Recipe for Scientific Paper Peer Review: Mixing fairness and objectivity with criticism

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Disclosure: I have been Senior Editor for Cancer Research since 2010 and have received a $3,500 annual honorarium for this function.
Outline

• What is peer review?
• Why peer review?
• The process
• Reading and reviewing a paper
• Writing the review
• Peer review etiquette
• Is the peer review system flawed?
What is peer review?

Peer review is the evaluation of work by one or more people of similar competence to the producers of the work (peers). It constitutes a form of self-regulation by qualified members of a profession within the relevant field.
What does qualification mean?

检查一下，我被要求成为明年会议的论文审稿人。

我猜他们认为我是这个领域的专家。

真的吗？你的资格是什么？

噢，我在上一年的会议上发表了一篇论文。

但这就意味着你的论文被审查了。

......人们对那些只凭一种资格被审查的人的资格有疑问。

停止，你让我自尊心受伤了！
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• Is the peer review system flawed?
Editors need you!

MEDLINE-indexed articles published per year

- 1M
- 800k
- 600k
- 400k
- 200k

- 1950
- 1970
- 1990
- 2010
Personal reasons to review?

- Peer review is part of academic work and scholarship, and part of a culture of “service”
- Experience as peer reviewers is part of career development and growth, and is used as a criteria for promotion
Many reasons to review...

Question: Please indicate the extent to which you agree that the following reasons describe why you review

<table>
<thead>
<tr>
<th>Reason</th>
<th>% agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I like playing my part as a member of the academic community</td>
<td>90%</td>
</tr>
<tr>
<td>I enjoy seeing new work ahead of publication</td>
<td>72%</td>
</tr>
<tr>
<td>I want to reciprocate the benefit gained when others review my papers</td>
<td>69%</td>
</tr>
<tr>
<td>I enjoy being able to help improve a paper</td>
<td>85%</td>
</tr>
<tr>
<td>I believe it will enhance my reputation or further my career</td>
<td>46%</td>
</tr>
<tr>
<td>It will increase my chances of being offered a role on the journal's editorial team</td>
<td>30%</td>
</tr>
<tr>
<td>I will gain personal recognition from reviewing</td>
<td>34%</td>
</tr>
<tr>
<td>It is an opportunity to build a relationship with the Editor</td>
<td>33%</td>
</tr>
<tr>
<td>It will increase the likelihood of my future papers being accepted</td>
<td>16%</td>
</tr>
</tbody>
</table>

**n=3,597**

*Sense about Science 2009 international survey
Supported by a grant from Elsevier*
Some are more willing than others

Respondents were asked to state the maximum number of papers they would be prepared to review in a year.

For most region, the modal response was 3-5 reviews per year.
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The Process

Submission

Quality Control

First evaluation

Second evaluation

Third evaluation
Peer Review
Recommendation

Decision

Accept
Reject
Accepted pending revisions
Not acceptable in present form

Revised manuscript
Revised manuscript

by who?

Manager
Reject

Editor in Chief
Reject

Senior Editor
Reject

Peer/Associate Editors

PUBLICATION

by who?
What should peer review accomplishing?

<table>
<thead>
<tr>
<th>Activity</th>
<th>% Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improves the quality of the published paper</td>
<td>93</td>
</tr>
<tr>
<td>Determines the originality of the manuscript</td>
<td>64</td>
</tr>
<tr>
<td>That it selects the best manuscripts for the journal</td>
<td>86</td>
</tr>
<tr>
<td>Determines the importance of findings</td>
<td>84</td>
</tr>
<tr>
<td>Detects plagiarism</td>
<td>81</td>
</tr>
<tr>
<td>Ensures previous work is acknowledged</td>
<td>81</td>
</tr>
<tr>
<td>Detects fraud</td>
<td>79</td>
</tr>
</tbody>
</table>

Sense about Science 2009 international survey
Supported by a grant from Elsevier
Approximately how long did the peer review process take from submission to final acceptance by the journal?

