In defense of *punk* science

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Abstract

We discuss the current state of *commodification* of science and marginalization of *individuals* and groups outside of the main institutions and research groups. We analyze how the number of publications and not the quality of the knowledge produced has become the *de facto* currency to buy resources, prestige and power in academia, further oppressing and excluding *individuals* and smaller groups from building the scientific consensus. Due to the unfortunate and misguided policies of countries, states and institutions privileging numbers over quality, many groups operate true pyramid schemes where those at the bottom, undergraduate, graduate students, lab technicians and post-docs, bear the brunt of the manual and intellectual labor while the upper strata of the pyramid concentrates publications, resources and power. In this system, those at the lower strata are often seen as disposable. We defend that an open-source model of presentation of scientific results with minimal voluntary curation from democratically elected representatives from the scientific community is an alternative to corporations. Public funds used to pay for publishing and access to publications in major corporations could be employed to maintain open-access databases. We defend that the distribution of public funding for research should not follow a free market capitalism approach, based on the number of publications as currency, as this leads to the accumulation of power and resources and oppression and exclusion of *individuals* and smaller groups, especially in developing countries. A do-it-yourself inclusive model is defended as an alternative to a for-profit, *commodified*, *profilicitized* model for science.

Keywords: Peer-review; commodification; profilicity; epistemological anarchism.

1 The Current State of Science

The *commodification* of modern science has brought concentration of power and resources in expense of the exclusion of minorities and independent *individuals* from contributing to the

scientific consensus. The word *individuals* in italics meaning individual persons excluded from the scientific process in this essay. This has benefited larger groups, being public or private institutions, civilian and military corporations, as well as state actors. The university has ceased to be a free stage for exchange of ideas in order to become an environment permeated by the interests of large corporations and government actors. In many countries education has become a commodity where students invest large sums of money for the right of sitting in classrooms for a fixed number of hours and receiving a diploma or certificate at the end of the cycle, without any guarantee of knowledge gain, a better future or a job, while the institutions main goal is profit even if they state otherwise.

More and more, research and education institutions are becoming dependent on tools, systems, software and equipments provided by an ever-decreasing number of corporations. The increasing dependence on *non-free* software, information systems (books, journals, databases) is only a symptom of a large-scale underlying problem. The continuing dependence on *non-free* alternatives creates a vicious cycle where at each upgrade or new system installed, each time training and specialization is provided for staff and/or students for use of these systems, the more difficult it becomes to revert to previous systems and to retrain personnel to use cheaper or free alternatives. With time, when a highly technical dependence is established such as for maintenance of large databases, servers and educational tools or specialized lab equipment and software, it becomes virtually impossible to become free from the dependence of the corporations without the risk of collapsing the infrastructure.

Besides the profound dependence on corporations, publishing has become a *de facto* currency for obtaining funding, space, power and privilege in terms of recognition, monetary gains, and administrative and decision-making power within universities and other research institutions. Not unlike within traditional political and military power structures, with greater power comes greater opportunity to further oppress and exclude those marginalized outside the power structures or with ideas outside some biased "consensus". With the policy of funding agencies to fund and reward researchers and graduate programs by the total number of publications, and in some cases the status of the journals in which the research is published, in detriment of novelty, quality and/or relevance to society as whole, an economics-analog system has been established in which the production of journal publications, dissertations and theses and not necessarily of *knowledge* became an end to prop careers, programs and departments. With more publications comes more prestige, resources and opportunities, but the individual growth is not distributed equally, those at the bottom of the hierarchy sharing the brunt of the manual and intellectual labor and little of the glory except the vain promise of having been through an *excellence program*, with little gain in culture, knowledge - and not of simple replication of *commodified* research models - and well-being.

We are today in an absurd position in which many universities and researchers pay to publish the results of research funded entirely with public funding (i.e., tax payers) - which is itself scarce in developing nations - on journals administered by international publishing conglomerates which in turn later charge universities and individual researchers for access of these same journals, while the authors themselves often work for free as editors and reviewers for these publications. Why

is this intermediary needed? In the name of quality control and *peer-review*, many of the major journals in each knowledge field are controlled by an intellectual elite, comprised of a limited number of research groups that end up censuring ideas and research fields that do not exactly match the *status quo*. Non-orthodox ideas are immediately discarded in favor of research ideas *en vogue* at the time and that are guaranteed to generate citations. The overspecialization and technological dependence in terms of equipments computational resources further excludes groups and *individuals* in developing regions.

