

The role of preprints in publishing

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We support the adoption of preprints in biomedicine, as one of a number of innovations that will help to accelerate scientific progress. However, we believe that simply adopting preprints on their own, whilst retaining the existing traditional journal publishing system, misses an important opportunity to make a more significant change to the way new findings are shared, and to how research and researchers are evaluated.

Preprints bring several benefits to the way research findings are shared, specifically:

Removing delay. Preprints provide a route for researchers to make their findings publicly available almost immediately – this removes the delay in when others can benefit from the new findings. It may also enable the authors to gain priority on the work. Preprints enable researchers to gather informal comments from colleagues on possible problems and potential improvements, before optionally committing to formal peer review at a journal.

Removing selection. No less important is removal of editorial selection (beyond the rapid set of checks for obvious nonsense etc., as already conducted on [BioRxiv](#), [arXiv](#), [PeerJ Preprints](#)). This enables a much broader range of findings to become visible that are currently difficult to publish. Examples include negative/null findings, advancements in protocols and methods, software articles, data notes, etc.

Increasing author responsibility. Because article preprints become visible with no prior editorial selection or judgement, and discussion on the article can be visible to all, the onus is on the authors to take more care in the quality of the article before they post it.

The need for formal invited post-publication peer review

Removal of delay and of selection are two important benefits that preprints bring in improving the way science is shared. However, simply combining preprints with the traditional journal peer review process only partly addresses some of the existing problems with the way research findings and data are currently made available. The non-transparent peer review scheme that most journals operate can censor what is made public and lead to abuse and bias. Furthermore, an important function of peer review in the standard journal model is to help editors select what to reject and what to publish in addition to helping author to improve the presentation. Preprints remove the need for selection.

We believe that the research community will benefit by enabling authors to publish their work immediately alongside invited formal post-publication peer review. This puts researchers in control of a publishing system that provides the structured scheme for expert commentary to help authors improve the presentation, and the need for readers and institutions for qualitative input. It allows, if adopted, to bypass the scheme currently operated by journals, which produces significant problems.

One of the challenges of preprints is that it is hard to get much commentary on posted articles, especially from subject experts. A quick review of three randomly selected blocks of 100 articles posted on BioRxiv in May 2015, June/July 2015 and September 2015 (so all 4-8 months ago to

ensure time to receive comments) showed that there were only 2, 2 and 5 preprints, respectively, in those selections that had received any external comments.

We believe that a formal organised process of inviting referees is required to ensure independent expert validation of the findings. Those referees should be selected from pre-existing lists of experts that are maintained and controlled by unbiased groups to ensure that those conducting this formal validation step have an adequate level of scientific expertise.

The need for article-level qualitative assessment

There is clearly a need for a better system to help funders and institutional research managers assess quality, potential impact and importance of a new study, as well as to provide readers with expert-based insight on the article. The current dominant assessment of articles and of researchers is through the journal Impact Factor, which is generally accepted to be ineffective and misleading.

We believe that transparent invited post-publication peer review of articles can provide a key source of qualitative article-level assessment. This can be combined with other quantitative and qualitative indicators of research value, use and re-use such as citation-based systems (e.g. RCR metrics), altmetrics, and expert recommendation of articles (e.g. F1000Prime) to provide a superior assessment to the current process.

We propose a new system

Our proposed new system of publication combines the benefits of preprints (i.e. the removal of delay and of selection in what is made publicly visible and citable) with a formal invited post-publication peer review process. We have operated such a system in [F1000Research](#) for the past 3 years and therefore can demonstrate this approach working in reality. A more detailed summary of this system is detailed here (1) but briefly:

- **Initial checks.** All submitted articles that pass an initial rapid check are formally published (made public and citable) within a matter of days. We will be adding a preprint option very shortly so that authors can post their article without having to commit to formal post-publication peer review; indeed, some article types may not be appropriate for peer review or the researchers may wish to get informal comments first. Articles submitted to this track will undergo checks similar to those of other major preprint servers before being made publicly accessible and citable.

When (if) the authors wish their article to move into the peer review track, the article is assessed more rigorously to include checks for readability, plagiarism, whether ethical standards have been adhered to, and ensuring supporting data/software and protocols have been included and deposited in a suitable format and repository.

- **Selecting referees.** Once the authors choose formal peer review, they then select referees from a large panel of experts. In our case, this is the F1000 Faculty, but it could be any large group (or groups) of experts – maintenance of such groups and rules for how one can join could be overseen by an overarching board of researchers, institutions, societies, funders etc. If authors need to suggest other referees, these suggestions are checked by the panel to assess whether they should join the panel. Both authors and referees are required to publicly declare any conflicts.

- **The refereeing process.** Refereeing is author-driven and transparent; referees provide a referee report and a status, which are both published immediately (following a quick check for appropriateness) alongside the article and the referee's name and affiliation. We believe it is important that all refereeing is conducted transparently to remove the many biases that plague anonymous and optional-open peer review processes. In such a system, referees get credit for refereeing through citation of their report, capture of associated metrics, and the work can be linked to their ORCID ID. At the same time, anyone who is a scientist can comment publicly on the article, as long as they provide their full name and affiliation, and declare any conflicts of interest.
- **Versioning.** Authors can respond publicly and can revise when they feel it is appropriate. New article versions are published, are independently citable, but the latest version is the default version visible on the site. Older article versions (HTML and PDF) include clear information about the availability of newer versions, and a dynamic article citation has been developed to capture the article version and refereeing status.
- **Indexing.** Once an article reaches a certain level of positive refereeing, it is included in PubMed and other major bibliographic indexers. The indexers are updated with all future versions and referee reports.

Such a system has been demonstrated to work in practice and provides valuable and auditable qualitative assessment on these articles whilst removing the delay and the selection, and we hope and expect other groups will operate similar services. Open peer review can also provide a valuable new qualitative metric, where the peer reviewer's name and what they said about an article could be used in grant reports, and grant and job applications. Furthermore, such a system is considerably cheaper than the current traditional publishing system (either subscription fees or gold open access charges, not to mention removing double dipping).

Call to action

We propose that a series of experiments should now be conducted by the science community where this approach is operated as a service on behalf of funders, institutions and researchers to test how well it fulfils the needs of biomedical science and how well it can accelerate scientific progress for the benefit of researchers, stakeholders in research, and society at large. There will no doubt be problems identified along the way that we have not yet foreseen, but only by conducting some experiments, can we discover these issues and work to identify the best approaches to address them.

Conflict of interest statement

Vitek Tracz is the Chairman and founder of F1000, and Rebecca Lawrence is the Managing Director of F1000, which comprise of F1000Research, F1000Workspace and F1000Prime.

Bibliography

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