Artículos

Scientific publications: Communication or business?[1]

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Abstract: Six major publishers, five of them private for-profit, control 50% of the world's indexed scientific publications, with overall profit margins of almost 40%. These large publishing companies impose criteria, rules of the game and self-determined values, such as the impact factor, to increase their business. These parameters are often used by scientific institutions as quality criteria and have a negative influence on the evaluation policies of this activity and on the orientation and development of the projects carried out, especially in peripheral countries such as ours. They also undermine the free circulation of scientific information. Given this situation, why does the scientific community maintain a system that profits from the knowledge and work of scientists without an obvious contribution to society? This article presents an overview of this problem and proposes possible alternatives to address the changes that this situation requires.

Keywords: scientific publications, scientific evaluation, open access.

Privatisation and concentration of scientific journal publishing

Since the creation of scientific journals, 350 years ago, private for-profit publishers have increased their influence in the scientific system. The proportion of scientific output published in journals from these publishers has increased steadily over the last forty years, and even more so since the advent of digital technologies. This advance of the publishing market not only represents a business with high profit margins, but also positions large publishers as major players in the definition of science system policies.

In 2015, a group of researchers from the Universities of Quebec and Montreal in Canada produced a study analysing this problem, which was widely disseminated. The study was published in the open access journal *PlosOne* and disseminated by specialised websites such as *Sciencealert.com* (Larivière, Haustein & Mongeon, 2015). Based on 45 million scientific articles indexed in the Web of Science (WoS) and published during the period 1973 - 2013, the authors showed that, since the 1970s, the world's six largest publishers of research papers have taken control of the publication of academic articles in various branches of science. These publishers are *American Chemical Society* (ACS), R*eed-Elsevier, Springer, Wiley-Blackwell, Taylor & Francis*, and *Sage*. Out of the six, five are private companies, except for ACS, which is owned by a non-profit scientific association. In 1973, these large publishers controlled barely 20% of publications. In 1996, with

the advent of the digital age, they reached 30%. And they continued to increase their share to the point that, by 2013, they absorbed more than 50% of the scientific publications indexed in WoS.[2]

On the other hand, and more recently, a report by the Canadian Association of Research Libraries showed how publishers unilaterally impose and increase subscription prices (Shearer, 2018). In that country, increases of between 5% and 7% per year were recorded between 2011 and 2015, accumulating to around 25% in four years (in that period inflation barely reached 2% per year). It is noteworthy that, while this was happening, the top five publishers achieved overall profit margins in the order of 29% to 39%.

The Canadian report points to two other aspects that are not so well known, but which also affect institutions' negotiations with publishers:

The first model is the assembly of thematic collections of journals by publishers that are offered as closed packages - something known as a "big deal" - to which one has to subscribe fully. In this model, the provider offers a package of journals in a given subject or discipline at a single price that is set on the basis of the size of the institution, its number of students and researchers, its scientific output and other criteria. The institution cannot choose which journals to subscribe to within the package, which generally does not include all journals in the discipline, but only those managed by the publisher in question. At the same time, the package includes many little-known titles that the institution would probably not buy if it had a choice, but whose removal does not lower the total price. This form of marketing imposed by the suppliers allowed them to consolidate their position in the market and to direct the institutions' money towards their exclusive products, preventing the institutions from diversifying their investments. In this way, they unilaterally increase both the size and the cost of the packages, leaving the institutions prey to this business model. The other aspect pointed out in the Canadian report is the lack of transparency in the subscription contracting process, as providers impose confidentiality clauses that prevent disclosure of the agreements reached, making it very difficult to compare prices and conditions of each contract across countries and institutions.

In turn, our country is no stranger to this situation. The Ministry of Science, Technology and Productive Innovation (MinCyT) is in charge of negotiating access to publications with international suppliers through the Electronic Library of Science and Technology programme. This is a centralised portal from which authorised institutions access scientific publications. According to information published on this portal, in 2016 the cost of the subscriptions made was almost 22 million dollars, allowing access to 13,275 journal titles, which also includes access to reference bases and other types of electronic resources. Access to these journals made it possible for Argentine researchers to consult and download 2,829,415 articles in 2017, which represents a cost of almost eight dollars per article. On the other hand, in the period 2008-2016, the cost of these subscriptions increased from 11 to 22 million dollars without a significant increase in the number of titles available, and the final figures for the negotiation of subsequent years are not yet known.

