Reviewer’s report

Title: The limitations to our understanding of peer review

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Reviewer: Serge Horbach

Reviewer's report:

In their manuscript, the authors give an overview of current studies and knowledge on editorial peer review, identifying major gaps in our theoretical and empirical understanding of it. They subsequently divide these gaps in six core themes, providing an assessment of both the difficulty and priority of filling them. Thereby the authors aim to use their analyses as a guide for future studies on peer review.

The authors provide a detailed and comprehensive overview of current studies about, and results regarding, journal peer review. This obviously constitutes a very relevant topic to the readership of Research Integrity and Peer Review. I believe their systematic account of current knowledge, and the lack thereof, of peer review may well become a valuable source to guide studies within this field for the upcoming years. I therefore think the manuscript should definitely be considered for publication in Research Integrity and Peer Review. Nevertheless, I have several points that the authors may want to address in order to clarify or improve their manuscript:

1. While the authors provide a detailed and seemingly quite comprehensive overview of studies on peer review, they inevitably missed out on some (relevant) sources and important knowledge. Even though I do not want to suggest that the authors should include more studies (they probably have their reasons for sticking to this selection), I would like to see some justification for their method of finding/selecting studies to include in their overview. Some methodological justification of how the authors went about finding literature and how they established their categorisation of six major themes (editorial accountability, subjectivity and bias of reviewers, etc.), might help to understand how well the authors managed to cover the entirety of peer review studies and where some gaps in their overview should be expected.

2. I believe the overview of current studies and gaps in our understanding of peer review is very convincing; I was less convinced by the authors' ranking of research topics with respect to priority and difficulty. Again, I believe that some explanation about how the authors derived their prioritization of research questions might improve the quality of the manuscript. I was wondering on what criteria they based their decisions of what topics have priority and which are most challenging to study.

3. Role of Editors: The authors seem to conceptualize a single, uniform role of editors. However, in many journals (especially those affiliated with the large commercial publishers), many different 'sorts' of editors are involved. These people might have different job titles at different journals/publishers, but they in any case include editors-
in-chief, managing editors, associate editors, editorial assistants, etc. Hence to speak of 'the editor', seemingly referring to a single person with a well-defined set of tasks, might be a bit too simple. I think it would be worthwhile to distinguish some of these roles and add a description of the diversity of editorial tasks.

4. Notions of expertise (pg. 7): I think this is a very interesting subsection, covering a topic that generally receives little attention in studies on peer review. However, I believe it could be meaningfully elaborated on a bit further. For instance, I think there are some noteworthy differences in what expertise is required to review articles in STEM or SSH subfields (which has been a major theme in the work within the ENRESSH network, of which one of the authors is a member). While I do not intend to have the authors include a full analysis of expertise (this would clearly be outside the scope of this manuscript) I think it would add to the quality of their paper if they include a description of different notions of expertise and how these may be required to meaningfully review a paper in different contexts.

5. Role of 'wider society': Both in their introduction and abstract the authors mention issues in 'wider society' affecting peer review, but this topic only has a very minor role in the remainder of the manuscript. While I think this is an interesting connection to explore, I do not think the authors currently sufficiently do this. Therefore, I would suggest to either remove a mention of this topic from the abstract/intro (as not to raise false expectations among readers) or further develop this theme in the remainder of the manuscript.

6. The role of automation in review: One aspect of peer review that seems to be increasingly important, but is yet missing from the authors' manuscript, is the role of automation in peer review (or the editorial process). With the introduction of several scanners (e.g. plagiarism, statistics, image manipulation) and even some suggestions to make review fully automated (i.e. without human interference, based on some AI mechanism), the role of 'peers' in peer review is increasingly questioned. I think this is a sufficiently important issue to warrant a (brief) discussion in this manuscript.

7. A last, and a relatively minor, point relates to the section on Peer Review and Reproducibility. The authors state that 'this raises the question whether peer review should be reproducible', but subsequently seem to continue with the conviction that it should be. I think this is a quite controversial issue, with at least some scholars believing that peer review is inherently not reproducible due to inevitable differences in backgrounds and perceptions of reviewers (I remember being part of a very interesting discussion about this with Mario Malicki and some of the people mentioned in the acknowledgement of this manuscript).

I think the position taken by the authors is justifiable, though I think it would be good to mention that this is a controversial issue and perhaps to include a short discussion of the different perspectives on it.

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