants, and cafes, and in metropolitan centers.

There is no denying that academic education has been and continues to be beneficial to society, but over time it has become clear that not only does the inflation of degrees fail to justify government subsidies, it is actually harmful: burdening public budgets, suffocating free enterprise in education services, instilling unrealistic expectations and false fantasies in young people, and creating a shortage of technical professionals (practitioners, technicians, craftsmen).

Academia is rapidly losing its relevance primarily because it is sticking to an ancient teaching model which is incompatible with the new era, and is finding it more and more difficult to compete with the alternatives that are growing on the outside. If in the past, one could ignore or suppress the squeaking and creaking, today it doesn't take a musical ear to recognize the sound of a machine that's about to break down.

The old teaching model will not be able to survive because it focuses on one or two fields of study; a random and limited menu with a poor selection of courses; a rigid, uniform schedule; overly long classes; a pedagogical agenda that has failed to catch up to the rate of technological developments; unfriendly and outdated learning materials; and lecturers who have not been trained to teach and have no real incentive to excel in teaching.

Academia is unable to bring teaching up to the necessary level, because it is in financial distress and can barely scrounge up budgets primarily based on statistical indexes of research output.[1532] The financial crisis deteriorates the level of learning as the years go by, pushing institutions of higher education to lower their admission criteria and requirements. And when the students are treated as desirable customers, the lecturers become service providers who must satisfy their every whim, which leads to decadence. The culture of higher education has been corrupted: aggressive marketing packed with false promises, grade inflation, papers for sale, and cheating and copying go unpunished, and end-of-year deals are available throughout the year.

Our book has presented the main issues faced by science and education in this day and age. We don't presume to have complete solutions for these many problems down to the discipline, institution, or state, since this is a complex global system which still contains quite a bit of heterogeneity, with many specific local constraints.

Nevertheless, we haven't completely avoided the challenge, and throughout the book we offer outlines for change which are consistent with the alternatives already popping up on the ground. This is the invisible hand of social evolution, which steers the human race back to safety during a storm.

Before we summarize the directions of the change, we would like to reiterate one fundamental point: Science and education will live forever. What's changing and will continue to change are the means of production of, access to, and consumption of research and learning. Technology has already broken through countless boundaries and changed reality forever, and it is also expected to tear down the walls of the ivory tower.

Scientific Research in Academia—Trends and Recommendations

Publicly Owned, Not Privately Owned, Scientific Publications

Corporate scientific publishing's days are numbered. Budget cuts in university libraries, as well as scientific papers becoming more accessible online—with the help of scientists, research foundations, institutions of higher education, governments, and even altruistic hackers—will make subscribing to journals an unfeasible option for academic institutions.

Growing criticism and protests against the lack of public access to scientific materials, coupled with new legislative initiatives, will bear fruit eventually. In fact, the problem of access will solve itself once scientific publishing is fully transformed from closed journals to open online platforms sponsored by local and international public bodies.

The "COVID-19 effect" is expected to accelerate this trend. The act of hunkering down in houses and the closure of the libraries mandated a new kind of digital preparation during the crisis. The urgent need to develop a cure and vaccine for the deadly virus has also forced private and public companies and organizations to make their publications accessible to the global scientific community already at the outset of the crisis. Moreover, the global state of emergency and the huge demand for digital learning materials have opened the hearts of many organizations. Institutions of higher education, museums, research and study institutes, and private and public libraries, as well as film companies and archives, have all made raw teaching materials (articles, books, pictures, photographs, films, presentations), textbooks, guidebooks, and online courses accessible for the benefit of the public—all of which would customarily entail a payment.

While most of the organizations that made their materials accessible declared in advance that they would remain open only for a limited period of time as a gesture of good faith, history has shown that it is difficult to close fountains of information once they have been opened.

Mass Review, Not Judgment by the Few

The COVID-19 crisis, perhaps more than any other historical event, has illustrated the importance of opening up science and increasing the general public's participation in scientific research and discourse. The desperate need to immediately deal with the epidemic has given rise to open proposals on behalf of public bodies that have invited not only academic scientists to submit suggestions and ideas in order to receive funding, but also commercial companies, private and non-academic organizations (e.g., hospitals or military units), and private entrepreneurs of any kind. The unlimited openness has indeed paid off and yielded a plethora of hundreds of ideas and suggestions, some of which are expected to be put into practice in the near future: from medicines, means of protection, and medical devices, to information-processing applications and algorithms (e.g., identifying the formations of crowds and detecting COVID-19 patients, or predicting future outbreaks and distribution centers).

To enable a more open and collaborative science, open advertising platforms must be formed. On such platforms, any study will become a kind of Wikipedia page, with each contributor adding to the whole body of knowledge according to his or her ability.

Today, the information generated from a certain study is disseminated to the world via an academic article published in journals after a grueling process of peer-reviews and a series of corrections. Sometimes advertising is delayed for a long time and access to the research has to be paid for. Most of the articles' readers are people who are dealing with the matter at hand for a living, either in academia or industry. The rest of humanity is doomed to settle for mere abstracts. The future promises a less bureaucratic and much wider exposure.

We expect the format of closed journals, which mostly benefits greedy corporations and mainly serves closed professional clubs of scientists, to give way to public, open-access, and free publishing platforms—with minimal limitations. They will contain a wider variety of scientific materials than what journals currently allow: from different kinds of papers to reports, feedbacks, and discourse groups on a variety of topics related or tangential to science. The formats will also be more diverse—not just simple text but also different visual and audio formats (including videos).

These platforms have already started to emerge in the form of preprint, and all it will take is to perfect them and turn them into the final stop of publishing, with (local and international) publicly funded management and maintenance.

These free and unmediated platforms will encourage an interactive, critical discourse, prevent censorship and/or unfair screening, and undo the advantage currently held by a privileged minority.

Any scientist will be able to publish his or her research without the need to get gatekeepers' approval. This will put an end to the tradition of peer review, which has become cumbersome, corrupt, and incompatible with the fast-paced and transparent digital age.

The journal-appointed jury, comprised of an editor and only a few reviewers (two to three peers), who up until now have been given final say over which papers were good and which bad and which papers were worthy or unworthy of publishing, will be replaced by an unlimited number of Internet users, who will send constructive feedback: comments, reviews, ideas for improvement, and so on. Anyone—professional scientists as well as amateurs with interest, knowledge, and experience in the field—will be able to comment freely on every publication openly and publicly (while identifying themselves and taking personal responsibility for the review). Comment threads will create dynamic discourse and accompany the publications (as is customary on social media), without the limitations of time and space. This will allow online users to learn about the strengths and weaknesses of every idea and argument brought up by the general public (including the scientific community).

Opening scientific publications to unrestricted public review will improve their quality control and reliability, requiring authors to take extra care (no one wants to be caught publicly with their pants down), forcing scientists to express themselves in a friendlier manner, granting authors the opportunity to make a statement on their own creation, and allowing them to defend their thesis as well as amend or update it in real time. Advanced AI technology will provide radars to intercept falsehoods and plagiarism.

Open and transparent digital publishing will save science and governments huge sums of money, simplify the traditional method of references and footnotes, and even allow automatic translations to expand access to scientific publications. Advanced data mining developments which are already being cooked up will allow us to retrieve targeted information at a high resolution in the not-too-distant future. All of this will also change the concept of copyrights, which is already changing under this new reality.[1533]

Rankings Based on the Book, Not the Cover

The deception and folly behind the ranking obsession in academia are being exposed. In a flexible digital world, where the publication of articles will no longer depend on journals and studying will no longer be dependent on any specific institution—there would be no point in ranking an article or course based on the platforms in which it was published or studied. It will become clear very soon that the statistical, mechanical, and one-dimensional indexes that have ruled the day have mostly injected poison into science, and that science would fare better without this insanity, or at least with a lower and more sensible dosage of measurement and evaluation.

Open platforms will offer a more complex quality assessment that focuses on substance rather than style. Furthermore, in the world of powerful search engines, profiling, and artificial intelligence, quality and significance will be determined based on the target audience. Each will decide according to their taste, standards, and needs when choosing an article, occupational specialization, or learning tool.

Self-Evident Greatness, Not Obsolete Status Symbols

Professional status is important, but mannerisms should be kept to a minimum—especially anachronistic mannerisms and subtleties, which force intelligent people to deal with nonsense, such as who contributed more to research and writing (order of names).

Since research is already less of an individual endeavor and more of a collective effort, we can switch to granting symbolic certificates of appreciation for exceptional achievements, and to collective reward and incentive mechanisms based on clear, transparent objectives. Either way, the real reward in scientific research is revealing the truth and discovering the mysteries of the world. Scientists don't really need to wear a halo of self-importance.

Despite the fact that in the world of academic employment, the significance of faculty ranks is more symbolic than practical (a higher rank does not grant someone a higher administrative authority, nor are they required to work more hours or take more risk)—this hierarchy is as sacred as the hierarchy in the church or the army. Furthermore, it is linked—without any practical reason—to wage levels. Scientists would be better off without these honorary titles (doctor, associate/emeritus professor, and scientific knight in shining armor), which originate from the Middle Ages, and ought to settle for rewards on the basis of seniority and (predetermined) quotas, with transparent bonuses for outstanding work. The mere idea of scientists constantly judging and ranking one another, usually based on vague and even unfounded conventions, leads to corruption and contaminates the workplace.

