Research publishing for the nonexpert

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Since the first scholarly journals were started in 1665, there has never been a time when all was right with academic publishing. However over the last several decades, many changes have occurred, and the stresses and contradictions in the system have become starkly apparent. Economic issues are key: the journal market currently involves

- non-substitutable goods (papers, journals);

- oligopoly (by large publishers such as Elsevier);

- anticompetitive bundling ("Big Deal" subscription packages);

- excessive rents (profit margins higher than Apple);

- privatization of public property (who pays those who write the papers and do the refereeing and editing?);

- unsustainable price increases (the "serials crisis");

- perverse incentives (e.g. Other People's Money being spent).

I recommend that nonexperts first read the Guardian article by Stephen Buranyi [Bur17] in order to better understand how the scholarly publication system evolved to the mess it is today. There are many actors in the system, including authors, referees, editors, readers, administrators, publishers, libraries, learned societies, research funders; they all have different incentives, and this makes change tricky. My overall opinion is that it is impossible to achieve a properly functioning market for scholarly publishing, and that a public good model is more appropriate.

1 Publishing models

The traditional model from the print world of last century is *subscription*, as used by newspapers and magazines. Another widely used name is *paywall*. This model has been used by all kinds of journal publishers. *Open access* refers to the model of articles being free to read for everyone (having an internet connection). There are various types of Open Access (OA):

- *green OA* refers to self-archiving by authors, possibly with help from university repositories;

- *gold OA* refers to journal publications.

Funders are strongly in favour of OA, since they want the research they pay for to be disseminated as widely as possible. There is substantial evidence that the obvious guess, namely that open access articles are cited more than subscription articles, is correct. It is hard to find anyone opposed to open access *per se*: arguments typically centre around how urgent it is, whether it can be paid for, and concerns about potential bad behaviour by publishers.

Green OA has drawbacks: it typically does not involve the "version of record", but an earlier version of the article; it is dependent on publisher goodwill. It often does not come with rights to reuse, redistribute and in some cases adapt material (such as granted, for example, by Creative Commons licences).

Gold OA usually involves clear reader rights specified by a CC licence, and comes in two main flavours. Costs of publication must be paid somehow. One model is *author-pay* whereby an APC (Article Processing Charge) is levied at time of publication. The author must either pay directly, have rich friends (e.g. their university, research grant funder) pay, or beg for a waiver (usually granted only if the author's country is considered sufficiently poor). The APC model is currently very popular with established commercial publishers and with scam artists (these sets are not necessarily disjoint). It is very unpopular with authors and with institutions that are not well-funded (that is, most of them).

No-fee ("diamond" or "platinum" OA) journals outnumber APC journals, but are typically smaller, and run by academic volunteer labour, often with a little IT support from their institutions. Other business models exist (e.g freemium) but are relatively little used.

Examples of mathematical journals:

- Annals of Mathematics: subscription, owned by Princeton University.

- Antarctica Journal of Mathematics: pay to read AND to submit; an obvious and complete scam run from India

- Journal of Algebra: subscription, owned by Elsevier

- Bulletin of the London Mathematical Society: subscription, published by Wiley, owned by London Math Society

- Forum of Mathematics Pi, author-pay OA, owned by Cambridge University Press

- Electronic Journal of Combinatorics: no-fee OA (explicit reuse licence), informal ownership by the editors

- New Zealand Journal of Mathematics: no-fee OA (no licence), owned by NZMS and University of Auckland

- Advances in Combinatorics: no fee OA (explicit reuse licence), owned by Alliance of Diamond Open Access Journals (run by Timothy Gowers), supported by Queen''s University Library. An *arXiv overlay journal* (all papers are submitted via arXiv and the final published versions are also hosted there).

To formalize the intuition of "community-controlled free journals" I was involved in formulating the "Fair Open Access Principles":

- The journal has a transparent ownership structure, and is controlled by and responsive to the scholarly community.

- Authors of articles in the journal retain copyright.

- All articles are published open access and an explicit open access licence is used.

- Submission and publication is not conditional in any way on the payment of a fee from the author or its employing institution, or on membership of an institution or society.

