

Performing a Peer Review

(and how to write better manuscripts)

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General Introductory Thoughts

Abstract

The process and goals in peer reviewing a research manuscript are often not part of a graduate student's formal education. Subsequently, many of us are thrown into the process with insufficient knowledge about what to do, relying on our experience of being the recipient of reviews (i.e. the opposite side of the coin). In this seminar, I will cover the typical workflow for conducting a review. This includes a) ethical issues surrounding the process, b) being invited and declining/accepting, c) giving the manuscript both an overview and critical reading, d) reading relevant background literature, e) spot checking citations and data, f) checking the reproducibility of the work, g) writing, editing and submitting the review, and h) private comments to the editor. Furthermore, learning about and conducting a peer review also improves your own manuscript writing. For an initial short introduction into being a referee, please read Bourne and Korngreen's "Ten Simple Rules for Reviewers" (PLoS, [10.1371/journal.pcbi.0020110](https://doi.org/10.1371/journal.pcbi.0020110)).

General Introductory Thoughts

Definition of Peer Review

Peer review is a scholarly system that evaluates the competence, novelty and reproducibility of a manuscript, grant, or other scientific writing (e.g. a conference talk).

Scientific info must pass experts scrutiny before release to a larger community.

A good review is part scholarly and part art.



Photo by Alice Achterhof on Unsplash

R. Tandon. [How to review a scientific paper.](#)

Asian Journal of Psychiatry, 11:124–127, oct 2014

Why Participate in Peer Review?

- It is a community service that has been around since ca. 1600s
 - An opportunity to respond to criticism raised by experts prior to release
 - You can learn something new
 - You can mentor authors to become better within their field
 - You will improve your own manuscript writing
 - And subsequently will get better future reviews
 - Peer review discourages fraudulent work
-

J. Bohannon. Who's afraid of peer review?

Science, 342(6154):60–65, 2013

Your Role as a (Manuscript) Reviewer

- 1 Make a judgment about a manuscript for an editor

- 2 Provide constructive criticism about a manuscript's content for the authors

As a reviewer, you are an advocate for the author and for the journal.
(**advocate**: one who supports or promotes the interests of a cause or group)

J. A. Hill. [How to review a manuscript.](#)

Journal of Electrocardiology, 49(2):109–111, mar
2016

J. M. Provenzale and R. J. Stanley. [A systematic guide to reviewing a manuscript.](#)

Journal of Nuclear Medicine Technology, 34(2):92–99, 2006

Qualities of Good Reviewers

- 1 Competence (expertise) in the field
- 2 Consistency (within and between reviews)
- 3 Confidentiality
- 4 Accepts responsibility for feedback (constructive, educational, unbiased)
- 5 Knowledge of the scientific process (research and writing)
- 6 Integrity
- 7 Impartiality
- 8 Timeliness (punctuality)
- 9 Detail orientation
- 10 Outstanding (or at least good) language/writing skills

G. M. Garmel. [Reviewing manuscripts for biomedical journals.](#)
The Permanente journal, 14(20740129):32–40, 2010

Types of Reviews

Three types of peer review processes:

Single blind Reviewers are anonymous, authors are not

Double blind Both reviewers and authors are anonymous

Open Everyone's identity is known to everyone

E. C. Moylan, S. Harold, C. O'Neill, and M. K. Kowalcuk. Open, single-blind, double-blind: which peer review process do you prefer?

BMC Pharmacology and Toxicology, 15(1), 2014

Overview of Major Considerations for Peer Review

- 1 ethical issues
- 2 being invited and declining/accepting
- 3 overview and critical readings

- 4 reading relevant background literature
- 5 research//work relative to the state-of-the-art
- 6 technically sound (e.g. methodology, data reporting)
- 7 spot checking citations and data

- 8 research/work novelty
- 9 reproducibility of the work

- 10 appropriateness of research/work relative to journal/conference
- 11 writing, editing and submitting the review
- 12 private comments to the editor

