Models of Peer Review – Is Peer Review Still Valuable?
May 17, 2016

Annette Flanagin, RN, MA, FAAN
Affiliations and Disclosures
Executive Managing Editor and Vice President, Editorial Operations
JAMA and The JAMA Network
Executive Director, Peer Review Congress
Committee Member/Author, AMA Manual of Style
Models Peer Review

• Definition and Purpose
• Types, Practices, and Models
• Weaknesses
• New Offerings and Services
• Threats
• Value
• Research and the Peer Review Congress
What is peer review?

“A process by which something proposed (as for research or publication) is evaluated by a group of experts in the appropriate field” (http://www.merriam-webster.com); first known use 1969

“Evaluation of scientific, academic, or professional work by others working in the same field.” (http://www.oxforddictionaries.com)

OED usage examples

– The academics needed peer review and high quality publishing of their papers for success and status in their field.
– At an academic level, peer review is basically hole-punching and fault finding.
– Evaluation and peer review should serve to improve standards.

“Organized method for evaluating scientific work which is used by scientists to certify the correctness of procedures, establish the plausibility of results, and allocate scarce resources (such as journal space, research funds, recognition, and special honor).” – Chubin DE, Hacket EJ. Peerless Science. 1990.

Focus of this session will be on journal peer review
History and origins of journal peer review

• 1665, *Philosophical Transactions*, the first scientific journal was founded

• 1752, Royal Society of London took over the fiscal responsibility for *Philosophical Transactions* and established the Committee on Papers to review all articles to be published in the journal and is often credited with having established peer review as we know it.

• “Peer review can be said to have existed ever since people began to identify and communicate what they thought was new knowledge….because peer review (whether it occurs before or after publication) is an essential and integral part of consensus building and is inherent and necessary to the growth of scientific knowledge.”

• This likely occurred before 1752.

History and origins of journal peer review

• Despite the historical origins, the modern evolution of peer review was haphazard, especially among biomedical journals

• