Peer Review in Theory and Practice

MNM Special Edition

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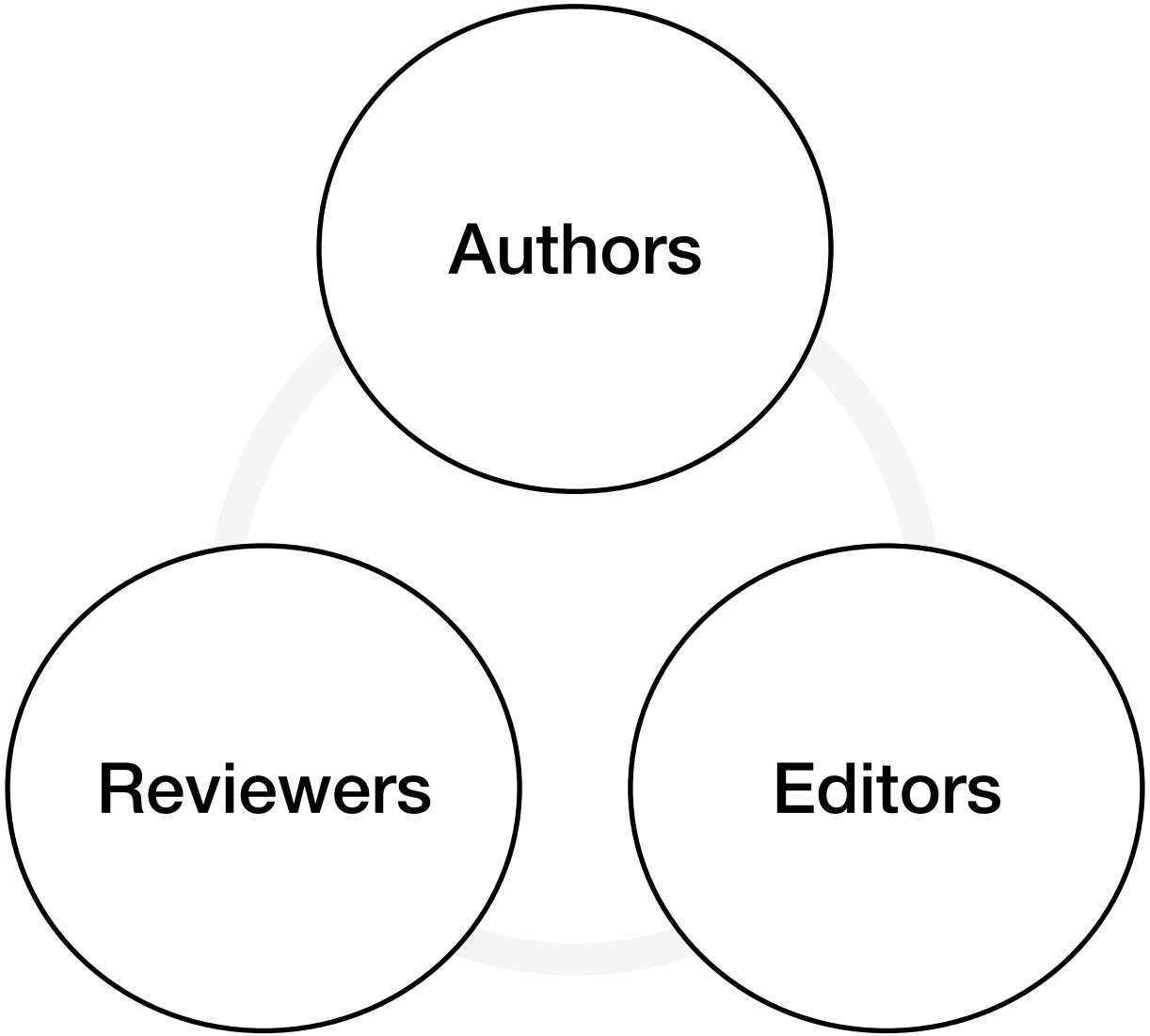
Why Peer Review?

- **The goal:** Ensure that additions to our collective body of knowledge are (as far as possible) accurate, precise, and rigorous.

- **The underlying assumption:** the best-qualified people to make those judgments about a work are experts in the same field.

The Players



The Process

1. Authors: produce and submit a manuscript.
2. Editor: is the work sufficiently <u>important</u>, <u>applicable</u> to journal readership, and <u>meritorious</u>? If so, decide on appropriate reviewers. (1-2 weeks)
3. Reviewers: evaluate the work fairly, and recommend:
   a) <u>rejection</u> (with or without a chance of resubmission),
   b) <u>revisions</u> (either major or minor), or
   c) <u>acceptance</u>. (2-6 weeks)
4. Editor: integrates the various reviewers' decisions (can disagree!), and communicates decision + reviewers' comments to the authors. (1 week)
5. Authors: address each reviewer's comments (i.e., new experiments, new analysis, reinterpretation/rephrasing, or rebuttal). (2-8 weeks)
6. Editor: evaluates revisions, and decides whether to publish or to return to reviewers (in which case, process repeats).