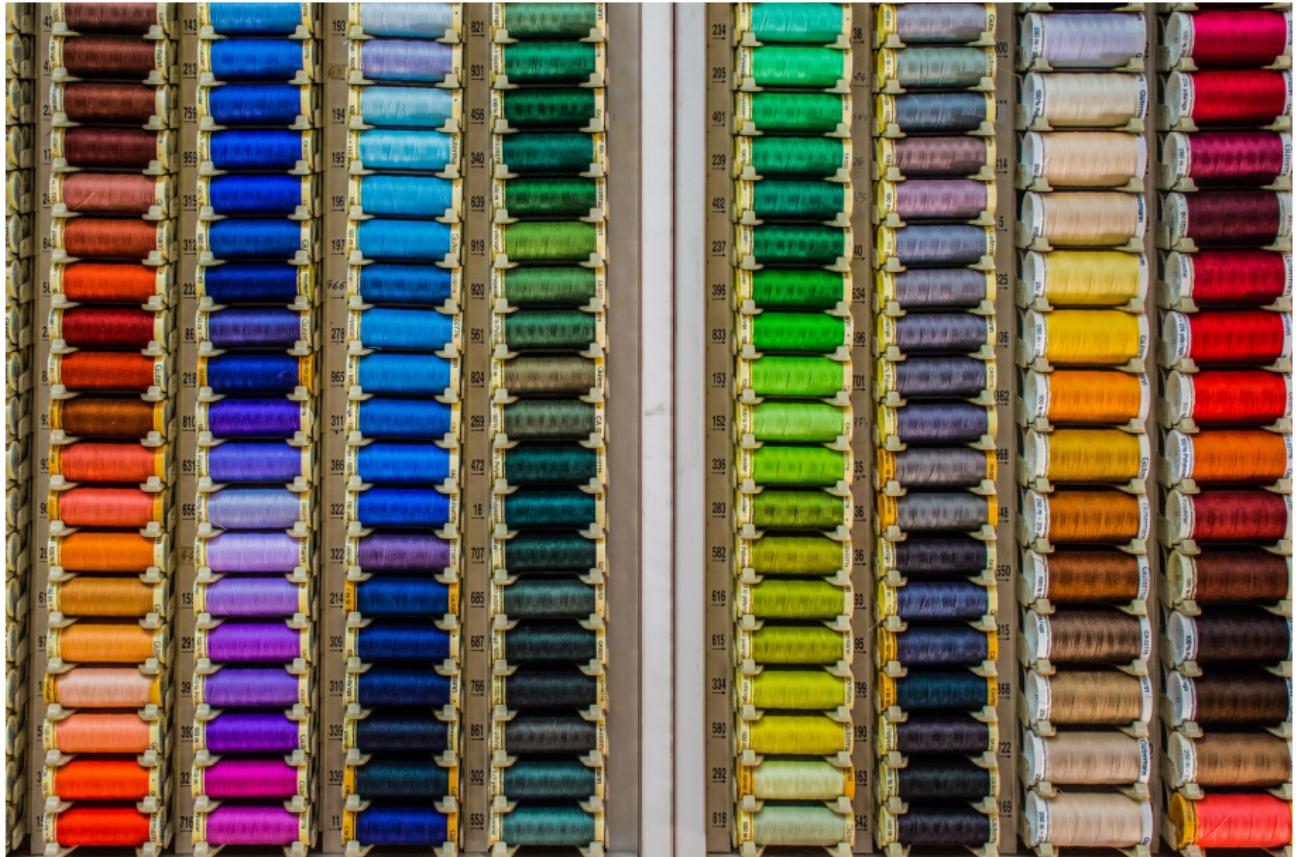


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Ethics

Ethical Obligation in Peer Review

You are obligated to:

- Insure you have no conflict of interest
 - Relationship (e.g. mentor, previous coauthor)
 - Financial (e.g. company interests)
 - Academic competition (e.g. rejecting or delaying their publication)

- Be as objective (unbias) as possible in the evaluation. Be blind to...
 - Gender of authors (especially of corresponding author)
 - Reputations of institutions
 - Well known scientists

