

The debate over open access is missing the point

Stuart Buck 

Vice President of Research, Laura and John Arnold
Foundation, Houston, TX, USA

ORCID: 0000-0002-8111-3239

E-mail: sbuck@arnoldfoundation.org

Key points

- It is more important to a funder to know that the research advances knowledge and has an impact on the field than that it is published in a prestigious journal (or not).
- Improving journal quality assurance is more important than improving the business model.
- Focusing on open access misses the point that journals need to improve their quality standards.

As the Vice President of Research at a large foundation that funds a great deal of academic research, I find the entire debate over open access to scholarly publishing to be oddly irrelevant. I worry more about quality and reproducibility than about price. In fact, all of the back and forth over what a journal's 'true' costs are, or what a 'fair' price is, tends to miss a deeper point about the real purpose of journals in today's scholarly ecosystem – *confering respect and prestige* – and whether we might be unwittingly missing a chance to rethink that purpose and how it can best be achieved.

As an initial matter, I might expect some pushback when I say that the real purpose of journals is to confer respect and prestige. What about, well, *publishing*? Yes, that was historically a function of journals – to print something and make it publicly accessible. When scholarly journals were first launched over 400 years ago, very few people had access to printing presses. Publishing your work in a journal quite literally meant being able to print copies and circulate it to people beyond your direct acquaintance. That was the only way to let other people be able to read your scholarship.

That purpose has been superseded today. In today's world – with the Internet, pre-print servers, working paper series, institutional repositories, personal websites, email, Figshare, Open Science Framework, DataVerse, etc. – no one needs journals to make their work public. There are many quicker and cheaper ways to do that without relying on journals at all.

What else do journals add of value? The *Scholarly Kitchen* blog has a blog post titled 'Focusing on Value – 102 Things Journal Publishers Do'. But I am sceptical that much of 'value' is here. The top 10 entries on the list include 'create and establish a viable brand', 'make money and remain a constant in the system of

scholarly output', 'plan and create strategies for the future', 'establish, cultivate, and maintain a good reputation', and 'solicitation of materials'. Like the rest of the 102-item list, these are mostly self-serving tasks that any business, from Walmart to tobacco companies, will do in the normal course of operations. It does not mean they provide value to the academic community.

So that leaves *respect and prestige*. To me, that is the *real* function of journals in today's academic world. For any academic who needs to publish or perish, a journal's acceptance is proof that he or she is being productive at the scholarly enterprise. And for the higher-ranked journals in particular, a publication is a particular bragging point – it is a signal that the 'top' people in a field think that a piece of scholarship is something to which it is worth paying attention.

As someone who heads up research at a foundation, however, I do not particularly care whether research that we fund increases someone else's prestige in and of itself. Instead, I care about whether the research truly advances knowledge and has an impact on the field.

If prestige was perfectly correlated with truth and impact, of course, that would be one thing. But it is not. As Brian Nosek of our grantee Center for Open Science is fond of saying, 'the incentives for individual success are focused on getting it published, not getting it right' (Association of Learned & Professional Society Publishers, 2018).

The respect and prestige associated with 'top' journals is being called more and more into question due to the reproducibility crisis (see, e.g. Baker, 2016). A systematic replication of all 21 social science studies published in *Nature* and *Science* between 2010 and 2015 found that only 13 were replicable, and even then, the effects seen were around half of the original study

(Camerer *et al.*, 2018). An earlier replication attempt of 100 top psychology experiments achieved similar results (Open Science Collaboration, 2015). In disciplines as diverse as political science, neuroscience, clinical trials, psychology, pre-clinical animal studies, and nutritional epidemiology, a substantial portion of the published literature may be incorrect, biased, or irreproducible. On occasion, even fraudulent articles have made it into top journals, including an article on political campaigning for gay marriage (Bohanon, 2015) and an article on generating stem cells (Cyranoski, 2014).