While it is true that historically publishers played a central role in the dissemination of scientific knowledge, in the digital era the facilities offered by the multiple resources available today allow us to question the traditional role they continue to play. Even more so considering that almost all scientific journals are based on a peer review system, which uses the researchers themselves, without payment, to carry out this task. In other words, the quality control of what is published is not a value added centrally by the publishers, but by the scientific community itself, which does it for free. On the other hand, digital publishing and webcasting have drastically reduced production costs (printing, distribution), which are now limited to the layout of manuscripts (often also by the authors), the administration of referees and the maintenance of digital publishing platforms and services, among others. These are real costs that exist, but in no way justify the price increases. This growing mismatch between costs and prices is undoubtedly one of the reasons why these large publishers have huge profit margins (profitability which is highlighted by Larivière, Haustein & Mongeon, 2015).

Private databases as a reinforcement of the concentrated publishing system

Analysing the complete picture of scientific publications is complex, because it is difficult to obtain the data, precisely because the databases that record them are either paid for and not accessible, or they are included in the publishers' publicity brochures and there is no way of checking their veracity. However, an approximate picture can be obtained on the basis of the following data.[3]

- The SCOPUS database, owned by Elsevier and created in 2004, states that there would be between 80,000 and 300,000 scientific journals worldwide, of which as of August 2017 they had included 21,950 in their database. To be in Scopus, the journal must be peer reviewed, have an ISSN (international standardised number) and be a regular publication, "*relevant and readable for an international audience*"[4] (the alphabet must be Roman alphabet and at least the titles and abstract must be in English). They must also contain a statement of publication ethics and malpractice.
- The Web of Science (WoS) database, currently owned by Clarivate Analytics, considered the traditional and exclusive source of "authoritative" information that records "*the best scientific publications in the world*", reports in its Faetbook that it includes around 20,000 journals in its select Web of Science Core Collection (Science Citation Index, Social Science Citation Index, Arts and Humanities Index and Emerging Sources Citation Index). In this case, and because it is a citation index, it only includes journals that have been cited before by others that are already in the WoS, and also requires that the journal meets certain editorial standards: peer review, format, regularity, international conventions, English language (minimum for bibliographic information), that its content is scientific, and that its focus is international, and to a lesser extent, regional.

Obviously, if around 300,000 scientific journals are published in the world[5], both Scopus and WoS register less than 10% of the total, and it is on this basis that they calculate their famous bibliometric indicators, which we will discuss later. A quick look at the inclusion requirements of both databases reveals the selectivity imposed on the basis of criteria that clearly benefit the journals of the dominant publishers mentioned in the previous section. In the case of Argentina, for example, we find that around 740 scientific journals are published. According to the Latindex[6] catalogue, these journals meet the basic standards of editorial quality. However, in 2015 only 21 and 54 of these journals were indexed in WoS and Scopus respectively (Rozemblum & Banzato, 2015), which highlights the low coverage that these databases provide for national journals, mostly published by public organizations and scientific societies.[7]

The impact factor and its influence on scientific evaluation

The large publishers that control the scientific publications market impose criteria, rules of the game and values determined by themselves to increase their business. These values and criteria are endorsed by an important part of the scientific community and are often used by institutions as quality parameters. One of them is the so-called *impact factor of a journal*.[8]

This index, created forty years ago to measure the impact of journals and help libraries in choosing titles to buy, began to be used as a measure of the quality of published articles, and later to evaluate the activity of researchers and their performance. In this way, an essential aspect of scientific activity -such as communication and evaluation- became trapped in the logic of a publishing system managed mostly by commercial companies. This begs the question: Why does the scientific community maintain a system that profits from the knowledge and work of scientists without an obvious contribution to society? What is it that publishers offer that is so essential to the scientific community to the point that scientists do not question its

power and dedicate an increasing proportion of their budget to this end? What do we need these companies for?