The researcher's community does not need countless statistical indexes to appreciate the quality and contribution of every faculty member. Science would do well to adopt the Jewish spirit of scholarship, which argues that greatness is self-evident (there are no hierarchies of wisdom in Judaism). This way, history will be the one to judge and screen, not official supervisory committees.

It may be hard to imagine scientists voluntarily shedding the tradition of honorary titles and the decorum that comes with them, but reality will take its course. These days, there are so many doctors that it's nearly impossible to tell researchers from senior scholars, and as mentioned before, what used to be associated with a small elite has now become a commodity.

The title of "professor" may still arouse admiration among laymen and be a source of public prestige, but it too is gradually losing its charm and glamour. A study conducted in Israel in 2016, for example, found that the public did not give much weight to the title of a professor when choosing a physician.[1534] The physicians' expertise and the patients' recommendations were more important as evaluation criteria. These results may only apply now to the world of medicine, but the survey is probably a precursor of things to come.

Furthermore: Part of the aura of senior academic degrees comes from the traditional linkage between research and teaching. When these two functions are separated (we shall elaborate on this shortly), the status symbols are also likely to be changed, and perhaps will even gradually disappear.

Higher Education—Trends and Recommendations

Zoom Out to Online Courses (Amid the Coronavirus Crisis)

Humans are learning creatures, but the mechanisms of learning evolve and the culture of learning changes. Two historical developments that happened in the past two centuries catapulted the world's mechanism of education into the modern age: the establishment of the public education system (from kindergarten to high school) and the expansion of the higher education system. These two institutions, which were established as an inseparable part of democratic society, replaced the familial-religious-communal framework in many fields, and provided an organized, efficient structure for formal education. Now a new stage in the history of mankind is emerging—the post-academic stage. But as you'd probably expect, not everyone welcomes this new development with open arms.

The rough state of the academia is no secret. A search for phrases like "crisis in higher education," "university is broken," and "universities in crisis" produces hundreds of thousands of results on Google. Scientific literature has also received countless articles, and recently quite a few reports and books, that deal with the escalating crisis in higher education.[1535] But even though the general feeling among authors is that the situation is indeed dire and cannot continue, their conclusions leave you speechless and perplexed. None of these esteemed scholars—most of whom are veteran sociologists and educational researchers—can even dream of a scenario in which the functions filled to this day by institutions of higher education, albeit with decreasing success in recent years, will be filled in the future by far more efficient alternatives. And all of this despite the fact that some of these alternatives can already be seen on the horizon.

Almost everyone that writes about the crisis in academia fervently defends the undisputed necessity of academic institutions and ardently claims that the problems faced by the higher education system today do not endanger its future. They usually cling onto three typical arguments: a. that the "apocalyptic" prediction (as they perceive it) is based on linear extrapolation, i.e., the assumption that the current trend will persist, while the change curve is usually also subject to unexpected fluctuations; b. that the academic system has worked well for many years, and still produces considerable achievements, both in education and in research. Institutions of higher education have managed to overcome past crises, and there's no reason why they shouldn't be able to overcome the current one as well; c. that the repeated rumors of academia's death (which have spread following the emergence of massive open online courses) have been greatly exaggerated. According to this argument, the difficulties in implementing the online revolution are irrefutable proof of an unfulfilled promise which will probably never be fulfilled.

Most of the people who study and write about the crisis in academia perceive it as a chunk of "temporal issues" and refuse to accept that these aren't actually issues but rather symptoms of a much more fundamental problem. Most of them also look at reality through the American keyhole and are unable to see the general global picture. For these reasons, their operative recommendations are weak (sometimes there's no prognosis, only a diagnosis), and more or less include the same old Band-Aids, such as abandoning the seniority method, eliminating the tenure system, reorganizing departments and programs, putting a stronger emphasis on teaching, improving the institutions' financial and marketing capabilities, and the like.

Their reaction is astonishingly reminiscent of the skepticism, disregard, and mockery with which so many inventions and innovations such as the phone, airplane, and handheld computer have been met throughout history.

Why do these talented authors and analysts hesitate to offer an alternative to academia?

- Because there's always hope, though in many cases it's an illusion, that we'll get through this rough patch and everything will return to normal once again.
- Because people tend to solve crises by making cosmetic changes ("inside the box")—in other words, "more of the same"—which don't really change things and even tend to exacerbate them.
- Because the legislative and technological conditions that would allow the alternatives to take form have not matured yet, not to mention the necessary change in mindset we are proposing. Conservatives and skeptics tend to jump to conclusions from the labor pains of the alternatives—the stage in which the biggest technological, financial, and cultural difficulties are revealed.
- Because most people have a limited perception of reality, and look at life through a sociological lens that focuses on the short and medium term rather than on the long term. Furthermore, people tend to see the glass as half-full and prefer optimistic forecasts, even if they contradict the accumulated data. Many try to present the crisis in softer terms in order to sweeten the pill (this is known as Social Desirability Bias).
- Because people fear the unknown, and are wary that a far-reaching ("extreme") change could endanger what they have now. This phenomenon is known as "the relative advantage of the status quo," or in layman's terms, "better the devil you know than the devil you don't." It is typical of transitional periods, in which the old is creaky and faltering but the alternative is still far off on the horizon.

British social psychologist Norman Dixon's renowned book *On the Psychology of Military Incompetence* discusses British generals who were deeply immersed in a heated dispute about the quality of saddles when armored cars were already on the assembly line. They couldn't conceive of an army without a cavalry, because who would be immortalized in town squares? This sort of stagnant mindset led to painful losses on the battlefield.[1536]

An example from the field of business in this context is Kodak, which sold affordable cameras and made most of its profits from selling film and photographic development materials.[1537] At the end of the 1970s, the company held 92% of the photographic film market in the US, and four out of five photographers in the Western world used its products. However, it became fat and complacent, entering the filmless digital age hesitantly and slowly and missing out on the data storage revolution, and was eventually defeated by its younger, hungrier, and livelier competitors. Although it managed to avoid bankruptcy, it had to perform massive layoffs, sell off most of its assets, and never returned to its former glory.

The same goes for academia. Many people are aware of the depth of the crisis, but refuse to even consider the possibility that the old education model has come to its historical end, and now the time has come to embark on a new path.

And yet there has been one notable exception. In 2015, an important book with an unusual title was published: *The End of College: Creating the Future of Learning and the University of Everywhere.*[1538] Author Kevin Carey, a well-known writer and editor for the *Chronicle of Higher Education*, dared to declare publicly what most experts wouldn't even dare to think: In a world where all learning materials are available online, anywhere and anytime, the historical role of higher education institutions has come to an end. The book was a bestseller, but as expected, it received skeptical reviews and failed to ignite an international public discussion over the implications of the online revolution[1539].

The conservatives and naysayers who cast doubt on the great promise of online courses based their flimsy arguments on MOOC providers' struggle to turn a profit, the high dropout rate, and the difficulty of these courses to compete with the traditional academic degree. But it seems that these difficulties and delays are merely temporary.

A technological revolution, which changes the world order, most often unfolds in a evolutionary manner—one development follows another, upgrade on top of upgrade, one generation superseding the former. But the process of change is never linear, because along the trajectory there are quantum leaps that are almost always surprising. The COVID-19 crisis will likely constitute such a leap in the digital history of the world at large and the history of online teaching in particular. In the Hebrew edition of the book, which was published shortly after the outbreak of the crisis, we wrote: "Contrary to the assumption that the online course revolution has stalled or proved unsuccessful, it continues to advance and is expected to make a leap forward." It turns out that our forecast was realized even faster than we had expected.

The COVID-19 epidemic is a great tragedy for the human race. Hundreds of thousands of people have lost their lives and millions their livelihoods. Many have also experienced and still experience mental distress, whose cumulative effect we will only be able to analyze in the future. But crises are, in many cases, also an opportunity—a springboard for a better future.

The fear of mass COVID-19 infection has forced people to barricade in their homes for a long time. This unexpected change has kickstarted the digital social exchange into a new phase. Old habits of communication, work, services, social gatherings, recreational activity, and study have been transferred to the medium of the Internet in one fell swoop. Changes that were expected to take years have undergone evolutionary shortcuts and silenced conservatives and skeptics.

The COVID-19 crisis has caught institutions of higher education embarrassingly off-guard. Not only were they not technologically and organizationally prepared for full-scale online teaching, but most professors had no experience in this type of teaching and had to jump into the cold water, which for many was painfully icy.

In media interviews and publications, heads of institutions rushed to take pride in their ostensibly rapid adaptation to the crisis. However, this was mere hypocrisy if not an outright lie. In fact, were it not for the Zoom software, which most of them discovered only at the beginning of the crisis, they would have had to cancel the semester. Zoom will undoubtedly be etched in the collective and global memory as one of the symbols and heroes of the COVID-19 crisis.

