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# Some considerations about reviewing and open-access in scientific publishing

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## Abstract

Scientific research changed profoundly over the last 30 years, in all its aspects. Scientific publishing has changed as well, mainly because of the strong increased number of submitted papers and because of the appearance of Open Access journals and publishers. We propose some reflections on these issues.

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## I. PREFACE

*Paolo Politi*

Scientific research changed profoundly over the last 30 years, in all its aspects: the possibility to collaborate has been facilitated; the number of researchers has increased [1]; computer has gone from being a calculation tool to be a conceptual tool [2]; bibliographic search was possible backward (who is cited in paper  $X$ ?) but extremely difficult forward [3] (who cites paper  $X$ ?); it was necessary going physically to a library to browse journals and it was common to receive and to send postal cards to ask the author a paper copy of their article; once an article was ready several months were necessary to disseminate it [4].

Scientific publishing has changed as well, mainly for two reasons: firstly, the increased number of researchers has produced an increased number of submitted papers without determining an equal increase of the capacity to process such papers; secondly, the appearance of Open Access (OA) journals and publishers [5] on the market. These journals ask authors to pay while keeping free access to the journal content. A third novelty, only apparently a technical one, has played a major role: the introduction of metrics to evaluate researchers ( $h$ -index [6]) and journals (Impact Factor, IF [7]).

It goes without saying that these changes have a strong impact on the work of all researchers but a public discussion around them is lacking. This small collection of short contributions has an obvious purpose but it would like to have a second one. The obvious purpose is to offer some basic information and some considerations because the reader starts to think more deeply about these changes. Hopefully the second purpose might be that other contributions follow and that some proposals emerge to try to direct rather than only undergo changes.

We offer four contributions. The first two concern the editorial and review process of articles submitted for publication and they are written by Satya N. Majumdar (Université Paris-Saclay) and Antonio Politi (University of Aberdeen). SNM has served in the Editorial board of several journals including Physical Review Letters, J. Phys. A: Math. Theo. (JPA), J. of Stat. Mech. (JSTAT), and also J. of Stat. Phys. (JSP). AP is serving as editor of Physical Review E since more than two decades; he has been twice part of the editorial board of J. Phys. A, and once of the European Journal of Physics D.

The last two contributions concern the Open Access process and are written by Stefano

Ruffo (SISSA Trieste) and by the author of this preface (Paolo Politi, CNR Florence). SR is the SISSA Director and the Chair of the Library Commission of CRUI (Conferenza dei Rettori delle Università Italiane). He offers several technical information to understand where we are and where we are going. I am a board member of the Italian Society of Statistical Physics (SIFS) and in my contribution I argue against the “pay to publish” model.

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- [1] According to the Unesco Science Report (Second Revised Edition 2016), “There were 7.8 million full-time equivalent researchers in 2013, representing growth of 21% since 2007”. At this growth rate the number of researchers doubles in twenty years.
- [2] R. Livi, G. Parisi, S. Ruffo, and A. Vulpiani, *Il computer: da abaco veloce a strumento concettuale*, *Il Ponte* **42**, no. 4-5, 41 (1986).
- [3] E. Garfield, “*Science Citation Index*”-A New Dimension in Indexing, *Science* **144**, no. 3619, 649 (1964). Things have not changed much for another twenty years.
- [4] The Open Access repository arXiv was created by Paul Ginsparg on August 1991. P. Ginsparg, *Preprint Dèjà Vu: an FAQ*, arXiv:1706.04188
- [5] It seems to me that the first Open Access journal in physics is *New Journal of Physics*, published by IOP, whose first issue dates May 1999.
- [6] The  $h$ -index (after J. E. Hirsch) is a metric that measures both the productivity and citation impact of the publications of a scientist. The  $h$ -index is defined as the maximum value of  $h$  such that the given author has published  $h$  papers that have each been cited at least  $h$  times. An Italian physicist (Paolo Rossi, University of Pisa) has proposed a provocative extension of  $h$ -index for the evaluation and ranking of medical doctors, as the (maximal) numbers of their patients who survived  $h$  years to the cure. I might propose the same for the evaluation of prosecutors:  $h$ -index is the number of defendants sentenced to at least  $h$  years. You can think to other examples in different domains.
- [7] The Impact Factor of a journal is the yearly average number of citations of articles published in the last two years in that journal. It is provided with three decimal digits while the distribution of citations is very broad.

