

How to review a scientific paper?

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How to peer review?

Although it is an important aspect of the scientific process, how to peer review is rarely taught in universities and can be a daunting task for those new to it.

Compared with conducting research, teaching, and writing our manuscripts, reviewing someone else's work may seem relatively easy.

In fact, reviewing effectively is a special skill that takes time and effort to develop.

This talk gives you an introduction to peer review and explains how you should go about reviewing a paper.

By the end of this talk you should:

- ❖ understand the purpose of peer review and the different types available
- ❖ be able to assess whether you would be a suitable reviewer for manuscripts you are invited to review
- ❖ know how to evaluate each section of a manuscript
- ❖ know what to include in your report

You will also have the opportunity to test your learning by completing a quiz at the end.

What is a Peer Review?

Why it's done?

and

How we can do it?

There is a lot of differences between many of the **research claims** that you read in **newspapers** and **magazines**, find on the **internet**, or hear on **television** and the **radio**, with those published in a **peer-reviewed (refereed) periodical journal**.

What is an academic journal?

- ❖ **Academic journals** are periodicals in which researchers publish articles on their work.
- ❖ Most often these articles discuss recent research.
- ❖ **Journals** also publish theoretical discussions and articles that critically review already published work.
- ❖ **Academic journals** are typically peer-reviewed journals.

What is a scientific journal article?

- ❖ In academic publishing, a **scientific journal** is a periodical publication intended to further the progress of **science**, usually by reporting new research.
- ❖ There are thousands of **scientific** journals in publication, and many more have been published at various points in the past (see list of **scientific** journals in your field).

What is a journal paper?

- ❖ An academic or scholarly **journal** is a peer-reviewed or refereed periodical in which scholarship relating to a particular academic discipline is published.
- ❖ Academic **journals** serve as forums for the introduction and presentation for scrutiny of new research, and the critique of existing research.

History of the Peer Review Process

- ❖ Peer review has been a formal part of scientific communication.
- ❖ The first scientific journals appeared more than 400 years ago.
- ❖ *The Philosophical Transactions of the Royal Society of London* is thought to be the first journal to formalize the peer review process in the **1665**.

Advantages of the Peer Review System

Peer review exists:

- ❖ to ensure that journals publish good science which is of benefit to entire scientific community.
- ❖ Scientific integrity and consensus rely on the peer review process.
- ❖ Quality validation by fellow experts serves to increase the legitimacy and credibility of an article.
- ❖ Ensuring that issues like adulterated work and plagiarism are nipped in the bud.
- ❖ Peer reviewers offer their criticism and suggest improvements in the manuscript, thus allowing the authors to improve the quality of their own work, helping them make a better impact in their field of work.
- ❖ Peer review also **helps the Journal select the best manuscripts** and ensures that they maintain the high standard of their journal through the continuous addition of high quality articles that have been deemed to be of high quality by a panel of experts.

Types of peer review

❖ **Single Blind or Closed Peer Review:** The names of the reviewers are hidden from the author, while the reviewers are aware of the authors' identities.

❖ **Double Blind Review:** Both the reviewer and the author remain **anonymous**. Neither authors nor reviewers know each other's identities.

❖ **Open Review:** The reviewers are aware of the authors' identity and the reviewers' identity is revealed to the authors. In some cases, journals also publish the reviewers' reports alongside the final published manuscript.

Who is a peer reviewer?

- ❖ Peer reviewers are experts who volunteer their time to help improve the journal manuscripts they review.
- ❖ They offer authors **free advice**.

Why serve as a peer reviewer?

Why do reviewers review? And what are benefits! of reviewing articles?

It is an integral part of the scientific processes.

As your career advances, you are likely to be asked to serve as a peer reviewer.

- ❖ Academic "duty".
- ❖ Serving as a peer reviewer looks good on your CV as it shows that your expertise is recognized by other scientists.
- ❖ Keep up-to-date with the latest developments.
- ❖ Aware of new research before their peers. You will get to read some of the latest science in your field well before it is in the public domain.
- ❖ Helps with their own research and/or stimulate new ideas
- ❖ Builds association with prestigious journals and editors
- ❖ Career development. The critical thinking skills needed during peer review will help you in your own research and writing.