Overnight, boosted by the epidemic, the Zoom startup has become the world's most successful and talked-about brand. Its shares have skyrocketed by dozens of percents, and the personal fortune of its founder, Eric Yuan, has grown by $2 billion, positioning him among the world's wealthiest people. The software's user-friendly interface, the fact that it enables simultaneous communication with hundreds of participants, the fact that it is free of charge (along with the possibility to pay for a premium account), the convenient features it provides to teachers and students (screen-sharing, hand-raising, group and personal chats, recording of lessons, and more) and its stability has also made it an ideal solution for people who are not well-versed in technology.

In our estimation, in the history of education, Zoom will be considered the particle accelerator of the online teaching revolution. Paradoxically, it has saved the academic year but drawn the death of the institutions closer.

The Zoom experience is expected to overhaul online teaching for several reasons:

- The intense use of this tool for diverse needs in everyday life has created a renewed awareness of the need to accelerate the transition to a more digital and flexible lifestyle.
- The positive experience with Zoom has led many commercial entities to change their attitudes in the fields of services, shopping, and employment.

Already today, commercial firms are selling offices and announcing the extension of work from home even after the crisis. This new social reality will require institutions of higher education to step up and offer more and more services in a digital format.

- Heads of institutions that had previously scoffed at online teaching and tried hard to prove its inability to replace on-campus teaching, have found themselves suddenly obligated to praise it and market it as a sign of their success. They have had to do this not only to cover up for their failures, but also because they realize that if they do not roll with the times now, the times will roll over them, and they will remain behind and student-less. Undoubtedly, once the medical crisis is resolved, many of them will return to the old "there's no place like campus" mantras, but they will have a much more difficult time lying to themselves and certainly to others.
- The mass experiment in online teaching has created an incentive to rapidly examine and research the experience of lecturers and students in this new type of teaching. This is due to several factors: scientific curiosity and a desire to capture the experience in real time; the understanding that online teaching is here to stay, and so it is worthwhile to start understanding what lessons can be learned from it and thus prepare better for the future; and perhaps a subconscious desire to "discover" that it is not a successful substitute for traditional learning. Needless to say, all surveys about the online teaching experience produced during the crisis are not truly indicative of the quality of online teaching, not only because this teaching has taken place under the conditions of an emergency (families locked up at home), but also because it has been a case of raw instruction from lecturers who made the transition from classroom to computer in an improvised manner—not to mention the myriad technical problems and the difficulties faced by lecturers and students, who have had to familiarize themselves with the technology while on the go.
- The urgent need to hastily create an online replacement for all courses, along with the hardships experienced by institutions and lecturers, created a proverbial avalanche of sources of support. For example, many lecturers consulted with one another on different academic platforms and networks, seasoned lecturers gave advice, various experts whose tips were previously not in demand published tutorials on YouTube, and commercial bodies released educational videos for the benefit of lecturers. This downpour of information has brought and will continue to bring the academy closer to the online world, and will encourage more and more faculty members to computerize their courses in the future.

- Online teaching, as we have elaborated, is not devoid of shortcomings and does not answer all learning needs. However, this crisis has removed a lot of prejudice and demonstrated its benefits to many students and faculty members. It is important to note that, in most courses, lecturers have simply took a copy-paste attitude and were satisfied with converting their frontal lectures to the digital medium, while maintaining the existing time frame. In doing so, they seem to have a great disservice to digital teaching, since it is quite clear that a "talking head"—certainly one that goes on for an hour or more—is a bad solution. And yet, even in this format, many have realized that the benefits of a Zoom lecture generally outweigh those of a classroom lecture. For example, there is no need to spend time and money on traveling to campus and parking; it is possible to watch the lesson additional times; introverted students can address questions to lecturers or other students in writing; and several actions can be performed at the same time during the lesson, including "leaving and returning to class" without interrupting the lecturer. Many also reported the formation of a more intimate connection between the lecturer and his or her students.

One can summarize and say that there are good odds that Zoom will become a Trojan horse: Once it has entered the academic fortress, it will dismantle it from within. The old model of academic teaching will never be the same, and we will see more and more bridges to the new era, such as an increased supply of online courses, more collaboration between institutions, providing rewards to faculty members for producing professional courses, a surge in the number of hybrid formats, and so on.

Many Courses from Many Sources

MOOCs are already on the way to escaping from the reins of the academic format, i.e. the rigid schedule, talking-head setup, overly long reading assignments, and the obsolete notion that the lecturer has a monopoly on knowledge. An educational course is just like any other high-end production and therefore requires a professional team with different specialties (researcher, screenwriter, pedagogue, director, photographer, graphic artist, and presenter). The whole old-fashioned idea that the professor embodies all these roles is absurd, certainly in the digital age.

Soon courses will become more dynamic, interactive, attractive, tailored to the discipline and subject matter, and customized to the learner's profile. They will also break free of the outdated concept in which the person with the knowledge must also be the presenter of the class. The term "academic course" will disappear over time, and each class will be judged objectively based on its goals and the means it provides to achieve said goals.

It is important to re-emphasize that the online format does not answer every single pedagogical need. The world of teaching and instructing will continue to include, at least for the foreseeable future, laboratory experimentation, field trips, studio lessons, simulation, practical internships, and other formats in which the lecturer has a unique guiding and mentoring role.

But, even if the online course is unable to provide a response to all of the learning needs and the variety of learners, it could certainly be an efficient, low-cost alternative for many courses that have until now followed the frontal teaching method.

One must keep in mind that most of the online courses which were taught during the “COVID-19 semester” were homegrown—that is, traditional courses that were haphazardly converted to online courses. In many institutions, the jump in the number of online courses offered was from a few courses, if at all, to hundreds and thousands of courses. It is likely that for many faculty members, the experience has proved to be traumatic and they will rush back to the old format. However, many have had their eyes opened, and they will translate their personal success into an enduring pattern that will be upgraded over time, including a transition from a closed and local course to a massive open online course. Furthermore, many adjunct lecturers, who will realize that the ground is slipping from beneath their feet, will choose to market their courses independently and transform from “outsourced workers” of a specific institution into independent specialists. Not coincidentally, during the crisis, the question revolving around the copyright protection of courses (of the lecturer or the institution), which had previously been on the backburner, became ever more present. Many lecturers were alarmed and quickly expressed misgivings, realizing that online teaching was about to make them redundant. For example, in Israel, faculty members demanded to remove their courses from the institutional network at the end of the semester. This request illustrated just how tall the academic ivory tower truly is. And indeed, quite amusingly and predictably, the request was immediately followed by Facebook posts condemning professors for their disconnect from the non-academic world and for claiming property rights for material that was publicly funded.

Online learning is nothing short of a historical revolution, because it gradually undermines the age-old basic principle that education should be granted by one institution, at one place, and on a dictated schedule. At this stage, the notion that institutions of higher education will lose their historical role may seem far-fetched to many, but it should be noted that up until about a decade ago, the idea that online shopping would replace going to the store also seemed like science fiction.

In 2019, news broke that the University of Pennsylvania, one of the oldest and most prestigious universities in the United States, had launched a fully online bachelor's degree in Applied Arts and Sciences.[1540] It's difficult to tell just how much and when the online revolution will affect the future of Ivy League institutions, which are at the forefront of academia. On the one hand, the online revolution is expected to have less of an impact on their status, because most of their budgets come from funds, equity, and donations. Furthermore, most of their prestige is based on research achievements and not necessarily the quality of teaching. On the other hand, these institutions also depend on high tuition. Ironically, MOOCs were conceived and developed in these institutions, and in this regard, you could say that they dug their own grave. If you can take a Harvard course (online) without paying Harvard's high tuition, what's the point of even applying for a full degree at this expensive institution?

At this stage, Ivy League institutions are trying to perform damage control by regulating digital accreditation, but this practice won't last, not only because of the online course revolution but also because the yield on their degrees in the labor market is diminishing.[1541]

Wallet-of-Expertise, Not Broad Academic Degree

The traditional model of higher education was based on passive learning and on the student's dependency on the teacher and institution. The new models will form an intelligent, active, and independent learning consumer—just like in other consumer fields.

Universities and colleges may still be attracting the young masses to get a degree, but the direction is clear: We're heading towards a truly open and competitive education market. When that happens, we will witness exciting teaching and learning mechanisms, some of which have already been hinted at. Artificial intelligence and big data will make teaching more learner-oriented, the link between education and entertainment (edutainment) will tighten, and knowledge will be acquired using tools that institutions of higher education can only dream of. The academic bachelor's degree as we know it now will seem like driving a horse and carriage in the age of jet engines.

The broad academic certificate will give way to a variety of skill credentials and badges, which during the job search will replace the question "What school did you go to?" with questions such as "What do you know?" and "Are you qualified and capable for a specific job/task?" There are already quite a few companies that specialize in granting such certifications (one of the better-known is Degreed, which provides certificates at different levels for over 1,500 fields).

When "microdegrees" are already being sold in the market, there's no reason why this miniaturization process shouldn't also be adopted by academic institutions. As a matter of fact, they've already started doing it by marketing targeted courses and classes alongside the traditional degree. They're building the bridge to the post-academic age without even realizing it.

The grading world is also expected to change, such that every student will be categorized according to his or her own strengths, weaknesses, knowledge, and skills. The new option to take classes and tests over and over again will soften the once-and-for-all labeling that often buries the learner's professional dreams today, as a second chance is likely to be denied.