J. Bohannon. [Who's afraid of peer review?](#)
Science, 342(6154):60–65, 2013

D. J. Benos, K. L. Kirk, and J. E. Hall. [How to review a paper.](#)
Advances in Physiology Education, 27(2):47–52, 2003

Ethical Obligation in Peer Review

You are obligated to:

- Be honest and neutral in your critique

 - Be informed of the state-of-the-art in context to the manuscript

 - Not plagiarize the ideas or data that you review confidentially
-

J. Bohannon. [Who's afraid of peer review?](#)
Science, 342(6154):60–65, 2013

D. J. Benos, K. L. Kirk, and J. E. Hall. [How to review a paper.](#)
Advances in Physiology Education, 27(2):47–52, 2003

You are obligated to:

- Remain anonymous (blind reviews)
 - Small communities - writing style and wording can provide clues about who the reviewer was, so be careful
 - Remove metadata from your electronic document (or use the journal's online portal)
 - Don't show the work to others (e.g. mentor → graduate students ... this is a gray area)
 - Be careful concerning talking about your reviews
 - Reveal authors' identities (through association)
 - Reveal yourself as a reviewer to authors (could have bad consequences)
 - **Inform others of private ideas/techniques (enabling others to "scoop").**

P. E. Bourne and K. Alon. [Ten simple rules for reviewers.](#)

PLOS Computational Biology, 2(9):1–2, 09 2006



Photo by Daniel Chekalov on Unsplash

The Invite

Accept or Reject Review Assignment

- Accept a review assignment only if you can get it done within the requested timeframe
 - This is fair to the authors
 - It saves editor time; save journal money
- Avoid conflict of interest (ethical obligation)
 - Must judge this from the manuscript's title, authors and abstract (if available)
 - When in doubt, ask the assigning editor

P. E. Bourne and K. Alon. [Ten simple rules for reviewers.](#)
PLOS Computational Biology, 2(9):1–2, 09 2006

Accept or Reject Review Assignment

Accept assignment start the review process

Reject assignment due to time limitations or conflict of interest

- Suggest others to the editor who could review the manuscript
 - Title and full name
 - Affiliations
 - Expertise
 - Email



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The Review

Your First Reading of the Manuscript

Goals: 1) Get an **overview** of the manuscript, and 2) see if it is **conceptually consistent** (i.e. consistent goals and take-home messages)

- Print the manuscript (or at least the figures and tables).
- Use a highlighter, and write reminder notes for yourself on the manuscript.
- Identify (or at least try to) the primary and secondary goals of the manuscript.
- See if these goals are stated & mirrored within the "Abstract" and "Conclusions" sections.
- Is the general methodology appropriate for obtaining the goals?
- Is there a "**red line**" that creates a consistent story that connects the different sections together?

Your First Reading

- Check for general consistency and thought process

For example:

- Inconsistencies within Tables, Figures and References
- Are the tables and figures concise - i.e. no redundant information
- Is Methodology info scattered throughout manuscript?

Why do this?

It tells you something about the author's

- Attention to details
- Thoroughness of their revision process, data reporting, etc.

(You are getting insight into the primary author's mind)

Your first reading should take about 1-3 hours

After Your First Reading

Identify where **your knowledge** is lacking

- Conceptual ideas related to the goals (including state-of-the-art)
 - Methodologies (including the state-of-the-art) (e.g. software, math, equipment, techniques)
-

Educate yourself

- Read the articles that the authors cite
- Do a citation search on the authors' references
- Google Scholar (or a similar engine) search for reviews and important papers (e.g. based on citation counts)

Critical Reading - Four different conceptual levels

Four different conceptual levels

1 The big idea

Goal → Methodology → Data → Interpretation (i.e. red line)

2 The details

- Reproducibility (methodology → data)
- Math
 - Are the equations correctly presented?
 - Can you reproduce calculations (e.g. averages)?
- References - Are the references correct for the given citation?
 - At a minimum, spot check them:
 - e.g. "Kirschner et al.'s 2000 paper [2]..."
 - "[2] Smith, Kirschner, Jones (2001)..."
 - Previously published data - are they correctly given (i.e. spot check) and cited (e.g. original sources given)