The formation of large research groups and the collaboration between different academic areas for the benefit of the collective has almost always been seen as a positive point in what is understood as science. Many current problems such as pollution on global scale, climatic studies, astrophysics, particle physics, structural geology, disease prevention and control, to mention a few, are often dependent on very expensive equipments and installations, and on the expert knowledge in different fields to study and propose solutions to specific questions. However, the demand for productivity indicators in the form of journal publications has shifted the overall scientific culture in favor or large research groups in virtually all fields of applied sciences. In this paradigm, research groups are led to meet publications goals, operating as a pyramid scheme where those at the base bear the brunt of the of field and laboratory work, writing of dissertations, theses, reports and journal publications, while those of the top contribute to review the work, obtaining funding and, more importantly, controlling the scientific narrative. In this scheme, there is a concentration of authorship in direction to the top, to the leader of major research groups, who on extreme cases tally dozens of publications in a year[1]. In this interview, the interviewee states in no ambiguous terms, when asked about why some author so many papers that[1]:

> "In some cases ... the fear of publishing or perishing, or a desire to win grant money... in other cases, there are more direct financial incentives. [A major country], for example gives its researchers cash for publishing, especially in influential journals ..."

Regardless of if the opinion of the interviewee represents that of the majority, it is clear that there is a problem with such a system. The egregious issue of *publishing or perishing* will be addressed later. It is fair to speculate that it is, with rare exceptions, humanely impossible that the author or authors at the top of the pyramid have contributed and carefully reviewed each and every individual publication. Another interesting phenomena is that individuals at the middle strata engage in a policy of cross citations where authors of a subgroup mutually include authors of other groups at the same level in citations, so as to inflate the number of publications per individual on the group. In these groups it is common that researchers that did little to no contribution to the research are cited as a means of inflating group and individual citations[2]. As in any pyramid schemes, the most negatively impacted are those at the base. In this case they contribute with intellectual and manual labor, in many cases exposed to chemical, biological and physical hazards, inhumane work hours and without the jurisprudence of any labor laws in most places, being mainly undergraduate, graduate students and post-docs[4]. In many countries there is the aggravating case that these are foreigners, often without family or social support systems and under the constant veiled (or not) threat of losing the student visa

status and being immediately replaced by the endless income of vulnerable students. These students are normally subjected to wages in the form of stipends well below the poverty line on the host countries. Early career researchers in tenure track positions are also pressured to fulfill publication and grant quotas at the risk of not be granted tenure, generating immense amounts of stress and potential health issues, and contributing to the overall problem of research and science becoming a numbers game. An anonymous academic brilliantly compared the problem of inflated metrics, inflated research to the cobra effect, with progress here being measured by accolades and showboat research rather than the number of captured cobras[3]

Progress is now measured in terms of the number of publications and not in terms of effective contribution of the research to the knowledge in a particular field and/or to society that often finances the research. By increasing the number of publications, groups, universities and programs have access to more resources which in turn generates more publications in a vicious inflationary cycle, where potential benefits are neglected and *individuals* and smaller groups are further excluded. With that, a few groups become increasingly larger, its members start to collaborate as reviewers and editors of highly cited journals and the vision defended by these groups is consolidated by censuring ideas from *individuals* and smaller groups. In the end, many of these large groups reach national and international proportions and the individuals from the upper strata of these groups become members of the boards of financing agencies, editors of highly cited journals (often by founding their own journals) and university administrators, consolidating the exclusion of emerging groups and *individuals* by controlling what is published and to whom grant money goes. Even if those involved do not consciously direct the destination of resources to research groups connected or within the main group, the concentration of ideas and culture within a group will tend to exclude different ideas and research lines because they do not conform to the program defended by the main group.