## II. SOME REFLECTIONS ON THE PUBLICATION/REVIEW/EDITORIAL PROCESS

*Satya N. Majumdar*

### A. Premise

I have been an active researcher in Statistical Physics for the past 30 years. The reflections/thoughts below are based on my experience as an author, a reviewer and also as an Editorial board member of the journals mentioned above.

Let me start with a basic problem that the academic world is facing today concerning the ‘cost of knowledge’. Several private publishing houses with their brand name high profile journals demand enormous article processing charges, in addition to the already large subscription fees paid by the Universities and the research Institutions. I am not talking about non-profit/open-access journals like APS, JSTAT, SciPost that are academically controlled and provide much better models. We scientists do the actual research, also provide mostly free services by reviewing the papers for such journals and these publishing houses make enormous profits out of nothing really. They use the scientists and we let them use us! This is totally absurd and it has to stop! These private companies need to scale down substantially their publication charges, subscription fees and in addition, they need to pay the referees substantially for their services [see my comments later].

### B. Practical problems

Having mentioned this basic problem, let me now turn to some practical problems associated with review process and editorial management.

#### 1. *Too many papers*

I think everyone would agree that one of the major problems we face today is: there are far too many papers these days compared to the number of available referees who are not only competent, but are also willing to devote quality time for a serious review. When the editor contacts a referee, a majority of the referees do not bother to even reply. Some

do, but they are typically busy and decline to review. They suggest some other names, who often reply in a similar way. Finally, some referees do an excellent job with useful and constructive suggestions to improve the paper, but their numbers are very few unfortunately. Quite often, the referee may agree to review but never gets down to the paper till she/he gets few reminders, and finally just a cursory glance (10 minutes typically!) decides the fate of the paper. The outcome is a ‘generic’ report with very little values. It is actually not very difficult for the authors to figure out quite quickly if the referee has read the paper or not. All of us, as authors, have unfortunately faced this situation quite frequently.

### *2. Referee selection process*

In some journals like J. Stat. Mech. or J. Stat. Phys., it is an Editorial board member (typically from the field of the paper) who selects the referees. The outcome is invariably better because the board member is a practicing scientist and usually can decide very quickly who could be the potential and appropriate referees. In contrast, in journals such as PRL, a desk editor (some of them are of course extremely competent) selects the referee (typically from keywords and the available referee data bases). Since the desk editor is not a practicing scientist, even though they may be very competent, there is always the possibility of a judgemental error in selecting the referee. As a result, often the paper lands up with a referee who is hardly interested in the subject, or doesn’t have a good idea of the main issues in the field. Consequently, one often gets a ‘generic’ and rather ‘shallow’ report with comments like ‘good work, but not interesting enough for a broader audience’. Such reports are absolutely useless and some referees latch on to one of those vague criteria like ‘broad importance’ etc. to quickly reject a paper without even trying to read and grasp the content of the paper. Again, I am sure that many of us, as authors, have invariably faced this problem far too often.

### *3. Lack of incentives for referees*

One of the major problems today is that there are not much incentives for a referee to do the review, unless the paper is of direct interest to their own work. Hence the quality of the scientific reviews has really taken a huge plunge compared to, even, 20 years back. In my

opinion, the review process has to undergo some major reforms (see my comment further down).

#### *4. Too many journals competing for higher impact factors*

Unfortunately the scientific community as a whole has become too sensitive to metrics such as impact factors, citations, *h*-indices etc. This is a direct result of big-grant driven research. People want to publish their results in high profile journals as quickly as possible, but often spare little concerns on the quality of the work and the presentation. To improve the impact factor, the journals often encourage reviews (they typically get more citations) or special issues. I remember from my days as a student that we learnt a lot by reading lecture notes, e.g., the Les Houches lecture notes. But these days, very few people bother to write really pedagogical lecture notes, since typically they take time and often may not fetch much citations! So, this is general problem that the whole academic community is facing, and I think one needs serious debates about the quality of scientific papers, and not the quantity or the number of citations it brings. A better (hypothetical) criteria for the quality of a paper should be whether (i) the results will remain valid say, even after 50 years and (ii) whether people will still find the paper useful after 50 years. Most of the papers published today won't satisfy this criteria.