Critical Reading - Four different conceptual levels

3 Formatting and reporting

- Significant figures and number precision (e.g. 0.2 versus 0.15)
- Units (check within text, tables and figures)
- References - missing information (e.g. pages), misspelling of names (umlauts), missing authors (difficult to identify)

4 Ethical considerations

- Are there appropriate citations for other's ideas?
- Are there citations for other's data (e.g. within tables)?
- Are there plagiarized sentences?
- Are the experiments done ethically (e.g. studies involving animal and humans)
- Should the results be reported at all - could they be used to do harm?

Checklist for Peer Review

A guide for conducting the review.

1 Overall

- Importance of the manuscript's central goal
- Originality of the work
- Quality of the work

- Writing - Is it clear, concise and in good English?

2 Title - Is it specific and does it reflect the manuscript content?

D. J. Benos, K. L. Kirk, and J. E. Hall. [How to review a paper.](#)

Advances in Physiology Education, 27(2):47–52, 2003

R. Tandon. [How to review a scientific paper.](#)

Asian Journal of Psychiatry, 11:124–127, oct 2014

Checklist for Peer Review

3 Abstract

- Does it indicate the purpose of the work, what was done, what was found, and the significance?
 - Is it concise?
 - Are there discrepancies between its content and the text within the manuscript?
 - Is it readable by a larger audience?
 - Does it stand on its own (i.e. one doesn't need to read the manuscript for understanding)?
-

D. J. Benos, K. L. Kirk, and J. E. Hall. [How to review a paper.](#)

Advances in Physiology Education, 27(2):47–52, 2003

R. Tandon. [How to review a scientific paper.](#)

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Checklist for Peer Review

4 Introduction

- Is a rationale for the study provided that is base on a review of the literature?
(What knowledge is missing? What is the state-of-the-art?)
(Is the literature appropriate and modern.)
- Is the purpose of the study clearly laid out?

5 Methodology

- Are the methods appropriate?
 - Is there sufficient methodological detail to allow reproducibility?
-

D. J. Benos, K. L. Kirk, and J. E. Hall. [How to review a paper.](#)

Advances in Physiology Education, 27(2):47–52, 2003

R. Tandon. [How to review a scientific paper.](#)

Asian Journal of Psychiatry, 11:124–127, oct 2014

Checklist for Peer Review

6 Results

- Are the results clearly introduced (e.g. each figure and table discussed within the text)?
- Are the tables and figures presented in a logical sequence?
- Should any data (in what ever form) be omitted or moved to SI material?
- Figures
 - Are they appropriate/justified?
 - Are they high enough resolution with good font size?
 - Are there legends to explain the figures?
 - Is the caption written to stand alone?
- Tables
 - Can they be simplified or condensed?
 - Is the caption written to stand alone?
- Abbreviations and symbols - Are these introduced or misused?

J. M. Provenzale and R. J. Stanley. [A systematic guide to reviewing a manuscript.](#)

Journal of Nuclear Medicine Technology, 34(2):92–99, 2006

R. Tandon. [How to review a scientific paper.](#)

Asian Journal of Psychiatry, 11:124–127, oct 2014

Checklist for Peer Review

7 Discussion

- Is the new knowledge clearly presented?
- Is there a discussion of how the new results fit with those in previous literature?
- Are approximations and their impact on the data interpretation discussed (i.e. weaknesses of the study)?
- Are the conclusions and their importance appropriate, or are they under-/**overstated**?

8 Conclusion

- Are the goal, methods and findings summarized?
- Is there an outlook at what comes next?

9 References - are they relevant and current (also see Slide 25's ideas)?

For example: "Recent advancement [1] have enabled ..."

[1] Smith et al. (1995)...