A brief diagnosis of the situation allows us to recognize various factors that contribute to this situation, but the most relevant ones are:

- Young researchers are pressured to publish in prestigious journals to advance their academic careers, while older researchers have to do the same in order to maintain their grants and prestige. In this environment, publishing in high-impact journals such as those published by large publishers is what counts.

  The use of bibliometric indicators as the sole criterion for evaluating individual researchers and for grants and projects has a negative effect on the quality of the evaluation and strengthens the role of publishers and the policies they implement. The "*paperism*" or count of the number of scientific articles indexed by large databases, which is used in evaluations, mainly takes into account journals published by large commercial publishers. This creates a strong incentive for researchers to publish in these journals, and therefore reinforces the power and control of private publishers in the dynamics of scientific communication.

In summary, as long as publication in high impact factor journals is a requirement for researchers to obtain positions, research funding and peer recognition, the main commercial publishers will maintain their position of power in the academic publishing system.

It is clear that it is up to the scientific community to become aware that the profit and business of publishing must be questioned and changed, not only because it threatens the free circulation of scientific information, but also because of its negative influence on evaluation policies of scientific activity and on the orientation and development of projects that are carried out, especially in peripheral countries such as ours.

In fact, there are already answers worldwide in this regard. One of them is the so-called *San Francisco Declaration on Research Assessment* (DORA, 2012), originally initiated by the *American Society for Cell Biology* (ASCB) together with a group of scientific journal editors. This movement, together with the so-called Leyden Manifesto (Hicks et al., 2015), raise the need to review the use of "counting" parameters such as journal impact factor and others for the evaluation of projects, grants and for individual promotions and evaluations of researchers. Both the Leyden Manifesto and DORA offer a series of recommendations to researchers and institutions to take into account when evaluating. The Leyden Manifesto also proposes ten basic principles that should guide scientific evaluation. These include the need to complement the quantitative with evaluative judgements by experts; to take into consideration the goals and local relevance of research; the transparency of evaluation processes by encouraging them to be open and simple, allowing for data verification; and the importance of considering and respecting differences between fields and disciplines.

Another resonant movement has been the *Cost of Knowledge* campaign, launched in 2012 at Cambridge University to protest against the business model of the publisher Elsevier, which proposes to stop participating as authors, editors and reviewers of the publisher's journals.[9] Several university libraries, including those at large and renowned universities such as California and Harvard, threatened to boycott major for-profit publishers. Other universities, such as Konstanz University in Germany, simply cancelled all subscriptions.

Closer to our context, debates are emerging about the usefulness, use and interpretation of university rankings. This is one of the areas where the type of evaluation variables used has been strongly questioned, denouncing the dimensions not contemplated in them. It has also been pointed out that the enormous regional differences call into question the global application of these indicators and rankings (see, for example, the special issue of the Ibero-American Journal of Science, Technology and Society - CTS; Vol 13, No 37, 2018). Another initiative to highlight has been the work of the Interinstitutional Commission for the Development of Evaluation Criteria for the Humanities and Social Sciences (CIECEHCS), in which a

group of researchers prepared a document between 2012 and 2013 that proposes to discuss the characteristics of research in the Humanities and Social Sciences and its evaluation criteria.[10]

Finally, we can mention recent statements by organizations such as the Latin American Council of Social Sciences (CLACSO) that reinforce the concept of open access to scientific knowledge as a right and its management as a common good, and recommend, among other things, *"to value, when evaluating researchers and their institutions, the indicators provided by repositories, platforms and open access publications, as well as other variables of impact and relevance in local and regional contexts, to complement the traditional international bibliometric indicators that so poorly reflect the production and impact of the production of developing countries "* (CLACSO, 2015).

The open access movement as a reaction and proposal

The open access movement (or open access, as it is commonly called) emerged in 2002 as a reaction to this problem by researchers, publishers, librarians, teachers, students and others members of the scientific community around the world, and proposed free and open access to scientific literature on the Internet.