From one end the independent academic community is attacked from within, by the misguided policies of administrators, by privileging numbers over meaning, which favors large groups that end up concentrating resources and power, resulting in exclusion and oppression of smaller groups and *individuals*. Larger groups can operate in a predatory manner akin to large corporations with unfair practices to eliminate or absorb the competition, draining and/or eliminating smaller groups. From the other end, free-thinking, independent scientists are under threat from larger corporations on at least on three different fronts: laboratory equipment and resources, systems administration and informatics and publishing companies. Highly specialized equipments are often manufactured specifically for laboratories by companies that own the patents on technology and components, therefore, in many cases there is no competition and prices are dictated solely by the manufacturer. This is especially worrisome for equipment used almost only in research institutions and universities in countries where almost all the funding comes from the government. Because the manufacturer knows that government funds may have a lot of restrictions to be spent, they specifically design products to be purchased from these grants and because there is little to no competition, exorbitant prices can be charged. Companies also take advantage of the market by branding simple products made by cheap components as laboratory equipment, compare for example the manufacturing and market prices of a “laboratory” oven or

refrigerator to a similar regular consumer product. With software, there are two levels of the problem, first with single user software for managing laboratory equipment and data analysis. In the past, the user would buy the license of a given program and have the right to use it as long as there was compatibility with the operational system and hardware. Today, several large software companies base their model on single user or institutional subscriptions by making the purchase of lifetime licenses highly prohibitive with unreasonable prices. Even if prices were fair, these "lifetime" licenses are usually for a version of the product which will become obsolete in a few years, and technical support and updates are often not included. Subscriptions are renewed yearly and once the user is familiarized with the application, they become virtually dependent on the product unless a conscious decision and effort are made for changing to different systems. This is particularly problematic in software that require large amount of training, such as programming languages and certain data processing applications. Most companies offer lower cost student licenses with very limited capabilities, which could arguably be seen as a way of leading to user dependency and promotion of the product. When the users leave academia, they are faced with a sudden increase in cost. Research workers are many times left with no option but to buy subscriptions using personal funds, grant money or require the institution to pay large amounts of money for institutional subscriptions. Aggravating is the fact that many of these applications are programmed using open-source programming languages and platforms, and using technology that is often developed in public funded laboratories and start-ups. The second level of the software problem is that many universities have moved from in-house platforms for e-mail hosting, servers and tools for remote learning to deals with large technology corporations. This not only creates a financial burden to the university but also forces users to subscribe to a for-profit model that heavily relies on personal data collection for targeted advertising. If that was not bad enough, these systems are increasingly vulnerable to massive hacking operations by state and non-state sponsored actors, which can result in the compromise of restricted information, loss of data and further financial loss by individuals and institutions by ransomware attacks[5, 6].

The most direct attack on science, however, comes from publishing companies and the complicity of university administrations, funding agencies and researchers. As previously mentioned, funding agencies have relied heavily on number of publications and in some cases in some metric of perceived status of the journals in which the research is published. Once those policies were established, publishing companies invested heavily on marketing, investing in metrics that emphasize the number of publications per author such as the *h-index* and similar metrics. This not only preys on the vanity of researchers but also creates a toxic environment by forcing researchers and students to move from a model of perceived authenticity to a forced *profilicitization*[7] that is further explored by companies such as Scopus, ResearchGate and Google. Under such model, the individual is no longer perceived as a person, but it is judged as a profile or a curriculum vitae, where the number of publications supersedes any humane aspects. In this model, teaching ability, cordiality, administrative work are all neglected in terms of how many publications a researcher can produce each year and how much grant money they can bring into the university system. Countries such as Brazil have a state enforced *profilicitization* police as everyone that

works as graduate adviser and is linked to an accredited graduate program is forced to subscribe to a government backed curriculum system. This state enforced curriculum is virtually how people are judged academically and often personally within universities and some research institutions, often leading to harassment by colleagues and administrators. The *publish or perish* model which was often understood as meaning that researchers who do not publish a lot lose visibility and opportunities for grants and promotions has gradually turned from metaphoric to literal as researchers are increasingly perishing from physical and mental health problems in an unsustainable and immoral system[8, 9].