Photo by Jonah Petrich on Unsplash

Writing the Review

General Guidelines for Writing the Review

- Write a review that you want
 - Your identity is known to the editor - journals keep a profile on you (e.g. expertise, quality, timeliness)
 - A good chance that the other reviewers will have access to your review
- Support your criticisms
- Support your praise
- Your comments should lead to a better paper
 - You are an unacknowledged partner in the paper
- Write clearly, concisely and use a neutral tone
 - Bullet point lists - sequentially follows the manuscript; easy to follow

P. E. Bourne and K. Alon. [Ten simple rules for reviewers](#).

PLOS Computational Biology, 2(9):1–2, 09 2006

Opening Paragraph(s)

One paragraph opening that:

- 1 Identify authors (and maybe manuscript title)
- 2 Identify the scientific aspect (i.e. the **novelty**) that is addressed
- 3 Summarize strength and weaknesses
- 4 State recommendation (journal or conference should give a selection)

- | | |
|---------------------------------------------------|---------------------|
| ■ Accept as is | ■ Strong acceptance |
| ■ Accept after minor corrections | ■ Weak acceptance |
| ■ Accept after major corrections (another review) | ■ Weak rejection |
| ■ Reject | ■ Strong rejection |

- 5 Identify *your expertise* in context of the manuscript

Opening Paragraph(s)

Example of a general opening paragraph(s):

- 1 This manuscript, by Smith and coworkers, is a study on ...
- 2 While previously investigated, the novelty of this work is ...
- 3 The research appears to be done competently with state-of-the-art approaches ...
- 4 It would benefit from improving ...
- 5 The topic is appropriate for Journal X, falling under the category ...
- 6 I recommend publishing after minor corrections.
(New paragraph)
- 7 My expertise with regards to this manuscript is...
- 8 (I will limit my comments to the portion that lies within my expertise.)

Opening Paragraph Examples

- "Reviewer #1: The manuscript by [Bernardi et al.](#) reports molecular dynamics (MD) simulations of butyrylcholinesterases (BChEs) with free Asn241 and glycosylated Asn241. It further suggests that of nine N-glycosylation sites in BChE Asn241 is a glycosylation site that critically affects the structure and function of BChE. [This work is important because](#) N-glycosylation affects BChE stability and its reactivity. [It offers new insight into](#) design of BChE mutants as improved scavengers against nerve agents. The reported MD simulations are of high quality as the simulations were performed under isothermal-isobaric conditions rather than microcanonical conditions. [I recommend publication if the authors can address the following issues.](#)"

Opening Paragraph Examples

- "Reviewer #1: **The authors** present a nice study of predicted binding poses for a very difficult problem of thiosptreptin binding to the 23S. **My recommendation is to publish after minor revisions which are mostly elaborations'**"
- "Reviewer #2: In this study, **Kirschner and co-workers** use a combined ... They show that ...

This study is well conducted and the manuscript well written."

Opening Paragraph Examples

- "It is a very good paper, of high technical importance, well written/structured and certainly worth to be published, thus **I recommend publication. However**, many figures are too small and need a magnifying glass to be understood , moreover there are many too many misprints.
I would go through the paper carefully once again. **Except for these minor aspects, the paper is ready.**"

- "The manuscript is a well-described overview of a collection of ... **I feel that it can be published in its current state, with the exception of some very minor revisions included below.**"

- "[...] Hence, the reviewer can recommend the publication of this manuscript in ACS Omega after revising the points suggested below."

Examples of a Simple, Collegial Rejection

Review Round 1 "The authors describe an update to the ACPYPE software that allows

...

Although the introduced update is a highly important and welcome addition to the software functionality of ACPYPE, I feel that the impact is not sufficient to warrant a dedicated publication. As the authors write, it is a relatively small code change and the added functionality of ... is a useful and welcome, but also relatively minor update."

Review Round 2 "Although I strongly agree with the authors that it is important to inform software users of deficiencies and bugfixes (and I also agree that this is an important one), I do not feel that a scientific journal is the right channel to do so. None of the major codes I am familiar with follow this strategy and I didn't find a valid justification for an exception here. In fact, I would argue that if different contributors to a code publish their updates and fixes across different journals, this would be highly confusing to the users.")