To achieve this goal, two complementary ways were proposed: firstly, that authors continue to publish their work in the journals of their choice but at the same time self-archive a copy in digital repositories that provide open access to their content. This way was called the *green way*. On the other hand, as a second instance, it was proposed that authors choose to publish their work in journals that do not charge for access to their content, i.e., open access journals. This way was called the *golden way*.

Argentina chose to develop the *green way* of open access by creating in 2011 the National System of Digital Repositories in Science and Technology (SNRD), which arose from a public policy of open access developed since 2009. In addition, a bill was drafted for the "Creation of Open Access Institutional Digital Repositories, Own or Shared" that was approved in 2013. This law, n°. 26,899, established the obligation for institutions that receive funding from the National State to create free and open access digital repositories in which it will be mandatory to deposit the national scientific technological production carried out by researchers and staff working in dependencies. of the State, within a period not exceeding six months from the date of publication. It was also established the obligation to deposit the primary data[11] that gave rise to these publications within a period of no more than five years. The Ministry of Science, Technology and Productive Innovation (MinCyT) is the body that enforces and controls compliance with the law, which was regulated at the end of 2016. Although it is still too early to assess the degree of compliance with this regulation, today there are 42 repositories adhered to the SNRD, of which 25 have already been integrated into its Portal and allow access to more than 120,000 digital objects of Argentinean scientific production available in open access (Fushimi, 2016).

On the other hand, the *golden way* requires for its success the existence and consolidation of open access journals in all scientific disciplines. Although this is currently the case, this does not guarantee that authors choose these journals to disseminate their work. As already mentioned, the journals considered to be the most prestigious in each discipline -which are the ones most often chosen for publication- are those run by the most powerful commercial publishers at a global level, and these are clearly not open access. On the other hand, let us point out that open access journals may be subsidized by foundations or scientific societies, or be financed by charging a publication fee called APC (article processing charges) that is paid by the author or the funding institution. This was seen by the private publishing sector as a business possibility. Thus, and facing the advance of the open access movement, commercial publishers gradually began to offer "hybrid journals". That is, journals that are closed but offer to "release" an article if the author pays the APC. In this way, some journals from the big publishers began to charge between 1,000 and 3,000 dollars per article, obtaining even more profits than they already had.

This policy was strongly challenged by the initial promoters of the open access movement, who believe that the real golden way implies that neither the author nor the reader has to pay. And it is also another example of how the large publishers appropriated an initiative that was originally conceived as a way to democratize and expand the dissemination and access to publications. In this modality there are institutions that come to pay three times for the same: to the researcher to investigate and generate an article, to the publishing companies for publishing that open article in a closed journal, and to companies themselves to be able to subscribe to the journal.

Proposals

As we can see, there is a widespread debate on scientific publications and their influence on scientific evaluation. From the Cátedra Libre de CPS we contribute our point of view and complement this with the following proposals:

1. Initiate a campaign to prioritize publication in non-profit and open access journals.[12] Particularly, those of academic associations and public organizations. In almost all disciplines, there is a significant number of very good quality journals that are edited by scientific societies from various countries.
2. Publicize the situation for which the State pays three times for the same (to the researcher to investigate, to the publishing companies to publish and to the publishing companies to be able to access the publications) and promote changes for a better use of the public funds.
3. Propose that in the instances of evaluation of researchers, subsidies and projects, the publications in journals of scientific associations and open access journals should be ranked, granting them some kind of additional consideration.[13] Publications in journals of scientific associations are not only a way to confront the profit and business of publishers, they also strengthen the associations themselves and can be a way to the creation of quality national or Latin American journals.
4. Value national and regional journals through a national system for categorizing scientific journals, based on their own explicit criteria and based on the combination of formal aspects (editorial quality criteria) and the judgment of experts.
5. Promote the so-called green way of open access to publications to ensure that research results are available to all. To this end, disseminate and deepen the application of Law 26,899 by creating free and open access digital repositories and encouraging researchers and staff working in State agencies to deposit in them the national scientific-technological production they carry out with public funds
6. In the evaluation processes of projects, subsidies and for individual promotions and evaluations of researchers, encourage the use of qualitative criteria that complement quantitative aspects. And not only "counting" parameters to establish the quality of the articles (such as the impact factor of journals, number of papers, etc.). In this sense, we invite you to adhere to and support the DORA Declaration on the subject.
7. Promote the use of public and explicit criteria to evaluate scientific productivity, clearly highlighting, especially for researchers / It is in the initial phase that the scientific content and the national / regional relevance of an article is more important than the publication metrics or the profile of the journal in which it was published.