With the commercialization of academic publishing over the last decade or so, many marginalized individuals in developing countries have come to perceive publishing as a means of income. Academic publishing companies and journals that operate outside of the margins of the minimum ethical standards flourished, as well as for-profit conferences, one would be hard-pressed to find a researcher that has published at least one paper in a major journal that does not receive at least one daily spam e-mail request for a manuscript or to be a speaker at a conference. The polemic culminated in Beall's list of predatory publishers [10]. But as for-profit, marginally ethical journals increase in visibility and attract reputable scientists - often because of the pressures to publish at any cost - they slowly infiltrate in the mainstream and their model becomes accepted as a viable alternative. Costs of around and over US$ 1000 are not uncommon in the name of article processing charges and *open access*. One of those publishers lists article processing fee of $1654 for "low-income countries", presumably in US dollars. In a single volume of a journal published by this company one would find articles about water absorption in solid buoyancy materials [11] and about the effect of consciousness energy healing in the properties of a metal. The authors concluded that remote treatment by trademarked biofield treatment by a certified healer significantly affected physical properties of tellurium in comparison to a sample treated by a sham reader [12], the authors being affiliated with the certified healer's company. We, by no means, mean to attack individual cultures or belief and advocate for the free exchange of ideas but this serves as a cautionary tale about what might be happening in a larger and more overt fashion in today's scientific culture. Journals are being used as a mean to make money at any cost and individuals are using these journal to promote products and services that might harm, both physically and economically, the public. The contamination by corporatist interests is hardly a problem of small obscure publications, during the 2020-2021 pandemic, two of the arguably most important journals of medical sciences in the world, The Lancet and the New England Journal of Medicine, had articles retracted due to shady data, poor *peer-review* practices and conflicts of interest[13].

Now the concept of intellectual property and patents are valid means of protecting the livelihood of independent artists such as musicians, artisans, writers and others. Scientists too have inherent right to protect and commercialize their work. But when the scientist is paid by public grant funding, working for public universities, who really owns the publication? The answer should be society, which funds the research, even if the researchers is the curator of the intellectual property. It is immoral to think that society must fund research and pay for the copyrights of publications to be transferred to major corporations which then sells the final product to the

same researchers and universities that produced the research at exorbitant prices. Although in many countries university professors are part of an economically privileged class, it is impossible not to note that such models of work exploitation are often seen in marginalized farmer communities which sell raw produce for corporations at low prices and then later might encounter the same goods cleaned and in a brand new package, purposefully design to attract buyers, at exorbitant prices. The nutritional value and vitamins content, for example, either does not change or is in some cases even lowered when the food processed. The analogy holds for processed articles. And what happens to those who dare to challenge this system? As it often happens with small indigenous farmers, threats, harassment, persecution, prosecution or worse. Alexandra Elbakyan has to live in hiding because she was sued by Elsevier for millions of dollars, a lawsuit which was ultimately ruled in favor of the publishing conglomerate [14] while Aaron Swartz ended up taking his own life after being prosecuted for sharing JSTOR academic articles [15]. Their crime in the end is giving public access to journal publications which should be free to the public and researchers, since they are often the result of public funded research done by public funded faculty, post-docs, graduate and undergraduate students.

While on one end these corporations prey on the system that rewards researchers solely on the number of publications for grants and promotions, on the other hand they prey on researchers using models similar to those used by large social media corporations, that is, on an ego-dopamine based reward system. The number of articles published in a period functions as an analogy to Instagram or Facebook posts. Posts that are well liked, i.e., cited in the case of articles, generate an ego reward and more visibility to the researcher profile. Many researchers opt to create and curate their own profile in sites such as ResearchGate, LinkedIn, Google Scholar and many others. There is nothing wrong with highly cited research if it contributes in some form for the benefit of society. But in the social media model, researchers go to many lengths to increase and in some cases inflates the number of citations, the pyramid model being one of them. It is not uncommon that researchers and journals request citations of their previously published articles during the anonymous *peer-review* process [16]. Large corporations appeal to ego with metrics such as the *h-index* mentioned previously, which amounts to nothing more than a metric of the number of citations by an author or journal. Having a high *h-index* is now a measure of success and a justification for oppression of exclusion, even if the index is void of meaning in terms of real-world impact and usefulness of the publications, thus perpetuating the *commodification* model of science. Individuals who publish in indexed journal have no option but to be listed in a limited "free" author profile in a platform administered by Elsevier[17]. The platform conveniently lists the number of citations and publications per year of a published author and the *h-index* in the name of "assisting with their research, such as searching for authors...". Such blatant non-consented *profilicitization* would be equivalent to Facebook or Google giving everyone a free, automatically generated profile with information such as net income and job status.

