# In the face of mounting challenges, is now the time to envision a new future for peer review?

*by Aimee Nixon*

**The scholarly publishing landscape is in a period of unprecedented transformation. Against the backdrop of international unrest and concerns around sustainability and climate change, publishing is facing its own set of unique challenges. The accelerated transition towards open science, the increasingly interdisciplinary nature of research and the emergence and rapid improvement of new technologies such as Artificial Intelligence (AI) are transforming the way that we discover, consume and perceive research outputs. Peer review remains a critical process at the very heart of the publishing process, and our most powerful tool for evaluating the rigor, credibility, and interest of scholarly research [1]. The first record of an editorial pre-publication peer review dates back to 1665 and to the journal *"Philosophical Transactions"* [2]. With a history of more than 350 years, the concept of peer review has remained relatively unchanged, but with so many significant changes within the wider publishing industry, visible signs of strain are starting to emerge in the peer review workflow.**

The theme of **Peer Review Week 2023,** voted by the scholarly community through an open survey, was "Peer Review and The Future of Publishing." Contributors to Peer Review Week were asked to consider not just the challenges that face our peer review processes, but how peer review could evolve to help us to address some of the broader challenges facing the industry. Within the framework of Peer Review Week, in September 2023, De Gruyter launched a campaign to ignite discussion about some of the critical questions surrounding the topic. We asked our book and journal editors to comment on what they see as the key challenges, and how they might envision a new future for peer review. Their responses have been curated into a series of blog posts, (https://blog.degruyter.com/tag/peer-review-week-2023/) and we are pleased to be able to share a summary of the key discussions in this features article for *Chemistry International.*

## Research is changing, and growing!

The practice of doing research is evolving. Researchers are increasingly engaging in interdisciplinary and hyper-specialised projects. Collaboration is becoming more common, both in terms of cross-disciplinarity and increased globalisation. The number of science and engineering articles published with international research collaborations (including authors from at least two countries) increased from 17% to 23% between 2008 and 2018 [1]. Finding a diverse pool of reviewers who can assess these more diverse research outputs is proving to be increasingly difficult.

Alongside finding the right reviewers, publishers are also facing the challenge of reviewer fatigue. The volume of scholarly research has increased significantly in recent years. According to data from Dimensions, the number of research articles in the Chemical Sciences field increased by 62%, from nearly 3.3m articles in 2014 to over 5.3m articles in 2022 [3]. As a result, publishers have significantly increased the number of reviewer invitations they send out, which is resulting in increasing pressure amongst the reviewing community. According to a study by the Institute of Physics, this has led to fatigue among experienced reviewers, who are being asked to review more frequently. As many as 40% of German, US and UK reviewers said they receive too many review requests [4].


Image used by De Gruyter for the Peer Review Week 2023 campaign which aims to ignite discussion about critical questions surrounding the topic of peer review and the future of publishing.

There is also an increasing call for publishers to ensure that they adopt diversity and equality policies which reflect the community when selecting reviewers and editorial team members. Guy Edwards, Senior Journals Manager at De Gruyter, believes that "*Publishers have a key role to play in encouraging greater diversity and inclusivity in academia. Peer Review is an area where we can influence change and we must be mindful of supporting our journal editors to develop a more diverse community of reviewers. Making conscious choices to diversify a journal's reviewer base can have huge benefits, giving a greater balance of perspectives to improve research outputs and also ensuring better representation of all groups in academia as a whole." [5]*

At De Gruyter, we are currently developing a set of internal guidelines to support best practice on how to consider diversity when establishing editorial teams and in managing the peer review process.

While editors and publishers are placing more focus on diversity and inclusivity in the peer review process, some stress the need to focus on equality in workloads. Professor Andy Gao, Editor-in-Chief of the journal *International Review of Applied Linguistics in Language Teaching,* urges the community to "*look into the data related to the ratio of reviews vs. publications by reviewers."* He adds: *"I am concerned that those who review a lot for the community publish disproportionately less than those who do not review. We should aim to achieve equity in both sharing the review load and having opportunities to publish." [5]*

Faced with a world where we need more reviewers, and where there is a need for diversity in both reviewer background and expertise, how can we incentivise reviewers to continue carrying out the vital work they do?