Who is peer review for?

When peer reviewing, it is helpful to think from **the point of view of three different groups** of people:

1. Authors. Try to review the manuscript as you would like others to review your work.

- Help the authors to improve the manuscript.
- Assume that the authors are doing their best to produce an excellent manuscript but need objective outsiders to help identify problems in their methods, analysis, and presentation.
- Even in the case of rejection, your suggested revisions could help the authors prepare the manuscript for submission to a different journal.
- **Ultimately peer review should be a positive process.**

2. Journal editors. Comment on the importance and novelty of the study.

- Editors will use your comments to assess whether the manuscript is of the right level of impact for the journal.
- Editors need to know **why** you think a paper should be published or rejected as your reasoning will help inform their decision.

3. Readers. Identify areas that need clarification to make sure other readers can easily understand the manuscript.

- As a reviewer, you can save readers' time and frustration by helping to keep unimportant or error filled research out of the published literature.
- By taking the time to be a good reviewer, several hours or more, you will be providing a service to the scientific community.

Considering a Request to Serve as a Reviewer and Accepting an invitation

When you receive a request from an editor to review a manuscript, there are several issues to consider, including:

1. *How your expertise matches? What the editor is looking for? Are you qualified?* Subject matter expertise is essential to being able to substantively critique a manuscript.

Firstly, ask yourself "Does my area of expertise and experience qualify me to thoughtfully evaluate the manuscript?"

It will usually be okay if you can review some, but not all, aspects of a manuscript. If the manuscript is too far outside your area, you should decline to review it.

2. *Whether you can provide the review by the stipulated deadline? Do you have time?* Timeliness in the peer review process is critical because journals strive to publish new material as expeditiously as possible. A review process needs several days. But, keep in mind that reviewing manuscripts, like research and teaching, is a valuable contribution to science, and is worth making time for whenever possible.

3. Whether you can be unbiased? Are there any potential conflicts of interest? you should be able to provide a fair review.

Another question to ask yourself is, "Can I provide a fair and unbiased review of this work?" You should evaluate the manuscript as fairly and objectively as possible.

Potential conflicts of interest include:

- a. The reported results could cause you to make or lose money, e.g., the authors are developing a drug that could compete with a drug you are working on.
- b. The manuscript concerns a controversial question that you have strong feelings about (either agreeing or disagreeing with the authors).
- c. You have strong positive or negative feelings about one of the authors, e.g., a former teacher who you admire greatly.
- d. You have published papers or collaborated with one of the co-authors in recent years.

If you are not sure if you have a conflict of interest, discuss your circumstances with the editor.

Other ethical issues except conflict of interest:

- ❖ Manuscripts under review are **highly confidential**, so you should not discuss the manuscript - or even mention its existence - to others.
- ❖ One exception is if you would like to consult with a colleague about your review; in this case, you will need to ask the editor's permission.
- ❖ It is normally okay to ask one of your students or postdocs to help with the review. However, you should let the editor know that you are being helped, and tell your assistant about the need for confidentiality.
- ❖ In some case(s), when the journal operates an open peer review policy they will allow the student or postdoc to co-sign the report with you should they wish.
- ❖ It is very unethical to use information in the manuscript to make business decisions, such as buying or selling stock.
- ❖ Also, you should never plagiarize the content or ideas in the manuscript.

Peer Review Process

- ❖ As mentioned above, peer review is a system used by scientists in **the Editorial Board of a Journal** to decide which research results should be published in a scientific journal.
- ❖ The peer review process subjects scientific research papers to independent scrutiny by other qualified scientific experts (peers) before they are made public.
- ❖ Peer review helps **validate research, establish a method by which it can be evaluated, and increase networking possibilities** within research communities.
- ❖ Therefore, peer review is a well established scholarly practice of getting a manuscript read and analyzed by experts in that field.
- ❖ **Reviewers play a central role in scholarly publishing.**

Peer Review Goals

Journals vary widely in their review guidelines, but their goals are very similar. Nonetheless, the goals of peer review are crystal clear:

- ❖ To ensure the accuracy of the work and data. **It is the only widely accepted method for research validation.**
- ❖ To improve the quality of published literature through constructive criticism.
- ❖ Another important purpose of peer review is to make sure that the manuscripts published in the journal are of the correct quality for the journal's aims.