Opening up the education market will remove traditional barriers which have prevented many from acquiring the education and training they desire. In fact, there's no reason why everyone shouldn't be able to try studying any field, at their own pace and style, and be judged based on the results rather than the process. Over time, the separation between instructional services and evaluation and measuring services (which examine learning outcomes) will also grow stronger—which will decrease the conflict of interests that currently exists and strengthen the reliability of the certification. When the academic degree is replaced by a wallet of targeted certifications, the distinction between academic education and "regular" education will be dissolved and wiped out.

Opening the gates to the forces of supply and demand will eliminate the myriad of duplicate institutions, departments, programs, and courses which exists these days only because of legal requirements and public funding. The regulation of educational services is expected to loosen in the future, and will focus mostly on sensitive fields which require supervision of curriculum content and the quality of graduates.

It should be noted that opening up the education market doesn't necessarily require total privatization, and we could also expect publicly-funded educational initiatives to be established for a variety of needs and audiences.

And finally, public platforms for online courses will have to receive much greater subsidization, preferably international. They will also need to become more interactive and allow any educational entrepreneur to upload his or her service to the platform (like uploading videos to YouTube) at low to no cost.

Subsidizing Learners, Not Institutions

Those who claim that institutions of higher education are irreplaceable often note their vital role as a mechanism for narrowing economic and educational gaps and increasing distributive justice and equal opportunities. There's no doubt that increasing access to higher education has softened the stratified social structure and helped grow the new middle class in countries across the globe. Unfortunately, what used to be helpful has become less effective over time, for several reasons:

- Although they have helped to narrow the gaps, institutions of higher education also still play a significant role in the reproduction of social class. As long as there are gaps in prestige between institutions and departments (which grant degrees a differential value), and as long as admission to prestigious institutions involves high tuition, higher education will continue to stratify society. To illustrate, only 20% of American students in leading institutions (both public and private) come from low-income (below the median) families. In many institutions, they only make up 5%-15% of students.[1542]
- The disadvantaged population has been helped along by means of various support programs: scholarships, tuition discounts, academic prep schools, tutoring during the academic year, and more. But as the number of students increases, and as the resources of higher education institutions shrink, the options for support become fewer and fewer. This is also probably one of the reasons for the growing dropout rate. They simply struggle to close the gap that followed them into their studies, and in many cases are also unable to pay their tuition.
- As we've shown, the rise in academic graduates has ironically actually caused a crawling depreciation of the degree's distinguishing value. We expect that in the not-too-distant future, those who choose to pass on the academic degree altogether won't just save themselves some time and money but will also be able to acquire an alternative status symbol: Their bold decision will be perceived as a sign of independence, self-esteem, and autodidactic abilities. At this stage, this is still just a minority that belongs to the top deciles, but this trend is expected to gradually spread to other social strata as well.

  Even now, more and more youngsters from a low to medium socioeconomic background give up the illusion of a degree in favor of a revived dream: vocational education (including on-the-job training), which is more focused and therefore cheaper and more worthwhile. Not only will this trend not hurt the process of integration and increase equal opportunities, it will actually accelerate it, for two reasons: a. When the academic degree is replaced by a wallet of targeted certifications, learners will be judged objectively and not according to external status symbols, which mostly give the wealthy an advantage; b. Public aid to those who really need it will be much more focused (such as scholarships for specific courses) and therefore will be much more effective and economical.

Autonomous Learners, Not Patronizing Teachers

The transition to the post-academic age isn't a simple one, as it doesn't just involve the breaking of a deeply rooted and sacred convention regarding the importance of academic degrees; it also requires us to break the psychological barrier associated with the learning process. Most people have been trained from a young age to acquire new knowledge from teachers. They also need schoolmates, not just because they challenge and inspire one another but also because they ask questions in their place, provide them with shortcuts, and serve as a benchmark for success. The concept of independent learning seems like too much of a hassle to many people, and is mostly intimidating. This is twice as true for young people nowadays, as they are coddled from birth and struggle to develop mental resilience, independence, and perseverance.

Institutions of higher education, which pride themselves on shaping learner autonomy, ironically base their economic model on fears and concerns about autonomous learning, and to a great extent on the ongoing failure of the public education system to train autonomous learners.

Conversely, the digital revolution has demonstrated to society as a whole that it is possible to learn many things independently. Many people acquire important everyday skills, such as operating appliances, cooking, and even learning a new language, using videos and apps. Widespread use of the dynamic digital medium to purchase new products and services has trained the public to read instructions and guidelines and get by on their own.

We can therefore assume that in time, more and more people will take responsibility for their learning processes, and choose the learning methods that fit them and acquire knowledge that used to be taught in the classroom on their own. This will even include fields that were considered academic. Even today, many people already understand that pre-framed education is too patronizing, and therefore sets excessive requirements that don't always meet their needs. The academic institutions are already beginning to grok that they shouldn't force an educational agenda onto the students, but rather let them decide what's good for them and what they need. With this in mind, many departments have already expanded elective courses at the expense of required courses. Even traditional requirements, such as physical education classes in B.A. studies, have been cut back and even canceled altogether in many institutions. According to this new approach, anyone who wants to get some exercise can do what they want, wherever they want, and whenever they want.

This trend will not stop in the institutions. Students can already acquire a certain amount of credits in other institutions. At the end of the process there will be a full education basket (without the need to commit to one institution), which each learner will compile for him-or herself—eventually making the academic degree redundant.

Getting Practical Education, Not A Symbolic Diploma

Vocational education, with its different paths, is expected to be elevated in a number of ways:

- In the future, the curriculum in tertiary education will include more practical experience, workshops, simulators, and strong ties with employers. Teaching bodies will develop more meticulous and up-to-date curriculums for diverse purposes and audiences, and will obviously employ the best lecturers and moderators, including highly skilled professionals. We're not far from the day that even fields that as of now have only been studied in institutions of higher education, such as medicine, engineering, psychology, or law, will also be studied in vocational schools, which will be built, operated, and supervised by professional associations.
- Industrial factories and commercial companies have already started opening boot camps for rookie employees, and even so-called internal colleges of their own, whose graduates are rewarded with an employment contract. So far, this phenomenon has been exclusive to the high-tech world and is expected to expand to many other fields in the near future.
- Employment agencies, and mostly employment websites, will offer aptitude tests alongside job openings, not to mention comprehensive information on the requirements (training, certification, and experience) to get hired for different positions in every field, as well as on the vocational bodies and training tools available on the market.
- In many countries, manual labor, artisanship, and craftsmanship (agriculture, masonry, carpentry, plumbing, electrical engineering, mechanics, and more) have been pushed aside due to the glamour of academic degrees, and as previously noted, society has paid a hefty price for this. However, vocational education has had a comeback in recent years, gradually shedding the stigma that it's only meant for those who are unable to succeed in theoretical studies. This rebranding is mostly thanks to the media, which produces countless TV shows and series about builders, farmers, food producers, auto mechanics, chefs, fashion designers, and more. The message is that these are fascinating jobs with charm, content, and meaning, which allow people to make an honest living and some. Digital technology has also affected this trend, as what used to count as manual labor now also requires mastery of

> advanced tools—including computers and robotics—and also managerial and financial knowledge at times. One of the signs for the change in attitude towards traditional crafts and their image is the rising popularity of makerspaces in the education system. More and more elementary and high schools are building such learning spaces that are based on craftsmanship and creativity, and more curricula include tours in factories and workshops.

It should be stressed: In many countries around the world, there's a tendency to separate the higher education crisis from the serious crisis affecting the public education system. These two things are actually firmly interlinked. As previously noted, this is an education ladder where every step dictates the requirements of the step underneath and vice versa.

When the public education system is forced to prepare its graduates for a different kind of higher education, a great deal of the problems it currently suffers from will probably be solved. This will happen because the inflexible, traditional structure of most schools—with its frontal teaching, rigid schedule, uniform and anachronistic content, and tenuous connection to real life—will also change. At the same time, fresh initiatives are mounting within high schools, and they will have an impact on post-secondary education in the future.

A Real Discussion of Core Curriculum, Not Loose and Sloppy General Education

One common "character witness" in favor of the university model claims that it provides a "core education"—namely "thinking and learning skills and basic knowledge." In the chapters that deal with the humanities and academic teaching, we have extensively elaborated on why this perception is nothing more than a regurgitated myth. It is obvious that every student indirectly acquires general skills and abilities, with an emphasis on "indirectly." Naturally, it all depends on the cluster of courses offered by an institution or department that year, and on the curriculum that the student randomly put together. In other words, this isn't a neatly organized general education, backed up by in-depth considerations about the basic know-how and intellectual skills needed by a person living in the 21st century.

The pedagogical tools with which this "general education" is imparted are outdated as well. In practice, young people these days acquire most of their general education through the media, which offers an abundance of content in an endless variety of outlets and channels.

In light of the massive changes in exposure and access to information, as well as many other factors, some of which have been reviewed in this book, a comprehensive, in-depth public discussion is in order over which elements of the core curriculum are vital in the current age and how we can and should impart them at every stage of the education ladder.