Until recently, peer review has always been regarded as a voluntary task. Dr. Myrto Aspioti, Acquisitions Editor, believes that *"Peer review is not a chore, it is an important service to communities of knowledge without which we are vulnerable to bias, disinformation, and 'alternative facts"* and that the practice can benefit scholars by being added as a research activity to their resumes. [5] However, with increasing pressure on workloads, editors and publishers are finding it increasingly difficult to find reviewers with capacity to take on the task. According to the Managing Editor of a book series, in the last decade the workload in academia has multiplied by 10 and *"we must find a way to compensate reviewers for their efforts*." [5] Many publishers have started to introduce incentives such as book discounts, or vouchers for open access publishing. There are also initiatives such as **Publons** which record reviewing activity and ensure reviewers receive recognition for the work they do.

With the increasing complexity and volume of research, finding reviewers will continue to be a key challenge. The resounding feedback from the community is that publishers should do more to recognise and reward reviewers, and ensure that the burden of reviewing is not disproportionate from the opportunities to publish.

## Alternative Peer Review Models

"Open access" (OA) is defined as the broad international movement that seeks to grant free and open online access to academic information, such as publications and data [5]. Although OA has origins in the 1990s, the OA model and broader open research practices have accelerated in recent years. Between 2012 and 2022 the percentage of OA articles made available via gold open access (i.e. whereby access fee is paid by the author or on their behalf) has increased from 9% to 35% [10].

'Open science' is not only transforming business models, but also the way in which all stages of the research workflow are shared and consumed. Many journals and research platforms such as F1000 Research have started to explore different, more open peer review models, and where the take up has not been as significant as originally hoped, many communities are keen to see the principles of openness be more broadly adopted in the peer review process. At De Gruyter, we have integrated an open review approach to the open access journal *Economics,* whereby the reviewer reports are published alongside the final article.

Rabea Rittgerodt, a Senior Acquisitions Editor, believes there are many benefits to an open peer review model. She believes the process is "*more transparent, less hierarchical, as well as faster and easier for everyone involved"* but she also highlights the need for some moderation. "*As is always the case with peer review, criticism must be constructive, and a third party – the publisher for instance – must ensure that is the case for each comment before it becomes public."* [9]

Beyond open peer review models, which other models could support an open and constructive dialogue in the future?

Within the social sciences and humanities there are a number of new initiatives emerging based on the concept of collaborative peer review. Dr Serena Pirotta, Editorial Director for Classical Studies and Philosophy, believes that a compelling alternative to traditional peer review

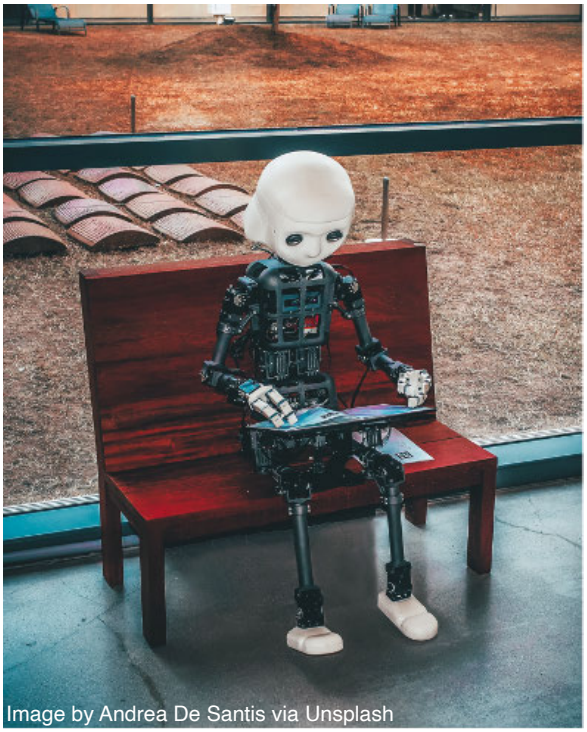
Image by Andrea De Santis via Unsplash

processes is the review workshop. Under this model contributors to a big project are invited by the editors to collaborate on their manuscripts in a workshop, either online or in person, where they provide feedback and suggestions for improvements in a discussion moderated by the editor. This format *"fosters fruitful exchange across diverse fields, and encourages collaborative refinement through concrete suggestions."* [9]

Could collaborative peer review provide a more constructive and cross disciplinary solution? Where this might work well for humanities and social sciences, would this approach offer the speed and scale required to review articles in the faster moving fields of STM?

Dr Shahid Hussain, Editor of the journal *Open Agriculture,* believes the editorial board could support a more open peer review model. A model he believes to be particularly effective is the one used by the journal *Frontiers in Plant Sciences,* which grants all editorial board members direct access to selected manuscripts for peer review and choose which manuscripts to review. He believes that this approach accelerates the review process, as members can assess manuscripts at their convenience and commit to reviewing a specific number of manuscripts in a given timeframe. [9]

Could the acceleration towards open science, and more willingness to adopt open review practices, open the opportunity for more innovative models of collaborative review, ensuring that feedback is constructive and transparent?