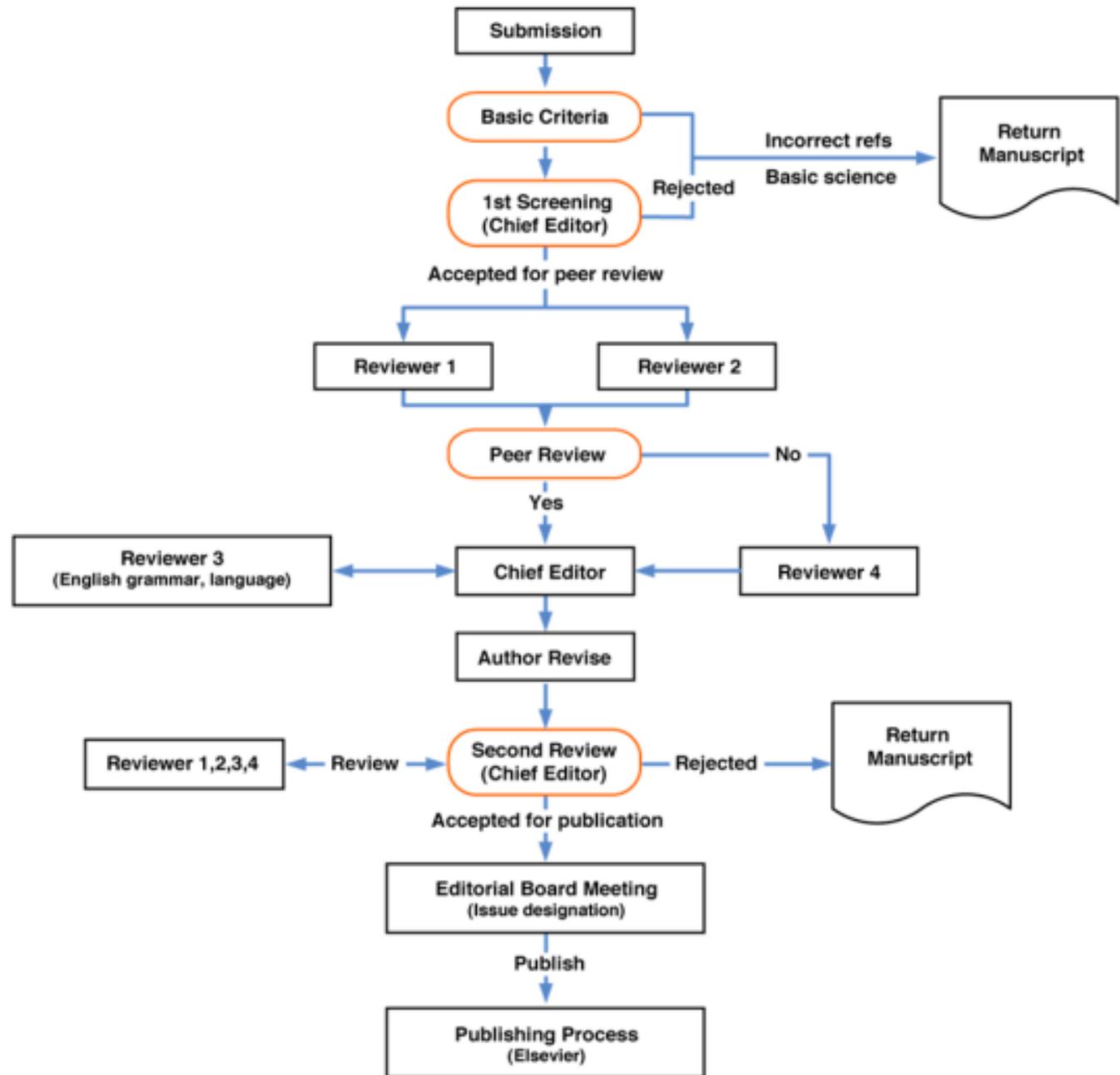
Reviewer's Role

- Editors of scientific journals draw on a large pool of suitable experts to scrutinize papers before deciding whether to publish them.
- Reviewers or scientific experts in the field, other than the authors, check research papers for:
 - ❖ **Novelty:** is it a new finding, theory, etc.?
 - ❖ **Validity:** are the research results credible; are the design and methodology appropriate?
 - ❖ **Significance:** is it an important finding?
 - ❖ **Originality:** are the results new? Does the paper refer properly to work done by others?
 - ❖ **Clarity:** do different parts clearly written? Is it reproducible?