#### *5. Rise of predatory journals*

Each day most of us receive many emails from all types of journals asking us to become a member of its Editorial board or submit a paper. They are extremely annoying to say the least. Most of us ignore such mails, but some take them seriously and these journals survive by those judgemental errors on the part of some researchers. Such predatory journals, causing nothing but pure nuisances, should be aggressively stopped.

### **C. What's the way out?**

It is, of course, not easy to come up with quick remedies to all the issues and problems I mentioned above. Here are some suggestions for the way out of some of these problems.

## *1. Review process*

I think, of all the problems, the most serious one concerning the review process that requires immediate attention is how to provide some incentives for referees to do their job seriously. For a very long time, referees have been doing their work voluntarily. But the time has changed and it requires new initiatives. Personally, I think one simple solution is to provide substantial financial incentives to referees (and not just some token fee). As I mentioned earlier, several private publishing houses are making enormous profits out of publishing our articles. In my opinion, if we want to improve the quality of the refereeing process, the referees should be paid a substantial fee for their services, especially from these profit making journals.

## *2. Journals*

We need to encourage our students and colleagues to publish more in non-profit/open-access journals such as JSTAT, SciPost etc. which are excellent models about how the publication process should be conducted. The academic community has to regain the control of the publication process, and not leave it to private buisnesses. For example, when senior scientists sit in evaluation committees (for promotions, grants etc.), they need to valorise the quality and the content of a paper, and not just the impact factor of the journal where it is published or the number of citations it has received. Again time is an issue: most people want a quick number (like h-index) or the number of Nature/Science/PRL 's to evaluate a person. But if we do not de-brand these journals or the metrics ourselves, we will pay for it dearly in the long run (and are already paying for it!).

I wish to thank E. Trizac for his valuable comments and inputs on this brief article.



### III. WHAT IS HAPPENING TO THE REVIEWING PROCESS OF PUBLICATIONS IN SCIENTIFIC JOURNALS?

*Antonio Politi*

It is not clear to me which problems are specific to the Stat Mech area. I am going to argue in general terms.

#### **A. Premise**

The major problem resides outside the reviewing/publication process: it is the far too large number of preprints continuously produced: it is not possible to judge them in a reasonable way, no matter which method is going to be used. I am deeply convinced that one should seriously address this problem.

The number of submissions has greatly increased because of the appearance on the international arena of India and China. On average, the quality of submissions coming from those areas is low but it has increased: at the moment, it makes the reviewing process very difficult because it is not obvious to recognize immediately poor papers. I cannot say whether the number of submissions per single person has increased in the last years: this happened many years ago with the new automatic technologies, but I suspect that now is almost stationary.

I am definitely convinced that many submissions are of low quality, in a way that it is not obvious how to spot, since I have the simultaneous feeling of the low quality of researchers which are the potential referees: this is a vicious cycle. How large should the referee pool be? Too large means exactly that poor researchers accept poor papers.

#### **B. Issues**

##### *1. Open access*

Bad idea, in so far as the payment is the authors' burden: it discriminates those who obtain valuable results without having been funded. In a normal world, such authors should be rewarded for the low cost of their research! If societies and funding agencies cover upfront

expenses (the so-called diamond open access) the objection dies down. I am aware that the Max Planck Society in many cases cover such expenses upfront. Can one extend this strategy to all countries and disciplines? Very unlikely.

Much more feasible is the idea of pushing for green open access: this is a point where physics, math and a few other disciplines could distinguish themselves from the rest of the scientific world, by introducing a mandatory archival of the accepted version (APS already accepts this policy). Being afraid of changes during the proofreading process is totally idiotic: a serious journal goes back to the referees if relevant changes are spotted.

## *2. Reviewing process*

Is it really necessary to undergo a reviewing process?

This idea is often proposed, but I am afraid that in the current world it clashes dramatically with what is becoming the main motivation to publish: validating the use of funds (fellowship, research project, travel funds, own salary). Can one disentangle publications produced to confirm a fair use of funds from a substantial scientific progress (reducing the number of “checks” ?) positive answer to this question would greatly contribute to solve the problem mentioned in the premise.