- Any fees paid on behalf of the journal to publishers are low, transparent, and in proportion to the work carried out.

These are core principles for organizations such as Free Journal Network and MathOA. Of the journals listed above, Elec. J. Comb. and Adv. Comb. satisfy these, although the ownership could be clarified; NZJM only fails the licence condition and I hope to rectify that by 2020.

2   Other important issues

Apart from access to research articles, there are many areas where the current system needs improvement. These include:

- correctness and reproducibility of published research (e.g. open access to raw research data, adequate pre-publication refereeing);

- transparency and fairness of the refereeing and editorial process (e.g. how conflicts of interest are dealt with);

- ability to innovate (e.g. papers in XML format for mobile device viewing, postpublication review, data mining of publications).

Despite the claims of large for-profit publishers, their performance in these areas has been mediocre. This is hardly surprising given the lack of competition they have faced. For example, commercial publishers often outsource copyediting and typesetting, and the quality of the LaTeX produced is rather often worse than that supplied by the author!

3 Current developments

Plan S was launched in 2018 by a coalition of European research funders, and aims to accelerate the large-scale conversion to open access by mandating that "all scholarly publications on the results from research funded by public or private grants provided by national, regional and international research councils and funding bodies, must be published in Open Access Journals, on Open Access Platforms, or made immediately available through Open Access Repositories without embargo". So-called *transformative agreements* are encouraged by Plan S, and several have already been signed. They often have the name "read and publish" or "publish and read", and involve a large fee being paid by an institution to a publisher to allow all authors from that institution to publish gold OA. Commercial publishers have attempted to double-dip by forming hybrid journals, whereby they receive APCs *and* subscription payments, but Plan S forbids these.

Many observers, including me, believe that such deals will only entrench the power of the large commercial publishers and that the payments agreed to so far are too high. Such agreements are particularly troublesome for learned societies used to relying on large subscription income to cross-subsidize their other activities (the NZMS does not do this).

4 The way forward?

It seems obvious that given the amount of money spent worldwide on subscriptions (estimated at US$5000 per paper), it is desirable to move to a system whereby libraries and research funders reallocate subscription money to pay production costs of OA journals directly. This has in fact been tried in some cases, including SCOAP3 in physics and the Open Library of Humanities. Costs of production are less than $1000 and mostly less than $100 per paper; although SCOAP3 overpays substantially, it is still better than the old subscription system.

I believe that cost controls and price transparency with commercial publishers are so weak that the current ownership situation cannot lead to the outcomes we want and need as a research community, and only journals run according to the Fair OA Principles are acceptable. Publishers may still have a role in providing services even in the 21st century, but the journal brand, built up over decades by authors, editors and referees (and very little by publishers) should be owned by the research community. Many of the older scholar-run OA journals (dating back to the 1990s) have uncertain ownership status and it is best to clarify this legally. Many newly founded Fair OA journals (such as Quantum, my standard example of best practice in almost every area) are owned by legally constituted nonprofit organizations. Of course, doing everything properly requires some time and money, which is why I write $100 and not $0 above comes from, but this amount of money is easily covered for many such journals by a fraction of a single library's current subscription spending. It is then fairly clear where we are now, and where we want to be: how to get there rapidly and efficiently is currently a hotly debated issue.

5 What you can and ought to do

Improving the current situation is not easy, given the multiplicity of agents and incentives in the global publication system. However, we can all do something. Waiting for others to solve the problem is unlikely to work well.

- As an author, submit to journals that are free to read, ideally those following the Fair Open Access Principles, or failing that, journals that are reasonably priced and owned by scholarly societies. It can be difficult to determine ownership status. Post your paper on an established preprint server (e.g. arXiv.org) just before journal submission, and update it with the latest version you legally can once accepted (don't duplicate work by putting papers on your own website unless you really want to). Prefer to submit to journals not owned by by Elsevier, Springer, Wiley or Taylor & Francis. Don't sign away your copyright to a publisher, or if you must, revise the copyright form to ensure that you have the right to post publicly the accepted version of the manuscript (and then do it!). Consider signing various open statements, petitions and boycotts aimed at steering the system toward community-owned journals run according to Fair Open Access Principles.