Through the peer-review process, manuscripts should become:

- ❖ **More robust:** Peer reviewers may point out gaps in your paper that require more explanation or additional experiments.
- ❖ **Easier to read:** If parts of your paper are difficult to understand, reviewers can tell you so that you can fix them. After all, if an expert cannot understand what you have done, it is unlikely that a reader in a different field will understand.
- ❖ **More useful:** Peer reviewers also consider the importance of your paper to others in your field and can make suggestions to improve or better highlight this to readers.
- ❖ Of course, in addition to offering authors advice, another important purpose of peer review is to make sure that the manuscripts published in the journal are of the correct quality for the journal's aims.

The major steps throughout your review, from contemplating a review request, reading and assessing the manuscript to writing the review and interacting with the journal's editors.

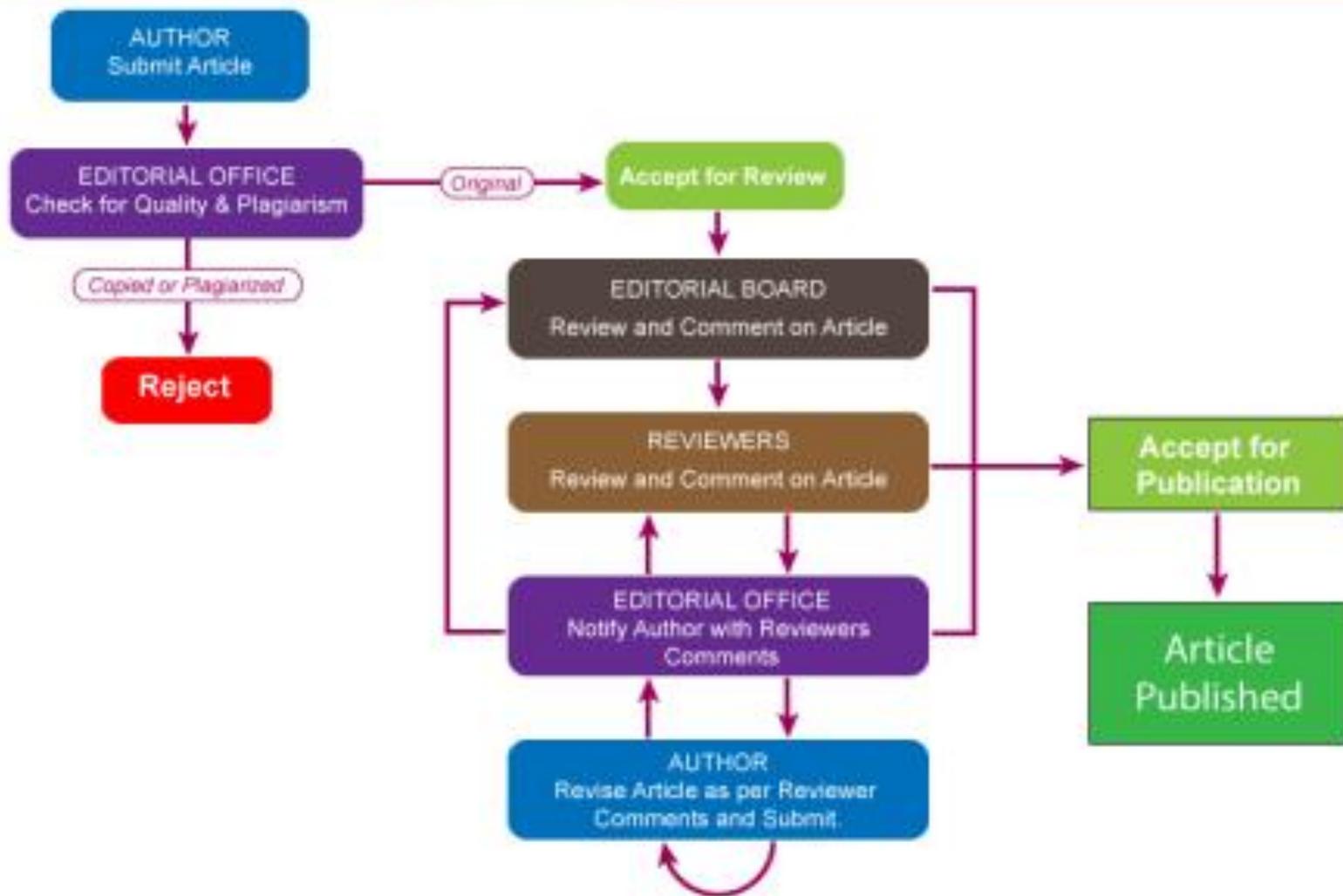


Peer Review Process

A flowchart depicting the major steps and decisions facing a peer reviewer throughout the review process.



Peer Review Process by Sci Forschen



Different Types of Evaluation Report

❖ Some journals will ask you to answer specific questions or rate the manuscript on various attributes (these often are not visible until you log in to submit your review, so upon agreeing to do the review, check for any journal- specific guidelines).

❖ However, some journals do not provide criteria for reviews beyond requesting your “analysis of its merits” or similarly open-ended directions; in that case the techniques below are a useful approach to writing a constructive and efficient review.

Reviewing the Manuscript

1. Skim the entire paper and evaluate whether or not it is publishable in principle.
2. Read through the paper a second time for detail, and draft the main points of your review.
3. Quickly read through the paper a third time, looking for organizational issues, and finalize the review.

Evaluating the Manuscript

- ❖ Ask questions such as:
- ❖ What research question(s) do the authors address?
- ❖ What methods do the authors use to answer the question? Were the results analyzed and interpreted correctly? Does the evidence support the authors' conclusions?