- "While the investigation does provide some insights into the performance of different ... **it is too specialized / narrow in scope for publication in J. Chem. Phys.** Specifically: ... (reasons for why it is not suitable for JCP)

Some other points the authors might like to consider: ... (bullet points follow)"

Important and Helpful Feedback Statements

Time to start being a good communicator through writing.

You goal is to guide the authors in your critique.
(New letter section: **Detailed Comments**)

How to identify specific points for *discussion*

- Section
- Line number
- Page number (might be problematic - could be page number of their original document, or after it has been uploaded and a title page has been added)
- Section X.Y (page number)
- Give no reference ← don't do this for specific points that you want to highlight!

Important and Helpful Feedback Statements

Examples:

- "4. Section 1.2.3 (page 9), paragraph between equations 3 and 4. The acronym "LES" is mentioned without being defined. It is defined later in this section. **Please define it upon its first use.**"
- "Page 21, line 42 "carbene group" - please rephrase for a general reader."
- "As far as the used basis sets are used, I would suggest commenting on less popular polarization-consistent basis sets by Jensen. This way one could obtain results of similar accuracy to correlation-consistent ones but computationally cheaper." → This lead to a new research project and manuscript!
- "**Introduction**
...[comments]...
Methods.
Model setup. Authors choose 1P0I structure with 4 mutated residues reducing glycosylation. Although...
Simulation setup. There is important and useful note..."

Closing Letter Statements

Closing statements are typically general/overview ideas that can be important for improving a manuscript, or more collegial in nature.

- Please consider comparing your results with those from theory x, which is considered to produce benchmark values.
- "These observations and inconsistencies need clarification prior publication."
- "Finally, in the Conclusion I was expecting a discussion of the findings of this study with respect to the future design of ..."
- "On the other hand, there is not much to criticize. Personally I do not like very large tables, difficult to read. However, I understand that it was difficult to include all the information in "one place""
- "In conclusion, I am please to recommend the manuscript for publication in [jounral]"

Summary of Review Letter

3 basic sections:

- 1 Opening Paragraph(s)
- 2 Detailed Comments (e.g. Page 2, Line 1:)
- 3 Closing Paragraph

And remember:

- Be ethical
- Be polite
- Be an advocate
- Be clear and concise
- Strip file of meta data
(e.g. File → Properties: your name, affiliation)

Comments to the Editor

- Optional
 - Seen only by the editor
 - Editor can use this to help decide about split reviewer decisions

 - Provide your personal opinion, hunches, ethical concerns and perspective - with supportive statements
 - State uncertainty about appropriateness of journal
-