Why is that so? Part of the problem is that journals may not be as good at screening for quality as we might assume. The medical journal *BMJ* did an experiment where they randomized 607 peer reviewers to different types of training (face-to-face or self-taught). *BMJ* then sent the peer reviewers three manuscripts to review, 'each of which had nine major and five minor methodological errors inserted'. On average, the reviewers only found between 2.58 and 3 of the 9 major errors. The conclusion: 'Editors should not assume that reviewers will detect most major errors' (Schroter *et al.*, 2008). Similarly, in an earlier experiment, *BMJ* added eight errors to a manuscript before sending it out for review. Out of 221 peer review reports received, the average reviewer noticed two of the eight errors (Godlee, Gale, & Martyn, 1998).

Another problem is that, historically, most journals have had fairly low standards regarding some basic indicators of quality, such as whether authors have shared data and code (not merely promised to do so on request) or whether authors have pre-registered research for which that practice is appropriate. Only in vanishingly rare cases do journals actually take the trouble to rerun code before publication (a top political science journal does so and routinely finds mistakes; see Political Science Replication Blog, 2015).

Fortunately, with the rapid rise of the Transparency and Openness Promotion (TOP) Guidelines, thousands of journals and major publishers have endorsed higher standards for articles, including sharing data, code, methodological details, and other materials (Nosek *et al.*, 2015). It remains to be seen how many of these endorsements will translate into rigorous policies that are actually enforced and how that will, in turn, affect the quality and reproducibility of scientific research. Still, things are headed in the right direction.

Turning back to open access, then, why do I think it is still somewhat of a side issue?

As an initial matter, if journals exist in order to confer respect and prestige, why should we even bother with (most) open access journals? Is there any prospect that these journals will equal or even displace 'top' journals in prestige any time in the near future? Very unlikely. Academic prestige can be extraordinarily resistant to change over time. Look at the history of universities themselves: a few hundred years ago, Harvard, Yale, Oxford, and Cambridge were prestigious. They are still prestigious today. The best one can say is that a few newer universities (such as Stanford) have risen to a high level of prestige (US News, 2018) – and that took over a hundred years – but most new institutions do not have a chance of equalling the traditional universities'

prestige. Instead, to be blunt, the behaviour of most open access journals looks to me like this: 'Accept nearly everything so as to maximize revenue, and don't worry as much about prestige because no one will think this journal is prestigious anyway'. (For confirmation, see De Vrieze, 2018).

But if that is the model, why are we bothering with 'journals' at all? Everyone should just post their work on a pre-print server and be done with it. That would be *far* cheaper and easier, and as a funder, it would serve my purpose of dissemination to the field. Moreover, new arrangements (such as overlay journals) might arise such that top scholars are able to confer prestige in a systematic way outside of the traditional journal infrastructure. To be sure, it is difficult to create new institutions of prestige, but that is all the more reason to try ways that are efficient rather than wasting thousands of dollars per article.

What if we tried to convert the current prestigious journals, such as *Science*, *Nature*, *Cell*, *JAMA*, and the like, to open access?

I am not sure how that would even work. The more prestigious a journal is, the more submissions it receives; the more submissions a journal receives, the higher the rejection rate; and the higher the rejection rate, the more it costs per published article. How does this play out if *Science* or *Nature* wants to keep exclusivity and prestige but also wants to cover all their costs? They might end up having to charge \$40,000 per accepted paper! (Van Noorden, 2013).

What would happen to the world of biomedical and scientific research if the top few journals started charging authors that much? No one knows. But how could those journals sustain themselves *without* such fees? Again, no one has a good idea or a good reason for switching to an alternative model. A subscription model *does* seem to work better for a journal with 10 articles that 1,000 people would pay for and read, while the 'author-pays' model seems to work better for a journal with 1,000 articles that 10 people want to read. I think we are stuck with the subscription model for the top journals.

Yes, to many, the scholarly journal pricing structure comes across as a racket: as one scientist told *The Guardian* (Buranyi, 2017), 'What other industry receives its raw materials from its customers, gets those same customers to carry out the quality control of those materials, and then sells the same materials back to the customers at a vastly inflated price?' I could not agree more.