- ❖ Will the results advance your field in some way? If so, how much? Does the importance of the advance match the standards of the journal?
- ❖ Will other researchers be interested in reading the study? If so, what types of researchers? Do they match the journal's audience?
- ❖ Does the manuscript fit together well? Does it clearly describe what was done, why it was done, and what the results mean?
- ❖ Is the manuscript written well and easy to read? If the manuscript has many mistakes, you can suggest that the authors have it checked by a native English speaker.

- ❖ Prior to commenting on Abstract, if necessary, add a short (few sentence) summary of article, indicating a general comprehension of article, its importance, your enthusiasm.
- ❖ Avoid personal remarks and excessive or pointlessly clever and sarcastic remarks. Remember that reviewer comments can be hurtful. If you must express strong emotions, add such remarks to "comments to editor."
- ❖ You can then proceed in evaluating the individual sections of the paper.

Title, abstract and key words

The title, abstract and key words are items that will help other researchers to find the published paper and decide if they will read further.

Abstracts must be a clear, short summary of the full manuscript. Researchers want their work to be read, so it is important that their abstract be interesting and hold the reader's attention. More people will read the abstract than will read the full paper, so it should be easy to understand by readers without a specialized background.

Some questions to ask yourself about the title, abstract and key words are:

- Does the title accurately say what the study was about? If not, can you suggest a different title?
- Does the abstract effectively summarize the manuscript?
- Could the abstract be understood by a researcher outside your specialty?
- Does it include enough information to stand alone? Does the abstract contain information that is unnecessary?
- Is there any information in the abstract that is not in the main text of the manuscript?
- If present, will the key words help readers to find the article? Are they specific, and do they represent the manuscript content?