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Notes

1 This article is a translation of the original version in Spanish into English by Rocío Montes and Betsabe Borya. Also, the original version is a corrected, updated and augmented version of an earlier work of the Cátedra libre CPS that was initially written and disseminated in 2015. It has been included in the UNLP institutional repository of since 2017. See record available at: http://sedici.unlp.edu.ar/handle/10915/62196 [Accessed 12/06/18].

2 The aforementioned work shows that the social sciences have the highest level of concentration, with 70% of published works being absorbed by the five main private publishers. The humanities have remained relatively independent (the five major publishers account for only 20%) and the natural and medical sciences are in the middle, mainly due to the strength of their scientific societies, such as the aforementioned American Chemical Society (ACS) in chemistry or the American Physics Society (APS) in physics. Beyond the presence of powerful scientific societies in the natural and exact sciences, it would be important to undertake research work that seeks to explain why these different proportions of privatisation and publishing concentration by area of knowledge occur.

3 The data recorded were consulted on 2-6-2018. The sources used are: Scopus Content Coverage Guide April 2017, and Clarivate Analytics Factbook.

4 Sentences in quotation marks are quotes taken from the companies' promotional brochures.

5 We took this generic value as a proxy indicator taking into account that Ulrich's database, considered the most complete, authoritative and comprehensive bibliographic source of the serials universe, records 383,000 journals from 977 disciplines and 200 languages, and includes academic and scientific journals, business and trade journals, international agency journals, newspapers and magazines, irregular circulation journals and others.

6 Latindex is an information system on scientific research, technical-professional, scientific and cultural journals published in Latin America, the Caribbean, Spain and Portugal. It is managed by the Universidad Nacional Autónoma de México (UNAM) with the collaboration of national centres in each country that provide the information. Latindex currently registers 26,010 journals in total, of which 9,035 are included in its Catalogue, which brings together those that meet recognised editorial quality standards. [Accessed on: 2-6-2018]

7 Naturally, detailed research work would be necessary in order to prove aspects that are only illustratively outlined here. For example, analysing which national and regional journals are indexed, which scientific disciplines they belong to, what situation other catalogues in the region present (SciELO, Redalyc, etc.), what trends are foreseen in the medium term, etc.

8 The impact factor is calculated as follows: the number of citations in a year of scientific papers published in the previous two years, divided by the total number of papers published by that journal in the same period. For a detailed history and discussion of this index, see: Lariviere & Sugimoto (2018).

9 For more information on this campaign, see http://thecostofknowledge.com/ (12/05/18).

10 The document can be consulted at: https://ciecehcs.wordpress.com/documento/ [consultation 17/6/2018]

11 Primary data is understood as "all raw data on which any research is based and which may or may not be published when a scientific advance is communicated but which are the basis for new knowledge". (Law 26,899, art.3).

12 There is a Directory of Open Access Journals (DOAJ), which registers 11,566 titles from all over the world and from all disciplines, where it is possible to find reliable information on existing open access journals, their subjects, publishers, licences and other data. See: https://doaj.org/ [Consultation date: 12/06/2018]

13 In other words, the fact of publishing in a journal that allows free access to its contents is seen as something positive. In addition to the considerations made throughout this paper, we believe that open access provides greater possibilities for dissemination and outreach to a wider audience, which, in some cases, may go beyond the purely academic and scientific sphere.