2 The Paradigm of *Commodified Science*

Throughout its history, science has never been a pure endeavor, devout of influences from religion and politics. The paradigm of science that is used in all societies that rely heavily on technology and industrialization is largely that inherited from what is called the *scientific revolution* that took place from the 16th to 18th centuries. Modern science has always been, at some level, a tool for control and social engineering. Feyerabend writes on the preface to the third edition of *Against Method*[18]:

> ""Facts" come from negotiations between different parties and the final product - the published report - is influenced by physical events, dataprocessors, compromises, exhaustion, lack of money national pride and so on."

A paroxysmal portrait of the use of science for societal control was during the second world war when the brightest physicists, mathematicians and chemists of a generation were co-opted to produce instruments of mass annihilation, the results of which need not be mentioned here. But to some extent, through at least some significant parts of modern history, any individual with enough knowledge, drive and inspiration could engage in *science*, even if as hobby. There are several examples throughout history of individuals who made significant contributions to knowledge that were not initially employed as a scientist. This stretches well before *scientific revolution science* and modern history. Almost all civilizations had perfected hunting and/or agricultural tools and several had dominated some form of animal husbandry and crop growing millennia before the *scientific revolution*. The choice of the best design for a spade or an arrow must have been largely a trial-and-error approach, and the diversity of successful designs a matter of the environment, culture, fauna, and likely many other factors, compare for example a boomerang, a bola, a spear and a bow and arrow. To some extent the process of model selection, interpretation of data and drawing conclusions must be inherent to human nature. In this aspect, what has been culturally classified as *science* is nothing more than an expression of human behavior in adapting to the environment and later adapting the environment to their needs. In this light, each person is inherently an agent of science, and should be free to express this inclination they wish to.

Science post *scientific revolution* has increasingly focus on math as an underlying language, at least in the physical sciences, and on empiricism. With the rise of empiricism, the need for data collection and observation to test scientific theories and the need for confirmation must have led to the genesis of modern laboratory setting and the need to *peer-review* as a means of comparing and validating information. On the *peer-review* model, the so called *peers* of fellow scientists who work in each field review, often anonymously, a piece of work and decide if it is publishable or not. Early form of *peer-review* must have taken part in the form of letters between researchers, lectures and presentations in scientific societies and discussion groups. While the opinion and collaboration with fellow researchers can greatly improve the interpretation of a study, the modern anonymous *peer-review* done for for-profit journals by rival groups amounts to nothing more than censorship which serves to perpetuate the power structures discussed on the first section. Often studies are rejected without any justifiable reason, the editors and reviewers

hiding behind the double-blind model. Even worse, it is hard not to think that some editors in for-profit journals do not consider if an article would be "profitable" in terms of citations for a particular journal in the decision process. "Profitable" publications increase the number of citations which in turn increase some artificial metric which brings more submissions, more money, more prestige and more subscriptions and profit from individual articles. Who is to say that some data set is not valid if it was collected meeting all the criteria of "scientific rigor"? Who is to say if an idea if too far out to be published? Where would you draw a line between a manuscript that it is poorly written or from an experiment that is badly designed or conducted from an idea that simple doesn't match the *status quo* or goes against the beliefs of the editors and reviewers? Many scientific fields are small and often members of groups that have conflict of interest with each-other act as reviewers to each-other's papers. In a sports analogy it would be akin to a player for a team anonymously act as an arbiters in a game against a rival team. Yes, it is possible to be objective and impartial, but who is willing to bet with human nature? Is *peer-review* then ultimately just a form of censorship?

Mathematicians and theoretical physicists have long enjoyed a form of freedom from oppression and censorship by using pre-prints platforms such as ArXiv.org. It is a free and open-source service where researchers can freely upload manuscripts. It is common to find pre-prints of books, lecture notes and articles that are later published in *peer-reviewed* scientific journals. Griegori Perelman, known for his proof of the Poincaré conjecture and by his fierce critique of the current academic model [19], including theft of ideas and oppression by larger influential individuals, published his three manuscripts with the proof in ArXiv [20, 21, 22] and all but abandoned mathematics in the process, not bothering to publish his research in academic journals. He is also well known for having refused the Fields Medal and the one million US dollars Millennium Prize. In the case of Perelman there was no need for academic journals, his point was made, the result was there for anyone who is knowledgeable and brave enough to investigate it. ArXiv allows a free exchange of ideas that might not be possible in the *peer-review* system except in rare cases where the fame and influence of the authors allows an almost free pass into academic journals. Unorthodox and controversial ideas are welcome (e.g., [23, 24]). But even these ideas, *if* proven less correct in the long term, can greatly contribute to the discussion and advancement of other ideas that are deemed to be in some more or less subjective "right direction" of understanding natural phenomena. The proposition by [23] has generated an intense discussion and production of counter hypothesis and arguments which served to rapidly improve the understanding of the objects investigated, while [24] discusses an issue that ultimately deals with a philosophical underlying model of reality which has troubled many physicists and philosophers over the last century or so. Would those ideas be allowed to be published by an early career, mostly unknown scientist, in an academic journal? I highly doubt it. Of course, the open access pre-print model has its disadvantages, anyone can submit and it is not uncommon to find manuscripts written by a layperson without any training on the subject being discussed or in scientific writing or even in writing in general. But are there many other downsides compared to commercial publishers? It is free, it has no censorship of ideas and it is accessible to anyone. One could argue that publishing companies deliver an overall better product in terms of content