Learning Spaces Around Town, Not a Closed Campus

Just as workspaces have started to change the employment world, learning spaces will change the education world in the not-too-distant future. These spaces are already being opened and will continue to be opened one by one, both on old campuses (in libraries and auditoriums which will be appropriately converted) and across cities. They will serve as lively hubs and sometimes even as "learning villages," which will offer a refreshing place for students to live, work, hang out, and study (including master classes, workshops, simulators, seminars, and coaching).

Learning spaces, where youths from all around the world will meet, will address one of the main disadvantages of studying in the traditional classroom: passive learning with very few options for a cooperative learning experience. At the same time, they will compensate for the obvious disadvantage of online learning: the learner's loneliness.

Enhanced alternatives to the university campus experience are also gradually growing—for instance, student dorms built by commercial companies deep in the hearts of European cities. In contrast to the old dorms that were usually built on the premises of universities and colleges and only allowed students of that institution to sign up (occasionally, only underprivileged students)—the new dorms will be spread throughout commercial zones and are envisioned as upscale hostels (including a lobby, swimming pool, computer rooms, and recreational areas), which will allow any young person, with any kind of student ID, to sign up (usually, different room models are offered for varying rental fees).

Intermediate Guide for the Perplexed

At the end of our lectures about the crisis in academia, we're usually approached by young people and their parents who ask: "So what do you recommend we do about academic studies?"

On a practical level, we don't have a solution we can whip out, nor do we have any rabbit to pull out of a hat, because unfortunately, we're in the midst of a transitional period covered in fog and riddled with contradictory messages. All we can recommend right now is this:

- An academic degree that requires you to dedicate three to four years of your life is not recommended, unless this is a vocational field that cannot be acquired outside of academia at the moment. If there is a short and targeted alternative (and the supply grows on a yearly basis)—best to choose that one.

- Many young people nowadays prefer to turn to academic studies immediately after high school and postpone work to a later stage. We recommend the opposite: Work first, even in part-time jobs, in order to get a taste of different types of crafts and occupations, get a feel for the market, learn about yourself and the world, and develop independence.
- Before deciding to specialize in any field, try to find out more about it and whether it is possible to try it on for size, especially if the experience allows you to make a living. It is best to postpone the comprehensive, intense, and longer internship to a stage where you will be sure that this field is right for you, at least for the next few years. For example, before enrolling to study medicine, it is preferable to try and volunteer as an EMT; before pursuing a career in teaching, it is preferable to experiment with informal instruction; and before studying engineering, it is advisable to take some rudimentary engineering classes or attend a technical school. In any case, it is better to delay the decision to study (more than ever, in light of COVID-19) because many tracks of study in the academy will be shortened and streamlined.
- Group study can be enjoyable and useful, and sometimes even necessary, but everyone should be able to learn on their own. Today, more than ever, we have the means to do that.
- And above all: Be brave. Look for the alternatives that are constantly evolving and don't follow the herd. The herd tends to go astray—especially when the shepherds are shortsighted.

Tearing Down the University Conglomerate

Separating the Professor from the Scientist

The traditional academic model was based on the assumption that higher education and scientific research complement one another. This perception undoubtedly contributed to the development of academia and its high status in the eyes of the public. However, as we've demonstrated throughout the book, this system may have worked in the past, but it is no longer appropriate for our time. Institutions of higher education and faculty members are struggling with this double burden, and it's time to cut the cord.

Some may raise their eyebrows and even get angry at the mere thought of a teacher who isn't necessarily also a scientist. Those who hold the opinion that the two functions cannot be separated usually present the following arguments: A)

Students must also experience research during their studies, which is why a lecturer who is also an active scientist is required; B) One of the purposes of academic education is to get students excited about science, and the ones that can do that in the most appealing way are the scientists themselves; C) In order for teaching to be up-to-date and connected to developments in the field, it is important that lecturers are also scientists who experience the reality of research on a regular basis; D) Teaching improves research, as it forces scientists to clarify and refine their insights and messages, and at times even challenges their own assumptions and axioms.

This is all well and good, except these arguments don't measure up to reality, for several reasons:

- The course curriculum isn't necessarily related to the scientist-lecturer's recent work. On the contrary, areas of expertise in science are becoming narrower. Furthermore, ongoing pressure to produce large quantities of output makes it harder for many scientists to catch up with anything beyond their specific expertise, let alone with innovations in the field of pedagogy.
- There is obviously some significance to the fact that a teacher who teaches a profession has experience in that profession. For example, flight instructors should have experience flying a plane, and it is definitely important that the simulators and training programs are supervised by experienced pilots. However, not every person that operates a simulator or every instructor in the flight academy, including the aerodynamics teacher, has to be a licensed pilot.
- There are academic fields—mostly applied sciences, which require close instruction—where it is preferable and perhaps even necessary for the lecturer to have practical experience. In the study of medicine, psychology, education, and engineering, for instance, at least some of the teaching staff should be active in their field. But there's no reason for them to be scientist-researchers.
- As we have previously noted, teaching skills and research skills don't necessarily overlap. It would be better if talented scientists focused on research, while talented teachers focused on teaching and became "learning engineers." This would also give the proper attention and respect to excellent teaching, which is looked down upon in academia nowadays.
- The less teaching relies on a flesh-and-blood lecturer and the more it relies on advanced pedagogical means, the easier it will be to improve educational tools and update learning materials with the help of scientists (purely as consultants).

Separating Teaching from Evaluation

The social credit given to professors not only to teach their students but also to evaluate and rank them (through grades), and thus to position them on a scale of quality, is a convention that has yet to be questioned or examined critically. The inextricable linkage between these two roles of the professor (teacher and evaluator) stems from historical, political, and practical factors, and has consolidated academia's monopoly on the market of filtering and certifying.

But the more widespread higher education has become, the more heterogeneous the level of students, and the heavier the burden on the lecturer—the evaluation and measurement mechanism has become less effective. It must be said forthrightly: The old method is no longer valid. Academia does not thoroughly examine the knowledge and capabilities of its attendees, does not allow the student to improve and be tested indefinitely (as is the case in many other fields), and largely reduces the curriculum to a mere economic exchange that contaminates the relationships between teachers and their students and extinguishes young people's desire to acquire knowledge.

Moreover, measurement and evaluation are complex professional skills that most professors have not acquired at any stage in their lives. Having no other choice, they are forced to improvise and, in many cases, do injustice.

At the same time, employers are becoming increasingly unimpressed by academic grades which have been inflated to please the courted clients, and have to apply their own screening and filtering processes.

When the teaching mechanism will be disconnected from the evaluation and measurement mechanism, everyone will benefit—teachers, students, employers, and society at large. The social learning experience will become neater and more enjoyable, and a fruitful intersection of interests between students and teachers will be created ("your success is our success").

Of course, this will require a profound change in outdated pedagogical conceptions, as well as re organization on practical levels. The examining bodies and evaluating mechanisms will vary (each by their own specific designation) and their institutional supervision (including licensing) will differ according to the profession, its importance, and its sensitivity: from public regulatory bodies (such as government agencies granting licenses in certain fields), through professional guilds (a process that is already underway in some professional fields, such as medicine, clinical psychology, or law), to employers (many examine their candidates and employees with internally-devised tools) and private companies (which are already providing examination and assessment services for anyone who is interested).

Computer technology is already deeply entrenched in the field of assessment and measurement, and is expected in the near future to make tests in every field more professional, objective, accurate, and fun.

The constraint brought on by COVID-19 to ease or entirely give up on entrance exams to universities and colleges in the coming school year, coupled with the unprecedented scope of the transition to online teaching, will require rethinking the old models of evaluation and measurement and will likely result in a surge of new tests of knowledge and aptitude. These developments will lead us to a digital age of filtering and sorting. Diverse self-study kits will allow anyone to progress at their own pace, with scoring being just a means of improving performance and achievement (as is the case, for example, in computer games). Each field will include tailored entrance and aptitude tests, and the teaching body will be disconnected from the examining and evaluating body.

The Next Generation of Science

Advanced degrees that train students for scientific research will probably not sever the link between lecturers and scientists, as young scientists are supposed to be mentored in the real environment of their future work. However, graduate studies for an M.A. or a PhD will have to undergo a fundamental change. Even now, most students in these tracks don't pursue an academic career, and there is no point in training them for a profession they will never engage in. They'd be better off studying something that interests them and that they need for the rest of the career at an advanced level.

So how will the next generation of scientists be trained? This remains to be seen. It may be done in research institutes, like every other professional internship, and/or dedicated schools for science. In other words, some of the departments that many academic institutions nowadays refer to as "Graduate Studies Authority/Institute" will become training schools/institutes for scientists. These institutions will be selective (not just for appearances' sake) and therefore will also allow the government and other donors to generously subsidize the studies of young scientists. As for people who sign up for master's and doctoral degrees purely out of a thirst for knowledge, they will have to look for other frameworks better suited to these needs.

A Market for Education and a Market for Research

One can assume (and also hope, in our case) that faculties and departments in institutions of higher education will split into independent scientific research/consultation institutes on one hand and independent education/instruction/training institutes on the other. The natural conditions of the market will dictate their success: Anyone who can create a relative advantage in the field of teaching (a unique specialty, high-quality faculty, attractive learning environment, employment potential for graduates), or anyone who can gain a relative advantage in empirical and theoretical research will thrive.

