

Double Anonymous Reviewing for Planetary Science Journals

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Introduction

The goal of peer review is to ensure the scientific quality and provide peer-based credibility of scientific research published in academic journals. The peer review process depends on the work of scientists with expertise and research knowledge similar to those of the writers of the scientific paper. This process is essentially a self-regulation by the scientific community. Since peer review is a human driven process, peer review is subject to the cognitive biases that are exhibited by all humans, including both explicit and implicit biases. Because the scientific community wants to promote the publication of all credible research, the community needs to promote implementations of peer review that are fair and inclusive.

Most peer review processes share with the reviewer the identity of the authors of the paper under review. Because of this, reviewers may unwittingly be subject to implicit bias while reviewing the submitted paper. Such bias, which may be positive or negative, may affect the review process and the final decision whether to publish the paper or not.

Bias is a statistical concept. Most often, bias is not clearly evident on a case-by-case basis, but its presence can become obvious when statistical methods are applied to a large number of cases. When negative bias occurs, affected authors may ultimately be discouraged from submitting research to a planetary science journal. There is also the potential for positive bias, leading reviewers to be less critical of work than they otherwise should be.

We can diminish the likelihood of bias based on the identity of the author by implementing Double Anonymous Reviewing (DAR). Here we outline the advantages of DAR and discuss how to implement it for DPS sponsored/promoted scientific journals.

Conscious bias still appears in the peer review process (Woolston 2015), and various author characteristics present different opportunities for unconscious bias (Lee et al. 2013). Numerous recent studies across multiple fields of science demonstrate that Single Anonymous Review (SAR) presents problematic barriers to inclusivity. Reviewers are not immune to prestige bias (Tomkins et al. 2017), nationality bias (e.g. Daniel 1993; Link 1998), or gender bias (Budden et al. 2008). These problems arise in the review process for both research papers and proposals for funding. An internal study at the Space Telescope Science Institute of SAR proposals for observing time on the Hubble Space Telescope showed a consistent pattern of higher success rates by male PIs than female PIs (Reid 2014). Several of these studies show that DAR does decrease bias related to these author characteristics (Budden et al. 2008, Reid 2018).

Proposed Implementation

Several journals have implemented DAR in the past, but with varying results depending on the underlying methodology. The journal *Behavioural Ecology* began mandatory DAR in 2001, and subsequently reviewed author demographics for published papers (Budden 2008). They demonstrated that not only were more papers by both genders published, but female authors in particular saw a 7.9% increase in published papers.

Optional DAR was also offered at the journal *Nature* beginning in March 2015. A review analyzed potential bias effects due to gender, country of origin, and institution prestige (McGillivray and De Ranieri 2018). No increase was seen in published papers by female authors, and authors choosing DAR tended to be from less prestigious institutions or particular countries. Those that selected DAR were less likely to be published in the end. Several competing effects cannot easily be disentangled when DAR is optional, including whether DAR in such cases actually has an impact, whether reviewers perceive a stigma for those who choose DAR when it is optional, or whether there is a self-selection by which those submitting lower quality work tend to choose DAR. In the few cases where journals have implemented DAR, results are generally inconclusive *unless it is mandatory for all submissions* and positive when it is mandatory (Budden 2008).

Therefore, we propose that DAR be implemented in the following way for planetary science journals¹:

- Double Anonymous Reviewing (DAR) must be **the default** for all papers (Palus, 2015). Evidence indicates that the benefits accrue only when everyone participates (for example, in the HST proposal process mentioned above).
- Both the author list and the body of the paper must endeavor, to a reasonable degree, to remove self-identifying information. The “instructions to authors” should discuss how an author writes a paper that cites their previous work without overly/overtly calling out the previous work as theirs.
 - Authors may still use “we/I” when referring to work done in the current paper, but when referring to a previous paper, they should not say things like “we previously” etc. Instead, the authors should refer to their previous work as they would refer to any other relevant reference with third person neutral wording.
- The following information must be removed from a manuscript prior to sending it out for review. This could be accomplished by the authors submitting two documents (one with this information and one without) or an editorial system may be able to automatically remove the following:
 - The Author List and their Institutions (including any running headers on each page that might identify the authors), corresponding author information, etc.

¹ This implementation was inspired by the successful process used by *Behavioral Ecology*, as outlined here: https://academic.oup.com/beheco/pages/information_for_authors. *Social Science and Medicine* also has detailed instructions for implementing double anonymous review: <https://www.journals.elsevier.com/social-science-and-medicine/policies/double-blind-peer-review-guidelines/>.

- Acknowledgements Text, which includes the acknowledgements, grant support information, etc. that is usually included at the end of the paper.
- Reviewers should be advised beforehand about the intent of the DAR process, and how identification of the authors is as irrelevant as identifying the reviewers if they were authors.
- Any language suggesting that the reviewer has attempted to identify the authors or that the reviewer has attempted to use information related to the identity of the authors to base their recommendations or decision on should be evaluated by the editor, in which case the editor could ask the reviewer to edit their review or the review could be set aside and a new reviewer sought. Reviewers will be encouraged to justify their review using scientific principles and should not be allowed to make arguments from authority.

We do not necessarily seek a perfect process. There may be a limited number of cases in which a reviewer may guess the identity of a paper's author. However, even in such a case, the diminished confidence caused by a lack of confirmation makes it less likely that such a guess would affect the reviewer's judgment. Furthermore, since bias is a statistical concept, greatly diminishing its occurrence would do a great deal of good, even if it is not eradicated in every case. We should think of this topic similarly to how the healthcare community thinks of vaccines, as in not aiming to prevent every single case of disease, but aiming to prevent a sufficient number of cases that "herd immunity" becomes the dominant effect.

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