Referees, who are generally unpaid volunteers, play an essential role in the scientific enterprise. It is part of every scientist’s obligation to the community to serve as a referee if requested, to the extent that his or her expertise allows.

Today we’ll look at the various duties and responsibilities of referees and how to write referee reports.

The terms “referee” and “reviewer” are used interchangeably in US English to mean an expert who provides an objective opinion about the scientific and technical merit of a paper, nomination, or application.

Training by George Miley and useful discussions with David Hertzog and Lance Cooper are gratefully acknowledged.

Today we’re going to focus specifically on reviewing scientific articles. But referees also evaluate proposals for funding agencies and nominations for prizes and awards. They evaluate the suitability of candidates for jobs and for promotion and tenure.
Journal editors generally have established criteria for the suitability of publications in their journals.

These criteria vary from journal to journal and generally depend on the nature of the journal’s readership.

The job of the referee is to provide an objective, expert opinion on whether the submitted paper satisfies the stated criteria of the journal. The reviewer must thus understand not only the scientific methods and results presented in the paper, he or she must also understand the aims, scope, and general readership of the journal.

Most journals will provide very specific instructions to referees about the criteria that are to be applied when evaluating a manuscript for publication.
You should have three objectives in refereeing a paper

1. “Protecting the cathedral by testing the brick”

2. Helping the authors produce a better paper (clearer, more persuasive, more concise, more complete)

3. Maintaining your objectivity and professional ethics
To provide an adequate review, you must be sufficiently familiar with the research topic to adequately assess the originality of the research, the quality of the work, the validity of the conclusions, and the significance and impact of the work being presented. If you do not have the necessary expertise, you should immediately notify the editor that you cannot review the paper because it is outside your area. You can suggest the names of other scientists who might be better suited to review, but you may not forward the manuscript to someone else to review.

If you have a prior relationship with one of the authors or if you are in direct competition with one of them, you should immediately tell the editor that you have a conflict of interest, disclose the nature of the conflict, and let the editor decide if you should review.

If you have pre-existing opinions about an author that would affect your objectivity—either positively or negatively—you should recuse yourself from review.

One benefit to referees for performing this service is they learn about innovative new work before it is published. However, it is a breach of ethics to use information obtained in the review process for your own personal benefit.

Can you realistically do an adequate review in the time the editor has suggested? If you cannot, either ask the editor if you can have more time or decline the review. It is not fair to the authors either to take an unreasonable amount of time to do the review or to provide a hasty, superficial, ill-considered review.

It is an absolute obligation of a referee to preserve the anonymity of review. Under no circumstances should a referee contact the authors or disclose that he was a referee. If you have a question for the authors, send it to them via the editor.
Referees must be more skeptical than readers. The referee is the first defense against the proliferation of bad science and the wasting of people’s time and funders’ resources.

Reviewing vs. reading a paper

As a reader, you are more likely to presume the details presented in the paper are true and correct (experts have already signed off on it)

As a referee, you have an obligation to carefully evaluate

1. the “truth” of what is being presented
2. the originality and significance of the work
3. the suitability of the methods used
4. the validity of the conclusions drawn
Questions to ask yourself as you’re reading the paper—on the science

Is the hypothesis being tested clearly stated and well motivated?
Is the work original? Is adequate referencing provided to prior work?
Were appropriate methods and techniques employed to obtain the results? Is sufficient detail provided?
Are there obvious errors or omissions?
Do the authors’ arguments logically support their conclusions?

Is it clear what problem the authors were trying to solve and why it is important?
Has the work already been done by somebody else? Has it been published elsewhere? Is it sufficiently new and different from the authors’ previous papers?
Have the authors adequately referenced previous work to provide a background and context for the work they are reporting?
Have the authors provided meaningful results and adequate evidence for their conclusions? Are there any unsupported claims?
Is the work correct? Are there errors or gaps in the data? Have the authors made unwarranted assumptions? Have any treatments or selection data been fully disclosed? Have inappropriate methods been used? Are there known sources of error that have not been accounted for?
Are the mathematics and statistics correct? (Yes, re-derive the equations.)
Questions to ask yourself as you’re reading the paper—on the science
Is the work being reported important?
Is it interesting?
How relevant is the work to other researchers in your field? in other fields?

Do the results reported significantly advance the field? Do the authors explain the significance of their work? Is it clear what they’ve contributed?

Is the work being reported of interest to the journal’s readership? Would it be more appropriately published in a different journal?

Should the editor get an opinion from an expert in another field?
While it is helpful to mark obvious spelling and grammatical errors for the authors, your job is to be a referee and assess the quality of the research, not to be a copy editor and correct every comma. However, do point out language that is imprecise, ambiguous, or misleading.

If the English is so poor that you cannot understand what the authors are trying to convey, you are not obliged to struggle to parse or “translate” every sentence. Simply return the ms. to the editor with the notation that you are unable to review it because the English is sufficiently bad that you cannot understand it.
Begin your review with a summary of the most important points in the paper to 1) show that you’ve actually read the paper, and 2) help the editors understand it.

Next, go down the list of review criteria provided by the journal and address each point; state how well the paper meets each criterion.

At some point in the review, explicitly state your recommendation for or against publication. Put the recommendation at the beginning or the end of the report and highlight it so the editor can see it immediately. Common recommendations are:

- Accept paper for publication as written.
- Publish after the authors have considered optional suggestions (and provide the editor with those suggestions).
- Publish after the authors have made mandatory corrections (and specify what those corrections are).
- Reject the paper.

If you make suggestions for how the paper could be improved, be sure to tell the editor whether the suggested changes are optional or mandatory.

If you want to re-review any revisions to the ms. before it is published, so state in your report.
Phys. Rev. Lett. provides very specific criteria for referees to consider.
Note that returning the form is not sufficient. A full narrative report is also required.
Here are further details of the PRL criteria for publication.

**Validity**—Is the work scientifically sound? If not, do you believe the paper can be revised to correct the scientific defects you find? Are the arguments made to draw the conclusions logically constructed and well-founded?

**Importance**—Does the manuscript report substantial research? Is the conclusion very important to the field to which it pertains? Is the research at the forefront of a rapidly changing field? Will the work have a significant impact on future research?

**Broad interest**—Papers are of broad interest if they report a substantial advance in a subfield of physics or if they have significant implications across subfield boundaries. Is the paper of broad interest?

**Accessibility**—Is the paper written so that it is understandable by the broad PRL audience? Is there an introduction which indicates, to the interested non-specialist reader, the basic physics issues addressed, and the primary achievements? Are assumptions clearly presented? Is unnecessary jargon avoided? Do the title and abstract stand alone? Are tables and figures, if any, well used and effectively presented?
“Review unto others...”*

Do not personally criticize the authors; focus on improving the paper, not straightening out the researchers

Do not make statements or claims without providing explanations and evidence

Strive for the highest standards of objectivity and honesty

Do not use information obtained through review for personal benefit

*Professor Lance Cooper’s “Golden Rule for Referees”

Your report should be written constructively, in a collegial tone, to benefit the understanding of both the authors and the editors.

In a positive, respectful, constructive way, point out experimental problems, flaws in the authors’ arguments, or alternative interpretations not proposed by the authors.

Provide appropriate references if inadequate credit is given to previous work.

Your assignment:
Prepare a referee report for the paper you’ve chosen for your journal-club talk
Address your comments to the editor
Use the PRL criteria for evaluating the paper
Back up your criticisms with examples
Make specific suggestions for how the paper could be improved
Make a specific recommendation for or against publication and give your reasons
Submit your report by March 3

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