

THE DANGERS OF THE “AUTHOR PAYS” MODEL IN MATHEMATICAL PUBLISHING

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Open access publishing is widely touted as making scientific knowledge quickly and freely available to scholars around the world, particularly in poor and developing countries. There is considerable validity to this argument. It also *feels* good and noble to participate in the global drive towards the free spread of knowledge.

The problem is that the “author pays” model for open access publishing, usually put forward as the solution to the lack of free access, is, in many respects, a cure that is worse than the disease, particularly for mathematics.

The first issue here concerns editorial integrity. When the financial bottom line of a journal depends directly on the number of articles published, the pressure to accept and publish papers faster and in greater quantities can easily compromise the integrity of the editorial and peer review process, even at good journals. Recently, “author pays” open access journals, which charge significant author fees (often a few thousand dollars per article) and promise fast refereeing and publication speeds, have significantly proliferated. In my observations, most of such mathematical journals are essentially “paper mills” and “vanity outlets”, publishing low quality research with pro forma peer review. Hardly a week goes by that I don’t receive another e-mail from such a journal inviting me to submit a paper there or to join their editorial board. This is not a healthy development. The “author pays” model, even if implemented with rigorous editorial standards, still significantly blurs the line between reputable journals and “vanity press” outlets.

The bigger problem concerns the effect of the “author pays” system on the open and egalitarian nature of mathematical research. While being able to access mathematical papers is crucial for conducting research, being able to publish the results of one’s research is even more important. Are we doing any great favors to mathematicians in developing countries by “pricing them out” of being able to publish their work? What about graduate students? Retirees? Unaffiliated researchers? And what about the majority of the faculty members in the U.S. mathematics departments who are not supported by NSF grants? Even those of us, like myself, who currently receive NSF support, do not have grants which contain a substantial publication fee component. Even if publication fees become a standard budget item of NSF grants, the grant sizes are not likely to increase - rather, the budget portions will be decreased for other activities.

The research enterprise is organized rather differently in mathematics and in experimental sciences. For the latter, it is relatively rare for graduate students to publish solo author papers, since most publications are based on research conducted at large labs (and most papers have many co-authors, starting with the lab director). These labs are usually supported by large external grants that can easily cover significant publication fees, even if they are \$1000 or more per paper. By contrast, in mathematics, research is still mostly conducted by individuals working alone

or in ad-hoc groups, and such research is not dependent on using the equipment and resources of some huge lab. Should the “author pays” model of mathematical journals become prevalent, colleges, universities and mathematics department would be expected to cover publication fees. With the higher education funding in the U.S. being squeezed on all fronts, it is unlikely that they would come up with significant amounts of institutional funding for that purpose. Forcing U.S. mathematics departments to use their modest resources to ration funding of publication fees by their faculty, graduate students and retirees could not lead to a positive outcome. Even if the standard publication fee were to stabilize at a relatively modest amount of around \$500 per paper, most U.S. mathematics departments could still only afford covering a fraction of them, and much (probably most) of the publication expenses would have to be paid by individual mathematicians, from their own pockets. Such a system will particularly penalize graduate students, young PhDs, and the faculty members without external grants. In mathematics, such a change would lead to a greater concentration of research funding toward a small number of well established researchers.

In my opinion, moving to the prevalence of the “author pays” model for mathematical journals would not be beneficial for the mathematical research enterprise as a whole, and for U.S. mathematicians in particular. The AMS needs to be much more pro-active on this issue; we can ill afford to sit on the sidelines, waiting for the events to overtake us. This need is made more urgent by the building up of administrative and legislative pressure towards the use of open access journals. The NIH already has a formal policy of requiring that all research supported by NIH grants be published in open access journals, and the NSF may well come under Congressional pressure to do the same. Yet, in my observations, most U.S. mathematicians are only dimly aware of these developments.

In my opinion, a key point in the AMS strategy should be to stress the already available open access alternatives not involving author fees. A substantial portion of new mathematical papers are posted to the `arXiv.org` preprint server, where they are freely available to everyone, well before being published. In this regard mathematics is far more open than most experimental sciences, where getting credit for a particular advance is closely tied to a paper’s publication date, and where pre-publication release of the results of scientific research is relatively uncommon. We need to build on our unique advantage. The copyright transfer agreements of many (perhaps most) math journals expressly allow the authors to post their accepted papers to preprint servers, provided the journal publication info is included. Some mathematical journals (for example, *Geometry and Topology*), already require the authors of accepted papers to post their final versions to `arXiv`. We should encourage wider use of such admirable practices.

The `arXiv` approach achieves the goals of open access without imposing new financial burdens on the authors of mathematical papers. We need to trumpet the extended usage of `arXiv` to legislators and university administrators, who are largely unaware of its existence. We should work on making the practices of `arXiv` posting more uniform and on convincing those U.S. mathematicians who do not yet post their papers to `arXiv` to start doing so. Currently the rates of participation in `arXiv` vary widely between various areas of math, and there are also significant generational differences. However, we do have a solid and naturally developed base from which to expand.

I believe that we should adopt a policy of expressly discouraging the AMS members from participating, as authors, referees or editors, in the activities of those journals that impose significant author fees without providing an alternative to publish a paper in a fee-free format. Finally, we need to develop tools for encouraging low-cost subscription journals.

Of course, as was noted by the reviewers, there are many nuanced and complex aspects of open access that cannot be covered in the short space of this column. But it is high time to have a broad and organized discussion within the AMS on these issues, followed by adoption of specific policies and implementation measures.

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