The median time taken from submission to final acceptance by the journal is 3-6 months.
Another way to look at it!
How are reviewers selected?

• Editorial board members
• Suggested by authors
• Databases
• PubMed and paper bibliography
• Past performance
• Area of expertise: restricted is better initially
Why at least 2 reviewers?

Reviewer 1: recommendation: REJECT

“I found this paper an extremely muddled paper with a large number of deficits”

Reviewer 2: recommendation: ACCEPT

“It is written in a clear style and would be understood by any reader”
Should I accept?

• Is it in my area of expertise?
• Do I have a conflict of interest?
• Do I have and am I willing to take the time?
• Which journal is it?
It takes time!

Trimmed mean (2 sd)

The median time taken to complete a review is 6 hours.
Some journals are more equal than others
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Critical reading of the manuscript

- A quick reading first or a more in depth reading at front
- Let time pass after the reading before writing the review
The title and the abstract

- Is it clearly and logically written?
- Does it adequately represent the manuscript?
- Do the data justify the conclusion?
The introduction

- Will provide an answer to 2 important questions
  - Is the manuscript addressing an important topic and hypothesis?
  - Is the work done ...
    - Original?
    - Incremental?
    - Previously covered?
The methods section

☑ Are the methods appropriate to address the question?
  • Authentication of cell lines
  • Sufficient details in specific methodologies
  • Good description of reagents
  • Clinical trial design
  • Statistics
  • Bioinformatics and meta-analyses

☑ Human subject and animal care issues
The results and figures/tables

- Are the figures carefully designed?
- Are the data well organized and well executed?
- Are the legends clear and detailed enough?
  - Replicate (biological and technical)
- Data description
  - Are some data not acknowledged?
  - Are data misinterpreted?
  - Are data missing?
- Are proper statistics used?
The discussion

- Does it reiterate the results?
- Does it acknowledge discrepancies with previous work?
- Does it acknowledge alternative explanations?
- Does it acknowledge limitations and unanswered questions?
- Does it acknowledge unexpected findings or just ignore them?
- Do the data justify the conclusion?
References

- Are importance references missing?
- Is the format consistent?
Other criteria

- Is the manuscript unnecessarily long?
- Are there multiple spelling errors?
- Are there multiple grammatical errors?
- Are conflicts of interest acknowledged?
- Is the authorship and contributorship properly described?
Checklist for reviewers: the big 5

- Importance of research question
- Originality of work
- Delineation of strengths and weaknesses of
  - Methodology
  - Experimental design
  - Statistical approach
  - Interpretation of results
- Writing style and figure/table presentation
- Ethical concerns (animal/human)

Benos et al.
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Man, the prof says I need to completely rewrite my final project.

It can’t be that bad, surely?

Here, read through this and highlight anything you think seems stupid.

Sure.

Hmmm....

.....Ummmmmm....
Reviewer’s dual role

• Provide constructive feedback to authors about how to improve the science
  – Confidential note to the authors

• Serve as “consultant” to the action editor
  – Confidential note to the editor
Writing the review

• A summary statement showing you have read AND understood the paper
• An opening paragraph with overall enthusiasm, strengths and weaknesses
• Major concerns: by number
• Minor concerns: by number
• Reread your review
Errors to avoid

• A snapshot verdict
• A mixed signal review
• A hidden agenda review (a confidential note different from the review)
• A request for an unreasonable number of new experiments
• A lengthy and detailed review for a paper you do not recommend for resubmission
Reviewing a revised paper

- Have the authors carefully addressed your (major) critiques ...
  - By providing new data?
  - By providing logical rebuttal arguments?
Reviewing the reviewer

- Thoroughness and comprehensiveness
- Timeliness
- Citing appropriate evidence to support comments made to authors
- Providing constructive criticism
- Objectivity
- Clear statement to editor as to the appropriateness and priority of research for publication

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Reviewer’s etiquette

- Decline review if you have a conflict of interest
- Stay within your expertise
- Treat the manuscript as your own
- Write in a collegial and constructive way
- Keep the paper confidential
- Do not use the paper for your own research (no plagiarism)
- Acknowledge if the review is done by someone else
- Submit your review on time
- Report suspected misconduct

Benos et al.  
Etiquette and Ethics Heck

Asok, we're getting killed by bad customer reviews online.