and editing, but those people should be reminded of the farm production analogy, is it necessary better because it is cleaned and packaged? In the completely open model, the readers can read the manuscript and decide its relevance for their own applications. After all, most researchers already do that for free for large publishing corporations in the name of *peer-review*. So, the first part of the argument is "do we need publishing corporations"? The answer is most likely no, the money invested in paying for publications and access could be better used curating and maintaining open access databases. The second part of the argument is "do we, in general, need to publish so much, all the time?"

When asked in a recent interview about machine learning and neural networks, Noam Chomsky stated[25]:

> "Ask yourself, is there any science which takes random experiments which are carried out for no reason whatsoever and tries to find out something from them? Like if you are, say, a chemistry Ph.D. student, you want to get a thesis, can you say "well I'm just gonna ... mix a lot of things together, no purpose, and maybe I'll find something?", you'll be left out of the department. Science tries find critical experiments, ones that answer some theoretical question, doesn't care about coverage of millions of experiments. "

He was referring to machine learning methods which, roughly speaking, learn or analyze data by looking at an immense number of cases, but fail to underline or identify the underlying principles behind the phenomena being investigated. How is science today any different than this? Each researcher is forced to meet an annual publication quota to have access to promotions and funding. In many cases what is being published is merely repetition and automation over previous themes, there are no new hypothesis being tested, there is no real advance in studying underlying principles, research is done fast, has no time to develop and mature, papers are published and immediately forgotten or cited by the same group to inflate metrics. In engineering, food sciences and agriculture it is common that the same research is merely repeated over different products, plants, foods, animals, using statistical methods to check for differences between treatments without any mention to underlying principles. Such research would be more rightly published as a report and not as a scientific paper, these reports could be published in databases without going to all the bureaucracy and cost of the so-called scientific journals. There is no lack of merit in writing a report, not everything needs to be published as science, and in many aspects. technological and engineering developments serve society more directly than much of what would be called scientific literature.

At one point in history an actual "thesis" proposed by the candidate was needed for a Ph.D. or D.Sc. degree in the few universities that offered such degrees. Now manuscripts, master's and doctor's degrees are produced following an industrial process, with quota of degrees and *peer-reviewed* publications to be met. It is now common that graduate programs have a requirement that the candidate must have publications to be conferred the degree. It is unfathomable that every dissertation, every thesis and every research project renders a meaningful, valid and representative outcome. Experiments fail, understanding and interpreting results is an arduous task and not all have the energy or the ability to do so, especially in the industrial production

line science model. Often, even if the research can be interpreted, no meaningful or valid result can be draw from data. There is no lack of merit in rejecting some hypothesis or proposition, but with today's editorial model of the big corporations, every outcome must be positive and valid. Due to the conflict between the obligation to publish and editorial practices, researchers, especially those at the bottom of the pyramid, are often left with the arduous and nerve-wracking task of transforming garbage into a publication. It is not surprising that people cut corners, fake data, plagiarize results.