- As a referee, refuse to donate your free labour to "bad" journals. There are plenty of better ones you can work for. Many of us are overworked with refereeing in any case. Politely make it the editor's problem for supporting that journal. Some templates for refusal letters are linked below.

- As an editor, talk to your fellow editorial board members about jumping ship (as done recently by *Algebraic Combinatorics*). Contact MathOA for legal and practical advice and other support. Don't sign a contract from the publisher without reading it or getting advice from MathOA. Realize that a few thousand dollars a year

may be nice, but think where that money is coming from: market power exercised against underfunded public institutions of higher learning.

- As an administrator, sign DORA and actually implement it in your institution. Do not allow important personnel decisions to be made based only on where papers are published, thereby outsourcing academic judgment; insist that evaluation committees actually read papers. Follow the University of Liège and Italy's Ministry for Public Education in requiring all publications considered for internal promotions and performance reviews to be open access.

- As a decision-maker in a library, allocate increasing fractions of your budget and staff time toward supporting the global OA infrastructure. Contact organizations such as Free Journal Network to see how you can help. Join Subscribe to Open. Join University of California and others in cancelling Big Deal subscription bundles. Resist the temptation to sign big multi-year "Publish and Read" deals. Raise these issues clearly with your library consortia.

- As an officer of a learned society, ensure that you use only publishers that are efficient and provide good quality service (almost always this means not the large ones). Contact your library subscribers and ask them to "Subscribe to Open". Realize that money you receive from journal subscriptions via a large commercial publisher is mostly subsidized by non-members and the research is locked away from the public; ask your self whether that is really consistent with the whole point of your society (spoiler: it isn't). Consult the site "Transitioning Society Publications to OA" to investigate converting your journal to a no-fee OA model.

- As a research funder, mandate that all work produced with your funding be immediately open access on publication. Consider signing up to Plan S but be wary of the pull toward the APC model. Try to support no-free OA journals directly.

- As a reader, every time you come to an unnecessary paywall, let the author know about it with a quick email. Use Unpaywall browser extension to locate free versions (52% of papers are legally available online for free, apparently). Use SciHub or other sites of questionable legality if and only if the paper is important. If the paper is not that important and can't be easily read, treat it as if it doesn't exist!

- As a citizen, let your politicians know that this issue is important. Many countries have Open Government and Open Data policies for government. Pursue an extension of this to cover all research outputs from publicly funded institutions, at least.

6 Tools and further resources

- Authors:
  - Free Journal Network `https://freejournals.org`
  - Directory of Open Access Journals: `https://doaj.org/`
  - Publisher copyright and self-archiving policies: `http://sherpa.ac.uk/romeo/index.php`
  - SPARC copyright addendum: `https://sparcopen.org/our-work/author-rights/brochure-html/`

- Referees:
  - Template letters for refusing to referee for "bad" publishers: `https://gitlab.com/publishing-reform/discussion/blob/master/Resources/letter-templates/refusal_to_referee.md`

- Editors:
  - MathOA: `https://mathoa.org/`

- Administrators:
  - Declaration on Research Assessment: `https://sfdora.org/`

- Librarians:
  - Subscribe to Open `https://www.annualreviews.org/page/subscriptions/subscribe-to-open-faq`
  - Fair Open Access Principles `https://www.fairopenaccess.org`

- Learned societies:

  – Transitioning Society Publications to Open Access `https://tspoa.org/`

  – Martin Eve's plan for converting society publications to OA `https://eve.gd/2018/01/21/how-learned-societies-c`

- Research funders:

  – Plan S `https://www.coalition-s.org/`

- Readers:

  – Google Scholar `http://scholar.google.com`

  – Unpaywall browser extension `https://unpaywall.org/products/extension`

- Citizens:

  – Who needs access? You need access! `https://whoneedsaccess.org/`

References

[Bur17]   Stephen Buranyi. "Is the staggeringly profitable business of scientific publishing bad for science?" In: *The Guardian* (June 27, 2017). URL: `https://www.theguardian.com/science/2017/jun/27/profitable-business-scientific-publishing-bad-for-science` (visited on 11/24/2019).