As a matter of fact, the separation process is already underway, albeit indirectly and unconsciously. Most academic research nowadays takes place in research universities, whereas the scope of teaching is larger in colleges (some colleges have little to no research). Furthermore, most teachers in institutions of higher education aren't permanent faculty members anymore, and therefore are also not researchers.

Moreover: Governments and research universities already encourage faculty members to spend the majority of their time and effort on research, far more than teaching. They achieve this through the institutions' budgeting model, criteria for promotions, performance-based bonuses (including reduced teaching assignments), and a full exemption from teaching for a limited elite of leading, ultra-productive researchers (some institutes have even created a new academic rank for them: "Research Professor").

Many universities also have teaching tracks intended for experts (artists, administrators, clinicians, pedagogues, etc.), mostly in the professional fields. Furthermore, as we've noted throughout the book, academia is already undergoing processes of industrialization and commercialization, encouraging the establishment of research institutes and entrepreneurship incubators inside the campuses.

It should be noted that institutions of higher education have never had a monopoly on scientific research, unlike the monopoly they had and continue to have on higher education. But if the vast majority of research was done in the past under a university framework, the tables have turned in recent years, and now industrial settings are taking the lead (scientists from academia make up only 10%-20% of the entire global scientific workforce).[1543]

Germany is a prominent example of a country that leads in science and industry, where most of the research is conducted outside of academia. As of 2019, only a quarter of German scientists (some 100,000) were employed by institutions of higher education and university hospitals, with the rest employed by industry (mostly in major companies) and by hundreds of private and public research institutes (most of which are held by four giant, globally renowned corporations).[1544]

The budgets for German research institutes come from the federal government, local governments, and municipalities, as well as private bodies and public nonprofit organizations. They are joined by international funding sources—mainly the European Union.[1545]

German industry has invested over two-thirds of the country's R&D costs—both individual commercial bodies and collaborations (within the industrial milieu and between factories and research bodies).[1546]

Research in academia (with the exception of wealthy prestige institutions) has become less efficient and less profitable than research conducted outside of it, for several reasons:

- Researchers in institutes devote all their time to research and aren't sidetracked by secondary tasks, which consume a lot of time and energy from scientists in academia: lectures, mentorship of students, attendance in various committees, reviewing articles and research proposals, and more.
- In public academic institutions, teaching positions dictate research positions—which create surpluses or deficiencies in many fields.
- Scientific research outside of academia focuses on burning issues, which is why they can attract talented scientists more easily. Even now, an increasing rate of doctoral and post-doctoral students (mostly in STEM subjects) prefer a professional career in industry over an academic career.

  The COVID-19 crisis will accelerate this trend for two reasons: a. It has made clearer that most scientists and organizations at the forefront of science today are found in commercial companies. Most of the ideas, laboratory experiments, and technological innovations attempting to deal with the COVID-19 crisis have been conceived and developed in the private market—from medications, to vaccines, to problem-solving for patient diagnosis, self-test kits, sterilization, partitions and dividers, masks, respirators, and more. B. Scientists' employment conditions in academia, which have been severely worsened in recent years, are expected to be further hampered by the economic cuts. Already during the crisis, many institutions have announced cuts to staff pay and pension benefits. Furthermore, many faculty positions are about to be eliminated—simultaneously increasing the competition for any given job, as well as the risk entailed in choosing an academic career path.[1547]
- Commercial research is more efficient and focused, since researchers in companies and factories can't settle for publication for the sake of their personal resume, and unlike their colleagues in academia, have to produce tangible results.
- The physical work environment of research institutes and industrial research departments is infinitely more appealing than the academic research

environment (generally speaking, of course). Many research assistants in institutions of higher education are forced to work in subpar conditions, which drives many of them to seek out jobs in friendlier and more indulgent environments.

- Scientific research is becoming more complex and more expensive. It needs big work teams and massive budgets, and institutions that can barely stand on their feet are struggling to keep up. For example, biological research, which used to deal with "big phenomena" and was descriptive (observational) in nature, has "zoomed in" in the past few years. It focuses on the ultra-micro, and is based on sophisticated and expensive technological procedures at the cellular level. Many university labs can't afford the devices and materials necessary for this kind of research, and scientists in academia are forced to improvise (buy one device that sparingly serves different labs) or "mooch off" their colleagues.[1548] The result is that a large portion of the world's greatest scientists conduct their research outside of their parent institution, in richer and more technologically advanced institutions and labs that can provide them with the necessary work environment. One Nobel Prize winner told us with a smile that his institution boasts of his achievements, even though most of the research that landed him the prestigious award was financed by and conducted in laboratories overseas.
- Even in research fields that aren't equipment-intensive, commercial companies are taking the lead, because mega-corporations employ big research and development teams, which gain rich professional experience, and in many cases maintain massive and current private-access databases.
- Research institutes focus on specific fields, which make it easier for governments to prioritize their budgets in accordance with the changing needs of the society.
- Many research institutes operate within a therapeutic environment, which grants regular access to the populations being treated and their cumulative data. The best example is the medical research institutes built in hospitals. Discoveries made following an observation in a clinic or a research hospital quite often lead to a study that manages to identify a disease or develop a new drug. And it works the other way too: The research institute tests new drugs and therapies on samples of patients available to them.[1549]
- Academia is losing its edge even in the soft sciences, due to the spread of public and private social research institutes that focus on a variety of fields: public policy, market research, advancing disadvantaged populations, and so on. They operate far more efficiently than academic researchers, due to

> a closer connection to the field and greater resources, which allow them to use expansive databases and advanced research methods.

Naturally, the management of teaching institutions on the one hand and of research institutions on the other hand will be based on modern, transparent patterns – each institution according to its characteristics, needs and goals. They will be led by professional managers, who will let lecturers and scientists do what they do best. Even sponsorships and funding will be targeted and differential, according to the institution's type: governmental, public or private, profitable or subsidized.

After the separation, faculty members will no longer be pressured by academia to publish more and more. And given the fact that 75% of the world's scientific publications are made these days by academics, it is also expected to save a huge amount of time, energy and money.[1550]

An Updated Model for Science Funding

As we have described in great detail, the funding of scientific research is stuck in a dead-end alley and must recalibrate its route pronto. It's not just scientists from different disciplines who are going to have to figure this out, but also fund managers, intellectuals, economics, and public officials. Instead of employing countless unnecessary faculty members, who produce scientific garbage under the umbrella of academic freedom; Instead of groveling for money from the wealthy; instead of enslaving scientists to write research proposals which are mostly meant to satisfy the financiers (and therefore compromise scientific creativity); instead of the perception of research as a means for the economic survival of institutions of higher education (a perception that's doomed to fail); instead of cumbersome, expensive, slow, and biased "arrangement committees"; instead of scientist-reviewers who are drowning in a sea of materials; instead of redundant bureaucracy and red tape; instead of exploiting cheap, naïve manpower (doctoral and post-doctoral students) to write and sometimes even review proposals; instead of the inefficient and unfair priorities of public budgets (without including the public in decisions on the direction of the research)—all of these must be replaced with efficient and fair alternatives that are compatible with the new zeitgeist.

The transition to a model based on dedicated research institutions will allow governments and philanthropic bodies to switch from researcher-oriented funding to research institute-oriented funding (and, along the way, also field- and subject-oriented). Such a model could even alleviate the massive load and pressure placed on the scientists' shoulders nowadays, and would allow the state to conduct a targeted, economical, and democratic policy for budgeting science.

This change will probably come from the digital sector, through advanced websites and search engines which will provide the general public with detailed and free information on studies, scientists, and ideas, and allow financers (public and private, big and small) to choose where to invest or donate their money. This information will be more transparent and more elaborate, which in turn will lead to more efficient and fairer funding, free of any middleman, just like search and comparison engines that have streamlined and thus fundamentally changed the old shopping process.

Crowdfunding, which grew out of Internet culture and social media, will also spread into the culture of science. Many studies will be funded in the not too distant future by "simple folks" (with no official titles and positions). They will do this for different types of motives: economic, ideological, and so on.

There is still the fundamental question of intellectual property in the age of information sharing. The human mind will also have to come up with creative technological and legislative solutions in this field in order to ensure the right balance between private property and shared knowledge, just as in the case of artists' copyrights in the Internet age (a case which remains unresolved).

Reinforcing Basic Research

There are some that argue that the process by which scientific research is tearing down the boundaries of academia, taking place also in industry and public and private research institutes, is a threat to society and to science—not just because of the potential for commercial biases, but also because only the academic framework allows for free research that isn't subject to private, short-term interests. This argument has some weight to it, but it has been undermined for two reasons:

First, academia is already operating in an unsterile scientific environment due to its desperate dependency on external funding, and it's doubtful whether the problems and noises of industrial research are more dangerous. Furthermore, the assumption that the credibility of studies conducted in academia is greater than that of studies performed outside of it has yet to be proven. In fact, the data indicates that the rate of false and manipulative studies in academia is skyrocketing, and has recently reached alarming proportions (as we've demonstrated). Furthermore, academic science bases its reliability on peer review, while industrial science bases its reliability on a much stricter trial—the success of its products. But even before the market trial, industrial products have another circle of strict external control: standards institutes. After passing that hurdle, they could stand to trial—literally, in the criminal and civil court system. As we know, scientists in academia cannot be sued for publishing false information, whereas industrialists are exposed to lawsuits if they market a faulty product.