## *3. Referees*

The willingness of our fellow colleagues to contribute to the reviewing process is very heterogeneous: some may have good reasons, but every senior scientist should be encouraged to contribute, as part of their duties. Unfortunately, this is not the case and it is difficult to coordinate the activity spread over different journals.

Paying referees is a very bad idea, because of the resulting conflicts of interests.

Recognition of “outstanding referee” does not help much in the long term.

Discount on publication charges (if charges have to be applied at all)?

#### 4. *Publishers*

Journals run by scientific societies (e.g. APS and IOP) were used to provide a good service to the community. My personal experience is that journals run by societies were functioning in a reasonably good way.

In the last years I have witnessed an increasing tendency to compete (especially because of the emergence and growth of private publishers) to maintain and increase the readership.

Altogether, scientific publishers kept aggregating in fewer groups thereby gaining increasing weight (Nature-Springer above all). Simultaneously, journals proliferated and keep doing so under the hope of attracting more papers.

This method works because journal subscriptions are typically arranged in large portfolios, rather than handled separately.

#### **C. Suggestions**

Given the increased concentration of publishers, the only way to react is via societies, which can have enough power to negotiate agreements.

Funding agencies have also a crucial power: can we convince them to contribute, without linking the funds to pre-funded projects?

#### IV. OPEN ACCESS AND THE STRATEGY OF TRANSFORMATIVE AGREEMENTS

*Stefano Ruffo*

At the beginning of the 90's, with the development of the Internet, it became clear that the circulation of scientific information through "preprints" sent by snail mail could cease and that it could take place using the web. The most successful project was that of Paul Ginsparg in Los Alamos (USA) in 1992, which has now become the arXiv of Cornell University. SISSA also launched a project that had a minor impact.

The first electronic journals began to appear in those years, and in 1997 SISSA launched the Journal of High Energy Physics (JHEP), a journal "made by scientists for scientists", which has now become the world's leading journal in the field of high energy physics. The JHEP model was replicated in the following years with journals of similar impact: JCAP, JSTAT, JINST.

It was then important to demonstrate that innovative and competitive journals can be made outside the perimeter of major publishers (Elsevier, Nature, Springer, Wiley, . . .).

It was equally important to identify "business models" that would ensure the long-term sustainability of the journals. It is clear that publishing cannot have a zero cost, the non-eliminable costs are those of the editorial management of the journal and of the "peer review". So the questions that must be asked are: i) what is the "right" cost, ii) who should be remunerated, iii) should the research institution pay to allow reading with a subscription model, "pay to read", or pay to allow the author to publish in open access, "pay to publish".

Publishers can be private, public, semi-public, they can aim for profit if private or for the reinvestment of budget profits if non-profit. In short, the panorama is very wide and varied, it is an "ecosystem" in which new "species" continually appear and become extinct.

In the early 2000's, some "principles" broke into this "ecosystem" with the declarations of Budapest (2002), Bethesda (2003), Berlin (2003). Among these, the principle with the greatest impact is that related to the right "for all" to read at no cost, the so-called "open access". The ethical basis for this principle is the simple fact that, if research is publicly funded, the results must be publicly accessible.

The advantages resulting from the implementation of this principle are also evident:

free access to scientific literature makes the knowledge contained in the scientific literature available to all researchers and facilitates its advancement thanks to the contribution of everybody. In addition, “open access” can allow a more effective knowledge transfer and facilitate industrial innovation. The libertarian ideological element of this principle is also non negligible, it is perhaps what has most moved the minds and the will of its supporters.

On the wings of this principle, a new business model emerged in the 2000’s which envisages that “open access” is supported by the author, through funding from the institution, public or private, for which he works. Subscription costs are completely removed and everyone has free online access to all publications. The most striking success story of this business model was that of PloS ONE, a journal published by the Public Library of Science, founded in 2006. The aim of this initiative was to create “open access” at a cost slightly above production costs, making the profit null or negligible. The hope that this model could guarantee “fair” publication prices, within everyone’s reach, has faded away from year to year.