Models of Anonymity

- Single-blind: reviewers are anonymous
- Double-blind: reviewers and authors are mutually anonymous
- Open: reviewer names are publically available after publication

Responsibilities of the Author?

- Deal fairly and transparently with editor and reviewers
- Respond to feedback in good faith - do not become emotionally attached to your favorite ideas/experiments
- If reviewers' suggestions are not feasible, provide reasonable alternatives
- Corresponding authors responsible for communicating w/ editors and reviewers (in addition to overall responsibility for the work)

Remember, all three parties share the same goal: <u>a better paper</u>.

Responsibilities of the Reviewer?

- Objective assessments
- Be as rigorous as possible in assessing validity of *data* and *methods:*
  - Are experiments appropriately controlled?
  - Are the authors (deliberately or inadvertently) concealing important information?
  - Are there feasible orthogonal methods?
  - Are sources of potential error adequately acknowledged?
- At the same time, give the authors a little more latitude with *models* – don't force them to fit your ideas to their data
- Make substantive comments

Responsibilities of the Editor?

- Impartially evaluate the initial submission
- Choose appropriate reviewers
- Arbitrate between authors & reviewers as the process continues.

Case 1: Dueling Reviewers

Reviewer 1: Recommendation: Too preliminary for publication. The authors present [technique 1] and [technique 2] studies on [system]. In the first part of the paper, they provide evidence for [phenomenon]. In the second part, they use [technique 2] to visualize [process].

The first part of the paper, the [set of experiments], unfortunately does not provide too many new insights compared to previously published work. The second part demonstrates an [effect], as previously suggested by many other studies (as referenced in the manuscript). The reported tools are exciting and will allow the authors to probe the mechanistic details underlying [phenomenon]. However, the conclusions that can be drawn from the present work are very limited and will need to be followed up by further studies.

Reviewer 3: Recommendation: Publish after minor revisions. The authors have studied [system]. They have also used [technique 2] to detect [process]. This is a solid contribution and I believe it meets the standards of [journal]. I have the following comments and questions that I think the authors should attend to in order to clarify their paper:

Conflicts of Interest

- Bias may be positive (e.g. with a collaborator, a former student, or a colleague)
  or negative (e.g. with a close competitor… or a former student/colleague)
- Editors and reviewers should recuse themselves in these cases
- Authors may request that certain people can be excluded from being reviewers – should be used with discretion
- Authors must also disclose potential financial conflicts

Cases of Potential Fraud

- On editors & reviewers' radar during peer review
- Even after publication, members of the community may approach the editor with concerns about the reproducibility or validity of results
- The editor may choose to nominate reviewers to investigate in greater detail, and if necessary try to replicate necessary experiments etc.
  - (Usually a rare event.)
- Can result in retraction, with or without authors' involvement

New Trends in Peer Review

- Open review
- Open-access journals
- Preprint servers (arxiv.org, biorxiv.org, PeerJ)
  - ***Check other journals' preprint policies!***

Tips for the Author

Before submission:

1. Keep the reviewers in mind as you write – have you done the appropriate controls? Obvious extensions to your experiments? If such experiments are not feasible, have you explained why?
2. Have you considered alternate explanations for your observations? Are there ways to verify or falsify these?
3. Make it easy for reviewers to follow your thought processes, and understand why you took the decisions you did with your manuscript – you know your data better than they do!
4. Suggest 4-6 suitable reviewers, and think carefully about potential exclusions – very close competitors, labs with whom you have a long-running vendetta, etc.

Tips for the Author

After submission:

Take a fresh look at your manuscript – any obvious places for new experiments? If so, prepare for these – but don't spend too much time second-guessing reviewers.

When you get reviewers' comments:

1. Read them, and do nothing for 48 hours.
2. Read them again, and try not to take them personally.
3. Consider each point in isolation, and decide which new experiments are necessary to effectively & clearly address the reviewers' comments – these are not necessarily exactly the same experiments proposed by the reviewers.
4. Formulate your responses – a separate itemized list for each reviewer's comments, and a letter to the editor.
   - Thank the reviewers for their insightful comments!
   - If a reviewer is being genuinely unfair or unreasonable, explain this at length in the letter to the editor, *not* in the response to the reviewer. Don't make this a competition.
5. Remember that, almost invariably, a revised manuscript is better than the original. This is the point of the exercise.

Responding to Reviewers: “Yes”

Both reviewers rightly draw attention to the importance of [data] in terms of confirming [conclusion 1], and [conclusion 2]. To that end, we have chosen to include [new experiment] as a new Figure 2A, and to perform a more rigorous statistical analysis. We globally fit [data] to different models: [model 1], and [model 2]. [Model 2] provides a marginally better fit, but [model 1] is preferred according to both [a statistical test], and [another statistical test]. We thank the reviewers for bringing this to our attention, and hope we have adequately addressed their concerns.