Perhaps one of the reasons open peer review has not been as widely adopted as originally hoped, is that some still value the benefits of the blind peer review process. As a Managing Editor of a De Gruyter book series commented, "*Peer reviewing is absolutely essential for high quality journals and not least for high quality book series. To be effective, reports must be critical, constructive and detailed. And, above all, blind: neither author or editor nor reviewer should be informed of identities, only this way can independent reviewing be promoted."* [9]

In a world where an overwhelming volume of information has led to challenges in trust and integrity, will open review models increase confidence amongst readers? Current opinion remains mixed. What is clear is that publishers, journals and research communities continue to experiment with new models and new collaborative approaches to peer review.

## New Technologies

Finally, and perhaps most significantly, one of the biggest challenges to face scholarly publishing in recent years is the emergence of new technologies, namely natural language processing (NLP) and AI, which appear to present the industry with both threat and opportunities in equal measures. Many automated AI driven tools are already being used in the publishing workflow. Tools have emerged that help with the assessment of plagiarism, image manipulation, and fraud. Machine learning algorithms can help to assess patterns and structures in research articles, to highlight potential weaknesses in arguments, methodology, or data analysis [1]. AI tools are also being used to support reviewer selection. These pre-screening tools have helped introduce efficiencies in the review process, freeing up precious time for editors and reviewers. However, despite the obvious benefits afforded by AI, there is a great deal of concern about the negative impact the new technologies could have on research practices and scholarly communication. The concerns have been mainly focussed around how AI might be used, or misused, in the authorship of articles, and how this could have a negative impact on quality and integrity. The Committee on Publication Ethics (COPE) has issued a position statement on the use of AI for authorship and asserts that AI tools cannot be listed as authors of a paper. COPE states that AI tools cannot meet the requirements for authorship because they are not legal entities and therefore cannot take responsibility for the submitted work [8].

But how might the use of AI further extend to the peer review process? Could we envision a future where

it is not a human scholar, but AI tasked with deciding between acceptance, revision and rejection?

Dr. Shahid Hussain turned to AI itself to ask this question *"Have you ever encountered AI being used in the peer review process? If so, what role did it play and did it do a good job?"* According to ChatGPT, *"AI has been used in peer review for tasks like language checking, plagiarism detection, reviewer matching, and content analysis. Its effectiveness varies; it aids language correction and plagiarism detection but struggles with nuanced judgment. Balancing AI's role with human review is vital to maintain quality and prevent bias."* [10]

It appears that even AI believes that where technology can provide much needed automation and drive efficiency, the value of peer review remains in that nuanced personal judgement and expertise. Although it seems inevitable that AI will play an increasing role in peer review, feedback from the community suggests that it will probably never come to the point of completely replacing traditional review. Professor Paulo de Medeiros echoes this with his comment "*Whether we like it or not AI will play a role in peer review, if it does not already. However, it will probably never come to the point of replacing traditional peer review as that depends not only on expertise and recognition of past scholarship (AI with a large database will exceed human capabilities of recall and identification) but also on personal judgement*." [10]

There are also concerns about the limitations AI faces in assessing innovative new ideas. Dr. Alireza Haghighi Hasanalideh Editor of the journal *Open Agriculture* points out that "AI works on the basis of past information" and so it will not prove to be a useful tool for research with an innovation aspect. [10]

The community appears to be approaching AI with both caution and hope. Many believe that AI will play a useful role in peer review, but it will have limitations and should be used responsibly. Excitingly, perhaps there is an opportunity to enhance the current process, to help alleviate some of the pressures highlighted by the community throughout this campaign. It is hoped that these efficiencies will relieve pressure on an overburdened system and leave space and time for the human interaction with science.

## Envisioning a new future

In academic publishing, as in the wider world, we face uncertain times, but with this comes opportunity to evolve and try new ideas. Peer review is and will remain at the heart of the research publishing process. The pressures on the wider industry may necessitate change, and in recent years we have seen innovation in new models and approaches. Looking to the future, feedback from the community suggests that peer review will need to continue to evolve, to ensure it remains relevant to an increasingly complex landscape, and that where the true value of peer review remains in the nuanced personal feedback and expertise, we should embrace new technologies to alleviate pressure on the system, and to focus more on incentivising and rewarding the reviewing community.

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