Meanwhile, the “open access” movement found an ever-increasing number of supporters and began to have, at the beginning of the 2010’s, important institutional support at the European level. In 2012 the “Finch Report” was published in the UK in which a decisive transition to the “open access” publication of the research results was urged through the creation of specific funds. In 2013, the “Science Europe” Association was founded, which brought together many European academies and research institutions in favor of “open access” (for Italy only INFN joined). In those years, the European Commission established that all research financed with European funds should be “open access”.

Since few journals were ready for a transition to “pay to publish”, the phenomenon of the “hybrid” began to emerge: in addition to the subscription costs, the author was also asked for a contribution to make the publication “open access”, the so-called “Article Processing Charge” (APC). This phenomenon, superimposed on the growing cost of journal subscriptions, produced a further increase in publication costs by universities and research institutions, causing the unsustainability of libraries’ budgets, which, unable to bear the costs anymore, began to cut subscriptions.

And the researchers, where did we leave them? Physicists and mathematicians, in the excitement of the early 1990’s over the availability of web resources, have continued, and indeed greatly increased, the deposit of their articles in the arXiv, which has grown in size and reputation. Thanks to much more substantial financial resources (“grants”), researchers

in the field of life sciences have absorbed the increased costs of publication without major problems and have been able to afford the new standards of "open access".

The SISSA journals JHEP and JCAP, after an initial agreement with the Institute of Physics (IOP) and then with Springer, found a way to finance "open access" with the creation of the SCOAP3 Consortium, which involves a network of about three thousand libraries and of CERN. Funds come from CERN and libraries, and the publishers involved are Springer, IOP, Elsevier, Oxford University Press, Hindawi, Jagellonian University with a dozen of journals in the field of high energy physics.

In 2015 an important "White Paper" of the Max Planck Digital Library (MPDL) was published which concludes: "All indications are that the money already invested in the research publishing system is sufficient to enable a transformation that will be sustainable for the future". It is the trigger for the process of the so-called "transformative contracts" between institutions and publishers. The argument is simple: from the data it appears that researchers are paying on average for each paper, within the subscription business model, about 4000 Euros, a high cost for a "good" that has restricted access and usability. In addition, the phenomenon of "double dipping" has spread so much that in order to read a journal we do not only pay the cost of the subscription, but also the APC's. An estimate of how much it would be "fair" to pay for each article published in "open access" is made in the document at about 1500-2000 Euros on average. The Open Access 2020 initiative (OA2020), launched by MPDL, aims at guiding the international process of "transformation" of all subscription based contracts into "open access" in which only APC's are paid, aiming at the average cost per paper mentioned above. It is a "transformative process" whose goal is a "transition" from the "subscription" (S) model to that of "open access" (OA). Ulrich Poeschl, chemist at the Max Planck Institute in Mainz and one of the main promoters of this initiative, sees this process as a "chemical reaction" ( $S \rightarrow OA$ ), in which an "activation energy" is needed which could also lead temporarily to higher costs, but moderately and only in the transformation phase, until the system would settle into the "OA state" which would have lower costs. We are in the midst of this "transformation", which is showing considerable success in the recent months also in Italy, where agreements have been signed with Springer, Wiley, American Chemical Society, Cambridge University Press, Emerald, de Gruyter and negotiations are underway in 2021 with a dozen of other publishers. The Italian model is based on agreements that universities and research centers have made with

the Conference of Italian University Rectors (CRUI) which entrusts to the CRUI itself the conduct of negotiations with publishers. The Group for the Coordination for Access to Electronic Resources (CARE) operates within the CRUI, it is a team that has developed considerable skill in conducting negotiations over the years and which has recently obtained important results.

I was invited to participate in the recent Open Access Summit, organized by OA2020, which was held remotely on 14 December 2020. During the meeting, the most recent data on the “transformative process” were presented. The Max Planck Society now publishes over 80% of its articles in “open access” with 20% of the most important publishers. The  $S \rightarrow OA$  transition is showing a strong acceleration centered in the period 2018-2019 and many countries now cover with “transformative contracts” from 30% to 50% of publications: Sweden, The Netherlands, Norway, Hungary, Austria, Finland, Switzerland, Germany, UK, Ireland. Italy is just at the beginning of this process. The OA2020 consortium looks forward to the “XV Berlin Open Access Conference” which will be held before the summer.