Second, the data shows that private companies also have a financial interest in conducting basic research, which might lead to developments in the long run, and some of them have indeed invested more resources in basic research as of late. Conversely, due to the massive pressure to publish in academia, less basic research is actually taking place there. Even research foundations are seeking out more studies that produce immediate results and are less interested in patient, long-term, macro-studies ("blue skies research").

Moreover, it has been commonly believed for many years that the incentive for scientific creation comes from the fertile mind of the scientists, who are given free rein by society to choose what to research. Many nowadays believe that this is mostly a myth, also known as a "beautiful lie."[1551] In reality, the motivation to conduct research is mainly provided by projects that seek to solve concrete problems and fill practical needs. The computer, jet aircraft, mobile phone, the Internet, lasers, satellites, GPS, and nuclear and solar power—all these were born in industrial and military laboratories, and gave rise to widespread scientific research, secondary developments, and even important scientific theories.[1552]

Even the social and behavioral sciences have quite a few theories that were born as byproducts of studies that focused on concrete phenomena. One of the most well-known examples is the Hawthorne Experiment, which was conducted during the 1920s in order to understand the relationship between the components of a physical work environment—like lighting—and productivity, but quickly led to surprising theoretical results in human relations and organizational management.

In an interesting discussion around the tension between goal-oriented research and "pure" research, which is meant to uncover another layer of truth about the world, Dr. Yaacov Bergman offered a nice simile from the world of artillery. According to him, those who support studies without any practical objective are likened to saying that "targets move around frantically in the sky. Therefore, we shouldn't aim at any one target, because if we do that, we won't hit anything. Instead we should provide anti-aircraft gunners with as many shells as possible, and give them complete 'artillery freedom' to randomly spray the sky in every direction. Then maybe they'd hit some of the targets by accident." Bergman, a former senior member of the Jerusalem School of Business Administration at the Hebrew University, wrote this sarcastically, of course. Clearly, his position is that such an approach would be wasteful and lead science to bankruptcy. It would also allow scientists to use the resources of science for their own personal whims and self-promotion.[1553]

Obviously, pure scientific research must also continue separately from any commercial or industrial framework. Therefore, we can expect to see public research institutes in the post-university age, which will focus solely on basic and theoretical science. These premium institutes will be comprised of the best minds that science has to offer.

The Crisis in Academia as an Expression of the Crisis in American Culture

The Americans have led global science for many years. Their success can be attributed to many factors, primarily the following five: A) The American university model managed to combine the British college model with the German research institution model; B) The Pilgrims' distance from their home continent facilitated democratic development, including the development of extensive academic freedom; C) The entrepreneurial and competitive market economy developed in the U.S. promoted advanced competition in science as well; D) Most scientific discoveries, key theories, and technological developments, in nearly all fields, have grown from American power in the past century; E) The digital revolution, which was born and developed mainly in the "land of endless opportunities," has also provided American academia with financial, technological, and reputational advantages, expanding the gap compared to other countries.[1554] The U.S. leads the world in almost every scientific metric—in the number of discoveries and registered patents, in the number of publications and the extent of their influence, in the number of winners of prestigious awards (the number of American Nobel Prize recipients is nearly three times higher than that of the United Kingdom, the runner-up in the global ranking), in the volume of donations, grants, and profits from patents, and in the position of institutions of higher education, faculties, and departments in international rankings. The American institutions serve as a role model for the rest of the world, setting the tone for the academic world.

Despite all of the above, this cultural turbo engine, which works at full capacity, is starting to lose its touch, hinting that it may be time to replace it with a new model. Legendary Green Bay Packers coach Vince Lombardi is commonly associated with the oh-so-American phrase: "Winning isn't everything, winning is the only thing." The desire to win is so engraved into American culture that it'd be very hard to find any popular sporting match there that ended in a draw. But it doesn't start or end with sports. Global academia, envious of the Americans' achievements, has embraced this worldview, not noticing that it doesn't just stand at the base of America's crowning achievements but is also at the core of its escalating problems. The U.S. nowadays is a sick country, both figuratively and literally: Epidemics of bulimia, anorexia, diabetes, depression, and stress (which impairs quality of life and recently has even been known to lower life expectancy); high rates of addiction to alcohol, drugs, painkillers, technology, media, shopping, gaming, work, and money; collapsing public health and education systems; rampant violence; the loss of personal and occupational security; immense socioeconomic gaps; ethnic tensions; countless disaffected, lonely, and lost citizens, estranged from their communities and families; ruthless lunatics who slaughter the innocent in mass shootings (while guns and ammo are sold freely to all who seek it); over half a million homeless people on any given night (0.17% of the entire population);[1555] the highest incarceration rate in the world;[1556] religious fundamentalism; political extremism (on both sides); and a polarized system of government, led by an odd, eccentric president.

"The American Dream" used to motivate millions of people, both on and off the continent, but these days even the Americans have become pessimistic about their future. In a 2019 Pew Research Center survey, most of the American respondents estimated that economic gaps would expand; that the quality of life would drop, particularly among the aging population; that political tensions would intensify; that the leadership crisis would get worse; and that the U.S.'s role in the world would become increasingly less meaningful.[1557]

The story of the downfall of academia is perhaps the story of the downfall of American culture, with its lifestyle and scale of values. What worked in the past and leveraged the Americans to reach incredible heights has been thrown off-balance, turned extreme and destructive. When everything is about money, and the categorical imperative is to get as rich as possible, beat everyone around you, and leave others in the dust—the community falls apart and the individual gets crushed by the pressure.[1558]

Over the course of this book, we have described the commercialization and industrialization process in academia, and the heavy toll it has taken and is expected to continue to take: oligopolistic publishers who take out the competition and siphon off public funds; the compulsion to keep producing output; the obsession with measurements and rankings; workaholism and the lack of a work-life balance; tightening supervision of "production workers," which leads to more fraud and taints the institutional atmosphere, and more. When competition becomes an endless war and enlightenment turns into tyranny—the decline is inevitable.

American academia is growing weaker not just because of the increasing squeaks and creaks in the model that it developed and has taken to the extreme, but also because it has grown rivals that are starting to defeat it. For decades, universities and research institutes in the U.S. were the Mecca of scientists around the world. Hundreds of thousands of research students and scientists flocked to it, bringing the values they acquired there back home. It was therefore just a matter of time until the students surpassed their masters. As the economic gaps between countries around the world are closing, and an economic power grows in the Far East, the scientific gap is closing as well.

In this book, we provided a lot of data that illustrates how the scientific periphery is getting closer to the mainstream. Here are two representative datums: a. In 2002-2012, China, India, and Brazil more than doubled their research and development spending; b. The joint share of these three countries in global R&D expenditure grew from 17% to 24%.[1559]

China used to be mocked for its tendency to manufacture cheap knockoffs of products made in the West. Nowadays, as China conquers every possible market, no one dares to disrespect the emerging giant anymore. The Chinese are still learning from and copying the West in academia as well, and they will probably win at some point. But it will be a Pyrrhic victory, since they are adopting a diseased mechanism.

Once you understand the broad cultural context of the downfall of academia and its desperate struggle for survival, you realize another important and fundamental thing: The alternative model, which is coming, will be able to provide an effective alternative only if it manages to overcome the cultural distortion in which the old model operated. This isn't just about the quality of science and education in the new model, but rather about the quality of life of the students and scientists.

Point of No Return

In 2017, the credit rating agency Moody's published an economic outlook for the American higher education system. For the first time in history, the traditional rating was changed from "stable" to "negative," and it remained "negative" on the 2019 outlook.[1560] From a practical standpoint, this outlook doesn't mean anything for now, because institutions of higher education are not independent economic entities, and they survive because governments and donors are keeping them in business. And yet the bag of debt continues to fill up, while demand for higher education in the world is starting to show signs of slowing down. It's difficult to predict exactly when the turning point is going to happen, but it seems we've already passed the point of no return.

The financial crisis has forced many institutions of higher education to merge departments and even institutions (we're talking about hundreds of departments and dozens of institutions around the world), and experts predict that this phenomenon will only expand.[1561] The advantages of merging are obvious: pooling resources and reducing costs, combining different types of expertise, and expanding study and research options. Mergers can also make it possible to gradually sell off old assets in the future, serving as shock absorbers and allowing them to avoid officially declaring bankruptcy. The issue is that mergers don't always solve the problem, and sometimes even exacerbate it, because this is a complex procedure that involves political, technical, financial, and scientific difficulties, among other things.