R. M. Rosenfeld. [How to review journal manuscripts.](#)

Otolaryngology-Head and Neck Surgery, 142(4):472–486, apr 2010

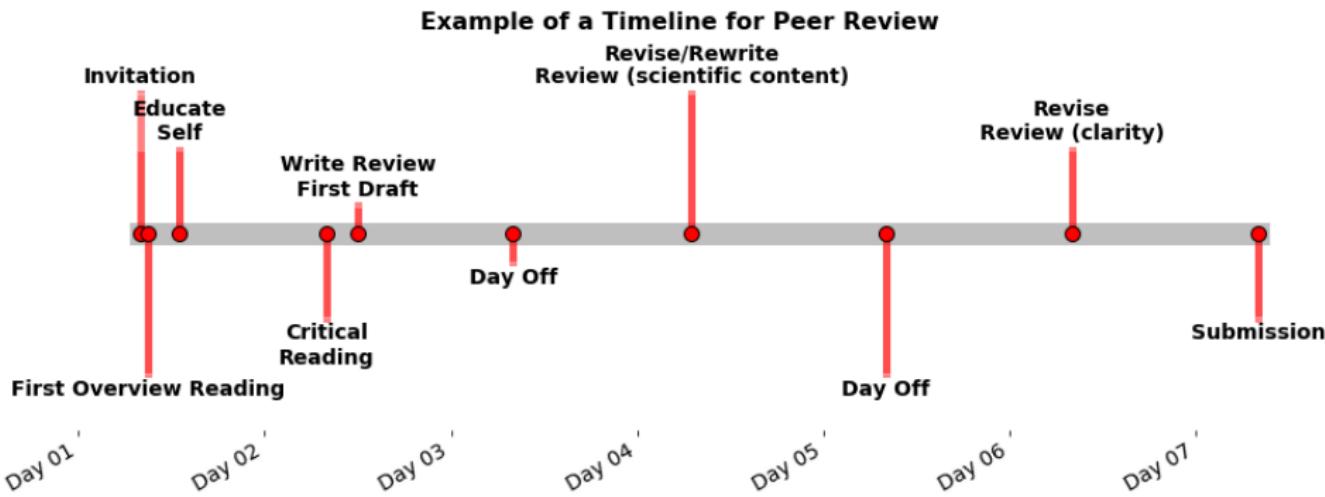
**Personal Opinion: Nearly everything I say to the editor
I will say to the authors.**



Photo by Andrik Langfield on Unsplash

Wrap-up

Example of a Review Timeline



The time required and the quality of your reviews will improve with experience.

Summary

- 1 The research goal / question is very important to guide reviewers / future readers
- 2 Originality of work
- 3 Itemize the strengths and weaknesses of methodology / experimental / statistical approach / interpretation of results
- 4 Writing style, clarity and figure / table presentation
- 5 Ethical concerns (animal / human)

"...peer review is not about happiness, it is about creating better, clearer, and more accurate manuscripts that, if published, contribute the most to science..."

D. J. Benos, K. L. Kirk, and J. E. Hall. [How to review a paper.](#)

Advances in Physiology Education, 27(2):47–52, 2003

R. M. Rosenfeld. [How to review journal manuscripts.](#)

Otolaryngology-Head and Neck Surgery, 142(4):472–486,
apr 2010

What Does This Mean For Your Own Manuscripts?

You want to write a manuscript that makes the reviewer's job easy.

Get the reviewers to be your advocates.

- "This is a well written manuscript that advances our current understanding."

versus

- "This manuscript suffers from X, making it's originality difficult to identify."

What Does This Mean For Your Own Manuscripts?

- Have a consistent **red line** throughout
- Put methodology statements in **Methodology**
- Proofread for inconsistencies
- Give a good **title**
- **Abstract** - General audience, concise and standalone
- **Introduction** - Good literature citations, state-of-the-art and goals clearly stated
- **Methods** - Provide enough info for reproducing the data
- **Results** - Tables and figures that are concise (i.e. not redundant). Logical sequence of data presentation
- **Discussion** - New knowledge/idea clearly presented. Discuss approximations/weaknesses. Justify conclusions with good argumentation. Over- and understatements
- **References** - Does it include state-of-the-art? Any missing information? Are they appropriate?

References |

- [1] D. J. Benos, K. L. Kirk, and J. E. Hall. How to review a paper. *Advances in Physiology Education*, 27(2):47–52, 2003.
- [2] J. Bohannon. Who's afraid of peer review? *Science*, 342(6154):60–65, 2013.
- [3] P. E. Bourne and K. Alon. Ten simple rules for reviewers. *PLOS Computational Biology*, 2(9):1–2, 09 2006.
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- [5] J. A. Hill. How to review a manuscript. *Journal of Electrocardiology*, 49(2):109–111, mar 2016.
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- [7] J. M. Provenzale and R. J. Stanley. A systematic guide to reviewing a manuscript. *Journal of Nuclear Medicine Technology*, 34(2):92–99, 2006.
- [8] R. M. Rosenfeld. How to review journal manuscripts. *Otolaryngology-Head and Neck Surgery*, 142(4):472–486, apr 2010.
- [9] R. Tandon. How to review a scientific paper. *Asian Journal of Psychiatry*, 11:124–127, oct 2014.