## V. AGAINST THE “PAY TO PUBLISH” MODEL

*Paolo Politi*

Two justifications are given to drop out the “pay to read” model in favour of the “pay to publish”: (i) The results of publicly funded research must be immediately available and free of charge to the taxpayer who funded that research; (ii) Subscription prices have risen much more than average inflation (and the bulk of the work is provided by the academic community, which is unpaid). The first consideration is welcome and the second one is true but both should be considered more carefully.

First of all, since the vast majority of researchers are public employees, certain obligations should exist regardless of specific funding and I don’t dare to think what would happen by putting together researchers from different countries, with different funding and different rules, in the same article. Furthermore, should public funding for research really require *universal and immediate access to results*? Since “results” are not just publications, should researchers make public the raw results of experiments or simulations? And what about the writing of monographs and textbooks? Should they also pass to a “pay to publish” model? This is not a specious question if you think that in Humanities the writing of monographs is the standard way to disseminate results and move up the career ladder. I think we should consider that different disciplines have different ways to disseminate results and that public repositories are the way to make results public, not Open Access (OA) journals (see below).

The second consideration about subscription prices is certainly true but publishers offering OA journals either are the same publishers whose subscription costs have increased or they are new predatory publishers. It is obvious that the problem of unsustainable subscription costs must be faced and that it is necessary to face publishers at the supranational level. It is also necessary to encourage the creation of new journals.

I see various reasons to be against the “pay to publish” strategy.

- The quality of many OA journals is unacceptably low and there has been an explosion of scam/junk journals that are polluting scientific publishing and are stalking the community. In some cases, with “pay per publish” and “pay per give a talk” you can buy your CV.
- If the researcher pays to publish a pernicious short circuit is created between the



authors and the journal, which have the same goal: that the article is published. When journals circulated only in paper there were “physical” limits to the number of articles acceptable and publishable in a single issue, now this is no longer true. The magazine must not have an interest in maximizing the number of published articles and the author must not be able to think that a good place to publish the paper will be found anyway because (s)he has the money.

- A practical example of this unhealthy relationship: the OA journal (even a “serious” one) invites someone to be guest editor of a special issue on a certain topic, asserting the recipient would be the most suitable person and for this job the publisher offers the guest editor to publish for free. In practice this happens because the guest editor assures the journal a certain number of contributors who will pay instead! And if the guest editor is good enough to convince a few authors (s)he will even get a free hard copy of the special issue. But I’m sure, as we are at the livestock market, the guest editor can negotiate better terms and obtain discounted fees or green cards to invite someone to publish for free.

Supporters of “open access” state that publishing on such journals (gold OA) is not mandatory because authors can use OA archives (green OA) if funding requires research results are made public. But the choice between OA and not OA journals is less and less an equal choice because Impact Factor (IF) plays a major role and IF of an OA journal is typically higher. The consequence would be that only people without money would use green OA and this would create a split in the scientific community (between different countries, between different research domains, between different research groups).

The IF inevitably leads to discuss the relation between publishing and research funding, because the latter is more and more based on pre-funded projects. If we want to get rid of the IF (do we?) it is necessary that the evaluator does not use it. Switching to OA journals will reinforce the importance of metrics, because they introduce the “dollar” factor: the higher the IF of a magazine, the more it can afford to charge publication costs. The higher these are, the smaller the circle of those who can try to publish in a high IF magazine. (Some journals charge authors just to start the editorial process.)

It is unrealistic to think that the majority of researchers affiliate to organizations that will be able to sign transformative agreements with Publishers (see Sec. IV by SR) and it is

unrealistic to think that researchers can afford to regularly pay to publish in OA journals. Therefore, OA journals will lead (are already leading) to a split in the scientific community, with a class A and a class B community: in the former class there is money to publish, there are high IF publications and there is access to funding; in the second class nothing or almost nothing of all this.

The well founded requests to make public the results of public research and to counteract the soaring prices of subscriptions could be met with public repositories, with collective agreements with publishers, and with the birth of new journals, always keeping in mind that different communities of scholars may have different ways to disseminate their results. The guarantee of green Open Access while a part of the scientific community moves towards the gold Open Access would not be the right solution.