Responding to Reviewers: “Hell, no”

Reviewer: The manuscript goes into depth about selecting starting structures that do not have [a characteristic], and going so far as to imply that [characteristic] results in an "unstable" structure. However, recent experiments and simulations suggests that the proteins can in fact [display characteristic]. This point should be compared and contrasted in the discussion.

Response: This would not be something that would be possible to really see experimentally; even with [technique]. One of many problems with our simulations, as run and described in this paper, is that they do not allow for [process] – as would in fact occur in a real system.

Reviewer: Given that the starting structures for all of the simulations are questionable, perhaps the manuscript should go into more detail about how the results obtained, i.e., [results], could be placed into a broader context.

Response: We feel that throughout the paper we have discussed the models and simulations, as well as our own experimental results in the “broader context.” Maybe you could be more specific about which comparisons you’d like to see made or discussed in more detail.

Responding to Reviewers: Finding a Compromise

Reviewer: I find the conclusions from the [technique] data (Table 1) in terms of [characteristic] overstated. Additional data should be provided to conclude about the [characteristic]. [Another technique], for example, could provide such information much more reliably. In fact, the [complex 1] has an apparent value of X, which would not be consistent with what the authors conclude based on Fig. 6.

Response: First we would like to clarify that, in Table 2, we reported an apparent value of *X* for [complex 1] and not [complex 2]. Therefore, the data we reported in Table 1 do not challenge our conclusion in Fig. 6, where we show [complex 2] to plateau at *Y*. Second, the [characteristic] is based not only on [technique], but also on previous studies ([refs]), in which [other techniques were used]. These findings are consistent with the [characteristic].

However, we do lack structural data on [the complexes], and agree that extension of the [technique] findings to discussions regarding the [characteristic] would be overstated due to the limitation of [technique]. We therefore have withdrawn some of our statements saying that [characteristic applies]. Instead, we state [more general version of characteristic], which description we believe is sound based on the principles underlying [technique]. We have revised three paragraphs accordingly to make our statements more conservative.

Appealing to the Editor's Judgment

Please find enclosed our revised manuscript entitled [title]. We are grateful for the unusual second opportunity to address the reviewer's concerns. In the accompanying attachment, each of the reviewer's comments has been considered separately and our changes carefully documented.

Significantly, the revised manuscript has a substantial addition of [new data]. This required considerable resources and is the origin of our delay in submitting this revision. Our initial sentiment was that such work constituted an independent study. However, we believe it dramatically improves the quality and scope of this work, and directly accommodates reviewer 2's most challenging criticism and request. To be frank, we took exception to the criticism of being speculative. [Specific complaints…] Thus, while the basis for the request was, in our opinion, unreasonable, we must admit to being grateful to have been pushed in this way.

Tips for the Reviewer

Throughout the process:

Do not abuse privileged information, for example by ‘borrowing’ findings or ideas for your own work until the paper is in press.

When invited to review:

1. Decide if you are sufficiently qualified to be a reviewer. Do you have genuine expertise in this field? Will you be able to make useful suggestions, and detect oversights or fraud?
2. Can you be sufficiently impartial? Declare any conflicts of interest up front.
3. Do you have time to complete a thorough review promptly?

Tips for the Reviewer

When reading the manuscript:

1. Evaluating the broad strokes of the paper, as if you were a general reader. Is the paper important? Interesting? Applicable? If not, is it fixable?
2. Read it again, but this time focus on the methods in as much detail as possible. Have the authors overlooked anything? Have they used the right experimental tools? Controls? Error analysis? Are they hiding anything? Do you understand their choices?
3. Read it a third time, and try to come up with alternative models that fit the authors' data – is there a simpler explanation? Are they inferring too much from their data? Have they appropriately cited related prior work in the field?

When reading revisions:

Approach the paper with a fresh set of eyes. Have the authors addressed each of your concerns? If not, do they clearly explain why? You may also get a copy of the other reviewers' comments – have *they* been adequately addressed?

Typical Review Format

Comments to the authors:

1. Summary paragraph, outlining the hypothesis as you understood it, plus whether it was adequately tested.
2. Detailed list of major comments – issues in experimental design, execution or data analysis that must be rectified
3. Minor comments – issues of clarity, grammar, typos etc.

You may choose to send separate confidential comments to the editor

Useful Links on Scientific Communication

- Kevin Plaxco, "The Art of Writing Science": http://dx.doi.org/10.1002/pro.514
  - An excellent guide to effective scientific writing style (including Wendel's point about topic sentences in paragraphs)
- Wager, Godlee & Jefferson, *How to Survive Peer Review*: http://www.bmj.com/sites/default/files/attachments/resources/2011/07/wager.pdf
  - A long but well-written overview of many of the issues we discussed in MNM, including specific tips for authors and reviewers in various situations
- George Whitesides, "Writing a Paper":* http://dx.doi.org/10.1002/adma.200400767
  - Focuses on the organization of good scientific articles
- SF Edit Newsletters:* http://www.sfedit.net/newsletters.htm
  - A set of newsletters from a scientific editing company that cover putting your manuscript together, responding to reviewers, and other useful topics

*Courtesy Natalie Garcia