Closing an academic institution—especially a public one—is a difficult and complex task, also because it involves mass layoffs and a receivership, and because it has symbolic and ideological implications. Nevertheless, what seemed like fiction a few decades ago has become a real possibility over time and is actually inevitable.[1562] Accordingly, five nonprofit four-year academic institutions were shut down on average every year in 2004-2014, and 2-3 institutions of the same category were merged every year (on average) during that period.[1563]

In 2016-2018, 100 private and 20 public institutions of higher education were closed in the U.S. alone. Analysts predict that the number and rate of closures will grow over time.[1564] A 2016 report by a leading American strategy consultancy firm found 800 colleges that are "exposed to critical strategic challenges" (a euphemism for being in real danger of closing). The report notes several risk factors, which apply mostly to small colleges: overdependence on tuition (over 85% of the revenue), insufficient rates of admission, and an exorbitant increase in the tuition for students and the rate of discount recipients among them.[1565]

Obviously, this trend is not unique to the U.S. For example, the *China Post* reported in 2017 that assuming that the birth rate in Taiwan will remain low, followed by a drop in the number of academic applicants (an expected reduction of 40% by 2028), the higher education bubble in the developed Asian country (the rate of higher education applicants in Taiwan has skyrocketed to 95% of the relevant class members) is expected to burst, leading to mergers and shutdowns of dozens of institutions. This forecast was quoted from the mouth of the Deputy Minister of Education, and the Taiwanese government has already established a fund intended to regulate the closure of low-performance institutions (the fund is meant to help students and faculty members from institutions that are closed to continue studying or working in another institution).[1566]

In 2018, Forbes published an article titled: "Will half of all colleges really close in the next decade?" Among other things, the article cites a prediction by Harvard Business School Professor Clayton Christensen, according to which half of the colleges and universities in the U.S. are expected to be closed or go bankrupt within a decade. It also quotes Richard Vedder, one of the leading experts on higher education: "To me the issue is not, 'will colleges be forced to close?' but rather how many will close and over what time period. I am not certain about the details, but the broad contours of the forthcoming changes seem pretty clear."[1567]

In order to get a glimpse of what's going to happen to institutions of higher education in the next few years, one must take a look at data about the state of supermarkets in the Western world, and particularly in the U.S. The data leaves no room for doubt: traditional retail is dying. There may still be stores as far as the eye can see. Retailers still need physical spaces to store the goods, and many customers are still used to wandering through the aisles and feeling up the products. Not for long, though. eBay and Amazon, which will be followed by other entrepreneurs, are changing the rules of the game. It is far more efficient (and usually also cheaper) to choose the right product in the comfort of your own home, buy it online, and have it delivered home or to the local pickup spot. Soon, when the virtual reality and augmented reality industry become prevalent, and when drones enter the shipping world, leaving home to go to the store will become even less necessary, and online shopping will become more fun. The first signs of the consumer revolution can already be seen in the consumption habits of the younger generation.

Tens of thousands of stores around the world are closed every year, and veteran, wealthy retail chains with thousands of branches are going bankrupt one by one. Those that manage to hold their head above the water are forced, due to the emptying branches, to cut tens of thousands of jobs and reduce inventories. Experts expect that at least 10% of retail areas in the US will be closed and repurposed in the next few years.[1568] Some stores and malls are already undergoing this transformation and being turned into warehouses, distribution points, entertainment and sports centers, and more. Of course, this does not mean that boutiques, which offer luxury items, and even shopping malls are going to completely disappear. Even in the age of the jet engine, sometimes you want to ride a horse.

Yet, even though any youngster can understand the general trend and its irreversibility, human nature still ignores the forecast and refuses to prepare for the tsunami. Just like entrepreneurs who continue to build malls and businesspeople who still believe in retail chains, the leaders of higher education continue to recruit faculty members and build auditoriums, classrooms, and student dorms. They continue to offer more of the same, and believe that the future is still bright. Reality is suppressed to such an extent that even a theoretical discussion about possible scenarios is not being held, ignoring the fact that a storm is raging outside and the windows inside are shuddering. Even *Nature* admitted in an editorial that "universities are losing control of the process. Change is being forced on them."[1569]

Academics, and they're not alone, will fight vigorously to prove that giving up on the traditional model is destructive and irreparable, just like taxi drivers who fight Uber and other ridesharing apps. Except this is a final battle predetermined to fail. While institutions of higher education are doing everything in their power to market degrees, the number and rate of young people who choose to pass on getting an academic degree in general and an expensive degree in particular has consistently grown (for example, in the past few years there has been a dramatic drop in the demand for law degrees in the U.S.).[1570]

In this regard, the state of academia is somewhat reminiscent of the state of the socialist communes (kibbutzim) in Israel during the 1980s. They fell into a deep socioeconomic crisis, caused by the rigidity of their ideology and their failure to adapt to the new era. The first to leave one by one were the talented young members, who were able to find work outside of the kibbutz with greater ease. However, the leaders of the kibbutz movement and the old founders of the kibbutzim kept ignoring the depth of the crisis and refused to make the appropriate practical and ideological adjustments. They convinced themselves that the storm would pass in time. Only when the right-wing government led by Likud refused to subsidize them, and when debts threatened to drag dozens of kibbutzim to insolvency, did the kibbutzniks on the ground take the reins. They initiated a long, systematic, difficult, and conflict-ridden process of privatization, which put them on track towards stability and prosperity. Nowadays, many kibbutzim are thriving, while the demand to join them (as members or in extension neighborhoods) is higher than the supply.

It should be stressed: Kibbutzim as they are today may be social entities that exist in the same geographic location, on the same properties, and carry with them many of the traditions of the past when it comes to communal solidarity. But these are no longer the communes of the past with their Soviet-like appearance. The kibbutzniks survived when they accepted that reality had changed, which meant that the rules of the game must change as well. One can only speculate that this will also be the fate of institutions of higher education.

In a world where logic is the rule of the land, governments would have read the reality on the ground, identified the blindness of interested parties, and treated institutions of higher education as potentially insolvent. They would have reduced the injection of funds, conditioned budgets on a gradual elimination of jobs and departments, and reduced the power of government councils and committees that supervise higher education (like the Council for Higher Education and the Planning and Budgeting Committee in Israel) or outright shut them down, opening up the higher education and science market to free competition and encouraging entrepreneurship in the field. And naturally they would have also stopped giving wage increases for academic degrees in public service. This hasn't been done so far, and probably won't be done in the foreseeable future, for all of the aforementioned psychological reasons, as well as a number of important sociological reasons:

- Most of academia's leaders don't want to go down in history as the executors of the inevitable outcome. No administration or president of an academic institution will declare the story's end of their own accord. They think to themselves: My term will end one way or the other, and whoever replaces me will have to deal with this mess. Even governments are struggling to enforce any fundamental institutional changes for selfish political reasons. Taking academia head-on isn't really a good look. A Minister of Education or Science who declares the end of subsidies for institutions of higher education, or even a significant reduction, will be denounced and forced to back down.
- Academia has all sorts of strong, worldwide connections, which include mutual commitments on an international level. Governments and universities fear that deviating from global conventions will cause them reputational and scientific damage, and perhaps even get their scientists thrown out of the big leagues.
- The academic system is controlled by a small elite that has the most to gain from the system: leading states and institutions in the U.S. and Europe, publishing corporations, and senior professors who get most of the perks. There's no reason why they would willingly relinquish their advantages—just as the royals and clergymen of the late Middle Ages and early modern period weren't quick to give up their privileges.
- Academia has always been the avant-garde of the entire education system. It dictated the curricula, trained teachers, had total authority over qualification and quality certificates in many fields, and served as a model of intellectual excellence. Many fear that rocking the top of the ladder would cause the entire ladder to shake.
- Institutions of higher education still hold a monopoly over certification in important professions such as engineering, medicine, law, psychology, and teaching. An academic degree is still a prerequisite for employment in other professions as well, and in some of them an graduate degree is a condition for a promotion or at least a pay raise. Dependency on academia could be terminated through legislation and policy changes, but parliaments fear revolutions.
- A real transformation in employment culture requires a change in perception among employers and the development of alternative tools. It also hinges on a change in mindset among the younger generation and their parents. This change needs a broad enough legitimization to gain momentum. The mass may be gradually growing, but it will take time to reach the tipping point.

It is therefore likely that the change will come from outside forces rather than the vision and courage of administrators and legislators. When will we bear witness to the serial bankruptcy of institutions of higher education and the accelerated pace of change in the scientific world? It's hard to tell. It may take five years and may even take twenty. After all, no one declared the death of the rotary dial phone or the film camera in real time. They were buried in the graveyard of history only when much better alternatives were created and after a considerable period of shuffling around.

What we do know for sure is that we will continue to see a consistent decline in the demand for academic degrees, as well as academic careers, in the near future. Lecture halls in campuses will be gradually abandoned, just like the ancient churches of Europe, which nowadays mostly function as tourist sites. Over time, the social legitimacy for not pursuing a degree will grow, and employers will gradually stop demanding it as a prerequisite. We will also continue to see diverse initiatives that will offer a variety of appealing alternatives in the field of education and research. Inside academia we expect restlessness, crisis after crisis, protest after protest, strike after strike, exposure after exposure. The budgets will grow increasingly thin, and positions, jobs, benefits, and wages will be cut to a point that will force governments and institutions to take emergency measures.

The collapse on the one hand, and new alternatives on the other, will lead us to a brand-new day—in which there will no longer be a need to continue lying in science and in education.

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