Introduction

- ❖ The introduction should be concise and to the point
- ❖ Provides proper perspective consistent with nature of journal
- ❖ Cites original and important work plus recent reviews for mature areas to provide context
- ❖ States purpose of paper and research strategy adopted to answer the question but does not give results and/or discussion or a summary of the paper (abstract should do this)
- To comment on effectiveness, clarity, organization
- To suggest changes in organization
- To document major grammar, style problems
- To point authors to appropriate cites [Don't only say "authors have done a poor job of citing relevant research." At least point out that the "early work of Smith et al. has been (again) omitted"]

Experimental/Methods

See whether the mentioned points here has been applied

- the author accurately explains how the data was collected
- the design is suitable for answering the question posed
- There is sufficient information to allow the research to be replicated
- the article accurately identifies the procedures followed, and these are ordered in a meaningful way
- If the methods are new, they are explained in detail
- the sampling is appropriate
- the equipment and materials have been adequately described
- the article makes it clear what type of data was recorded
- the author has been precise in describing measurements?

Results and Discussion

- ❖ Include first a design of research. Continue with description of experimental results. Include "ongoing conclusions" if appropriate
- ❖ Use figures to illustrate typical results, S/N, peak shapes. Minimize figures despite the cliché: "a figure is worth a thousand words. . ."
- ❖ Avoid excessively enthusiastic interpretations (Don't use words such as "novel", "first time", "first ever", "paradigm-changing" etc. Allow others to draw such conclusions)
- ❖ Insure interpretations and interim conclusions are justified
- ❖ Comment on suitability of data, tables, figures, etc for inclusion as supplementary material

Results and Discussion

- Suggest organization changes, improvements in presentation and style
- Comment on logic and justification of conclusions and interpretations
- Detail concisely and carefully required changes (recall that author must respond or rebut your requirements!). Minimize the number, if possible. Avoid —thinking out loud
- Consolidate as one item suggested changes in style, grammar, and other small changes
- Comment on number of figures, tables, schemes, their need and their quality
- Require or suggest other experiments. Make clear the need for such. Defer to editor if you are unsure whether new experiments are essential or would be more appropriate for future studies
- When suggesting further work, be aware of the nature of submission—is it a communication, note, full article?

Conclusions

- ❖ Present global and specific conclusions
 - ❖ Indicate uses and extensions if appropriate
 - ❖ Suggest future experiments and indicate those that are underway
 - ❖ Do not summarize paper (abstract is for that purpose)
 - ❖ Avoid judgments about impact
-
- Comment on validity and generality of conclusions. Request “toning down” claims to generality that are not justified
 - Request removal of redundancies and summaries

References, Tables, Figures

- Check, if possible, accuracy of cites
- Comment on number of cites, if necessary
- Point out redundancies, incomplete cites (missing volume nos, page numbers, author spellings)
- Comment on need for figures, their quality, legibility (recall figs are often published in one column) presentation and relevance
- Comment on need for color in figures (recall color is allowed in electronic versions but expensive in print version)
- Comment on Table footnotes and request additional ones

Ethical Issues

Plagiarism. If you suspect that an article is a substantial copy of another work, let the editor know, citing the previous work in as much detail as possible

Fraud. It is very difficult to detect the determined fraudster, but if you suspect the results in an article to be untrue, discuss it with the editor

Other ethical concerns. If the research is medical in nature, has confidentiality been maintained? If there has been violation of accepted norms of ethical treatment of animal or human subjects these should also be identified

Communicating Your Report to the Editor

- provide a quick summary of the article at the beginning of your report
- the report should contain the key elements of your review. Commentary should be courteous and constructive
- Explain and support your judgment so that both editors and authors are able to fully understand the reasoning behind your comments.
- When you make a recommendation regarding an article, consider the categories the editor most likely uses for classifying the article.
 - a) Reject (explain reason in report)
 - b) Accept without revision
 - c) Revise (either major or minor)
- Last, clearly identify what revision is required, and indicate to the editor whether or not you would be happy to review the revised article.

Common Reasons for Rejection

A manuscript can be rejected for many reasons but these can generally be divided into **technical and editorial reasons**.

Technical reasons: usually require more work such as further experiments or analysis before it can be published.

These reasons for rejection include:

- ❖ Incomplete data such as too small a sample size or missing or poor controls.
- ❖ Poor analysis such as using inappropriate statistical tests or a lack of statistics altogether.
- ❖ Inappropriate methodology for answering the hypothesis or using old methodology that has been surpassed by newer, more powerful methods that provide more robust results.
- ❖ Weak research motive where the hypothesis is not clear or scientifically valid, or the data does not answer the question posed.
- ❖ Inaccurate conclusions on assumptions that are not supported by the data.