I need you to pretend you're several different customers and write positive reviews.

Doesn't that break some sort of law?

Heck no. It only crosses some ethical boundaries and violates the terms of service for the web site.

And depending on your religious views, it might be a hiccup on your way to paradise.

But I'm almost positive there won't be any jail time or eternal damnation.

Well... okay.

And be sure to defame our competitors.
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Is peer review flawed?

The jury didn't consist of my peers... This jury believed citizens have a civic duty to obey laws.
Review is at the center of science

• Creating new knowledge is the aim of research, and communicating this knowledge is done through scientific publishing
• Peer review papers are the currency of science
• Fierce competition places the system at risk
Peer review is like democracy: A system full of problems but the least worst we have

R. Smith, 2009
Editor BMJ
Arguments

• S. Lock study (BMJ 1985): A front-line editor is as good as a group of peer reviewers
• Slow and expensive
• Inconsistency
• Bias: Gender and institution (Peters and Ceci study)
• Abuse: D. Rennie story NEJM 2003
The trouble with retractions
Researchers want to improve not replace peer review

(n=4037)

- Very Satisfied: 61%
- Satisfied: 22%
- Neither satisfied nor dissatisfied: 8%
- Dissatisfied: 1%
- Very Dissatisfied: 8%

Sense about Science 2009 international survey
Supported by a grant from Elsevier
Opinions vary

Question: Please indicate the extent to which you agree with the following statements

<table>
<thead>
<tr>
<th>Statement</th>
<th>% Agree 2009</th>
<th>% Agree 2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>It is reasonable that journal editors evaluate and reject a proportion of articles prior to external peer review</td>
<td>17%</td>
<td>68%</td>
</tr>
<tr>
<td>Without peer review there is no control in scientific communication</td>
<td>38%</td>
<td>84%</td>
</tr>
<tr>
<td>Peer review is unsustainable because there are too few willing reviewers</td>
<td>16%</td>
<td>19%</td>
</tr>
<tr>
<td>Scientific communication is greatly helped by peer review of published journal papers</td>
<td>24%</td>
<td>82%</td>
</tr>
<tr>
<td>Peer review is biased against authors who are from developing countries</td>
<td>9%</td>
<td>32%</td>
</tr>
<tr>
<td>Peer review is holding back scientific communication</td>
<td>4%</td>
<td>21%</td>
</tr>
<tr>
<td>Peer review in journals needs a complete overhaul</td>
<td>7%</td>
<td>30%</td>
</tr>
<tr>
<td>Peer review is a concept well understood by the scientific community</td>
<td>29%</td>
<td>88%</td>
</tr>
<tr>
<td>Peer review is a concept understood by the public</td>
<td>3%</td>
<td>32%</td>
</tr>
<tr>
<td>The current peer review system is the best we can achieve</td>
<td>3%</td>
<td>32%</td>
</tr>
</tbody>
</table>

* n=3964 (added after pilot stage so number is slightly lower)

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Alternate approaches

- Single-blind peer review: 39% Disagree, 45% Agree
- Double-blind peer review: 12% Disagree, 76% Agree
- Open peer review: 61% Disagree, 20% Agree
- Open & published peer review*: 56% Disagree, 25% Agree
- Supplementing review with post-publication review: 24% Disagree, 47% Agree
- Peer review could in principle be replaced by usage statistics: 67% Disagree, 15% Agree

2007 (Agree):
- 52% 
- 71% 

* This is where the authors and reviewers are known to each other and additionally the papers of single-authored are published along with their names.

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Supported by a grant from Elsevier
How to improve peer review?

- Training
- Blinding the authors' identity (You can do your own)
- Trust
- Transparency
Acknowledgments/References

• Sense about Science 2009, international survey