But again, as a funder of research, pricing reform seems distinctly secondary to the questions of quality and reproducibility. We need to fix those problems first by enforcing stricter guidelines. To put a finer point on it, if an article on arsenic-based bacteria (Reaves, Sinha, Rabinowitz, Kruglyak, & Redfield, 2012) is not reproducible, the last thing I want to do is give that article an even wider reach and influence by making it free.

REFERENCES

- Association of Learned & Professional Society Publishers. (2018, 18 October). Professor Brian Nosek on increased openness and the credibility of science [Web log post]. Retrieved from <http://blog.alpsp.org/2016/10/brian-nosek-from-center-for-open.html>
- Baker, M. (2016). 1,500 scientists lift the lid on reproducibility. *Nature*, 533, 452–454. <https://doi.org/10.1038/533452a>

- Bohanon, J. (2015, 28 May). *Science* retracts gay marriage paper without agreement of lead author LaCour. *Science* [Web log post]. Retrieved from <https://www.sciencemag.org/news/2015/05/science-retracts-gay-marriage-paper-without-agreement-lead-author-lacour>
- Buranyi, S. (2017, 27 June). Is the staggeringly profitable business of scientific publishing bad for science? *The Guardian* [Web log post]. Retrieved from <https://www.theguardian.com/science/2017/jun/27/profitable-business-scientific-publishing-bad-for-science>
- Camerer, C. F., Dreber, A., Holzmeister, F., Ho, T.-H., Huber, J., Johannesson, M., ... Wu, H. (2018). Evaluating the replicability of social science experiments in *Nature* and *Science* between 2010 and 2015. *Nature Human Behaviour*, 2, 637–644. <https://doi.org/10.1038/s41562-018-0399-z>
- Cyranoski, D. (2014). Stem-cell scientist found guilty of misconduct. *Nature*. <https://doi.org/10.1038/nature.2014.14974>
- De Vrieze, J. (2018, 4 September). Open-access journal editors resign after alleged pressure to publish mediocre papers. *Science* [Web log post]. Retrieved from <http://www.sciencemag.org/news/2018/09/open-access-editors-resign-after-alleged-pressure-publish-mediocre-papers>
- Godlee, F., Gale, C. R., & Martyn, C. N. (1998). Effect on the quality of peer review of blinding reviewers and asking them to sign their reports: A randomized controlled trial. *Journal of the American Medical Association*, 280(3), 237–240.
- Nosek, B. A., Alter, G., Banks, G. C., Borsboom, D., Bowman, S. D., Breckler, S. J., ... Yarkon, T. (2015). Promoting an open research culture. *Science*, 348(6242), 1422–1425. <https://doi.org/10.1126/science.aab2374>
- Open Science Collaboration. (2015). Estimating the reproducibility of psychological science. *Science*, 349(6251), aac4716. Retrieved from <http://science.sciencemag.org/content/349/6251/aac4716>
- Political Science Replication Blog. (2015, 4 May). Leading journal verifies articles before publication – So far, all replications failed [Web log post]. Retrieved from <https://politicalsciencereplication.wordpress.com/2015/05/04/leading-journal-verifies-articles-before-publication-so-far-all-replications-failed/>
- Reaves, M. L., Sinha, S., Rabinowitz, J. D., Kruglyak, L., & Redfield, R. J. (2012). Absence of detectable arsenate in DNA from arsenate-grown GFAJ-1 cells. *Science*, 337(6093), 470–473. <https://doi.org/10.1126/science.1219861>
- Schroter, S., Black, N., Evans, S., Godlee, F., Osorio, L., & Smith, R. (2008). What errors do peer reviewers detect, and does training improve their ability to detect them? *Journal of the Royal Society of Medicine*, 101(10), 507–514. <https://doi.org/10.1258/jrsm.2008.080062>
- US News. (2018). *National university rankings*. Retrieved from <https://www.usnews.com/best-colleges/rankings/national-universities>
- Van Noorden, R. (2013). Open access: The true cost of science publishing. *Nature*, 495, 426–429. <https://doi.org/10.1038/495426a>