Editorial reasons for rejection include:

- ❖ Out of scope for the journal.
- ❖ Not enough of an advance or of enough impact for the journal.
- ❖ Research ethics ignored such as consent from patients or approval from an ethics committee for animal research.
- ❖ Lack of proper structure or not following journal formatting requirements.
- ❖ Lack of the necessary detail for readers to fully understand and repeat the authors' analysis and experiments.
- ❖ Lack of up-to-date references or references containing a high proportion of self-citations.
- ❖ Has poor language quality such that it cannot be understood by readers.
- ❖ Difficult to follow logic or poorly presented data.
- ❖ Violation of publication ethics.

Revising and Responding

Journals have different revision deadlines which vary from as little as a few weeks to three months depending on the revisions that need to be made. If we do not think we will be able to return a revised manuscript in the allotted time, should tell the editor immediately. They should be able to offer us an extension but it is best to discuss this with them as early as possible.

When revising the manuscript and responding to peer review comments, we must:

- Thank the reviewers and editors for their time and comments.
- Address **all** points raised by the editor and reviewers.
- Describe the major revisions to the manuscript in the response letter followed by point-by-point responses to the comments raised.
- Perform any additional experiments or analyses the reviewers recommend (unless we feel that they would not make the paper better; if so, please provide sufficient explanation as to **why** we believe this to be the case in the response letter).
- Provide a polite and scientific rebuttal to any points or comments we disagree with. Remember if the manuscript is sent for a second round of peer review the reviewers will see this letter too.
- Differentiate between reviewer comments and the responses in the letter, for example by color and/or by font.
- Clearly show the major revisions in the text, either with a different color text, by highlighting the changes, or with Microsoft Word's Track Changes feature. This is in **addition** to describing the changes in your point by point cover letter.
- Return the revised manuscript and response letter within the time period allotted by the editor.

An Editor's Advice to Reviewers



From **Paul Haddad**, Editor in Chief of the Journal of Chromatography A

1. **Be critical.** It is easier for an editor to overturn very critical comments than to overturn favorable comments.
2. **Justify all criticisms** by specific references to the text of the paper or to published literature. Vague criticisms are unhelpful.
3. **Don't repeat information from the paper**, such as the title and authors names, since this already appears elsewhere in the review form.
4. **Check the Aims and Scope** of the journal to ensure that your comments are in accordance with journal policy.
5. **Give a clear recommendation.** Don't put "I will leave the decision to the editor" unless you are genuinely unsure of your recommendation.
6. **Number your comments** so that the authors can easily refer to them.
7. **Be specific** - refer to line numbers in the paper or to exact regions where you wish changes to occur.
8. **Be careful not to identify yourself** by your comments or by the file name of your report if you submit it as a Word file.

After the Review Process

- ❖ Expect to hear back from the editor about his or her decision to accept or reject the manuscript.
- ❖ You may be asked to review another version of the manuscript to assess whether the manuscript has been modified sufficiently (if requested) in response to criticisms, comments, or suggestions.

Putting Yourself Out There

- ❖ If you are not already an established reviewer, you might be wondering how you can break into the peer review network.
- ❖ Contact editors of journals you read regularly and tell them of your willingness to serve as a peer reviewer in specific disciplines.
- ❖ You may also want to let your mentors know that you are interested in serving as a reviewer so they can pass along appropriate opportunities to you directly.

A Word to Teachers and Professors

- ❖ There is surprisingly little training in graduate school on how to develop this essential skill or discussion of best practices to ensure that reviewers at all levels efficiently provide the most useful review.
- ❖ Faculty guide graduate students during the process of writing a scientific paper.
- ❖ A similar emphasis on mentoring students on how to review scientific papers would fill a gap in graduate school training. Generating a review together is one approach.
- ❖ Another would be to review a manuscript as a group laboratory exercise. Faculty might share copies of reviews they have received on their own manuscripts.
- ❖ Advisors to postdoctoral trainees should also ensure that these new scientists receive proper guidance on this key responsibility.

Some of the References Used

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