It can be argued that today few researchers adopt the rationalistic deductivist approach to science. Many scientists might agree that what is "science" and what "methods" are used in a particular sub-field are, for a greater extent, a cultural phenomena, where some form of consensus, often transient, is achieved until everything needs to be rebuild again, often from scratch, when theories fail to address natural phenomena. Quine writes[26]:

> " The totality of our so-called knowledge or beliefs, from the most casual matters of geography and history to the profoundest laws of atomic physics or even pure mathematics and logic, is a man-made fabric which impinges on experience along the edges. "

Surely, Quine argues that the is much room for adjustments on the edges of the fabric without having to completely readjust the fabric or even, perhaps, throw it all away, since the whole of the fabric is undetermined by experience. But what happens to the fabric if publishing corporation and small powerful groups and interests have the power to decide in which direction the fabric must be pulled? Or even if because of artificial pressures and metrics, researchers are left with no choice but to investigate and publish disposable research that tests nothing and serves for nothing in the long run but to inflate individuals or journal metrics? In this model numbers, and not necessarily quality of ideas, is the guiding principle for the cultural phenomenon which is science. Feyerabend writes[18]:

> "Science must be protected from ideologies; and societies, especially the democratic societies, must be protected from science."

Maybe more than ideology, science must now be protected from corporate and personal interests. Scientific discoveries and technologies can be used to generate resources, income and development, but science should never be used as an excuse to generate profit in an exploitative system that aggregates nothing of value, such as in the current corporate *peer-review* model and should never be used as a numbers game to simple advance careers and gain power over others. Science should and must be protected from predatory publishing corporations and the individuals who profit from this model, be either academicians, administrators or shareholders.

3 Do-it-Yourself Ethics

What we mean by *punk* in the title is a strong individual and communal do-it-yourself (DIY) ethics when it comes to doing and communicating science. In this perspective, science can and should be done by anyone willing to study and understand a given subject, perform experiments,

if applicable, and contribute with well thought out and substantiated opinions. This applies especially to smaller groups and *individuals* in developing countries which might not have access to millions of dollars of grant funding for laboratory equipment, bibliographic sources and computational resources. Science can be done with radically different approaches and ideas, even the unorthodox ones should have the chance to be investigated by the community. Companies whose only job is to organize meetings at hundreds of dollars for registration fees at luxury hotels and resorts or to accept, format and sell "packaged" journal articles should be excluded from the process. Metrics such as the *h-index* and others similar which measure nothing but the number of citations and the companies that profit by transforming individuals in *profiles* should be excluded from the process. The government and grant funding agencies who decided to base funding and promotion in artificial metrics should take responsibility, as they are the ones who triggered the current state of *commodified* science. Instead of falling for the predatory pay to publish - pay for access, alternative open-access models should be sought. Artificial inflation of citations should be prohibited. The process of distribution of grant money should be more democratic and not on a solely by merit basis, based on artificial metrics. Inclusion of smaller groups and *individuals* on the decision process can greatly contribute to a more democratic science. The public, who often pays for everything, should be aware of what is happening to be able to consent or not on the current model of scientific publishing. Most of all, society should have free access to what is being produced, independently of the result, since it is paying for it, independently that if the result is deemed *publishable* or not. Hiding publicly funding research behind a very expensive, digitized pay-wall is a disservice to society.

Publicly funded science should be a *free and open-source* and like on the *foss* software philosophy, any individual with enough talent and energy can contribute. Similar to what happens in the *foss* system, corporations should be able to contribute, via tax deduction or product and technology development, but never as way of exploiting the system solely for profit. Finally, we make clear that we are not against research development in private corporations. Corporations, as private entities can decide if the current model of paying for publishing is a viable economic alternative, although I suspect that little of private research is published in academic journals. We strongly encourage partnership between private companies and public research institutions as long as the researchers can be shielded from private interests. The issue here is against publishing and technology companies that exploit the scientific publishing system.

4 Summary

We discussed the current model of *commodified* science and the dangers of it to society and science. This model can be summarized in five principal characteristics:

1. Inequality and exploitation of undergraduate and graduate students, post-docs, early career scientists and technicians.
2. Assembly line production of publications and degrees.
3. *Profilicitization* as a means of categorization, discrimination, control and oppression.

4. Metrics and productivity devoid of meaning for career advancement and status.
5. For-profit publication and editorial model controlled by larger corporations.
6. Exclusion of *individuals* and small groups of the cultural-scientific process.

Alternatives using the *free and open-source* paradigm of organizing research funding and publishing should be sought to avoid the current model and reduce the power and influence of large corporations. We must rethink the way we do and publish science, not only for the health and security of scientists but for society as a whole and for the future and integrity of *science*.

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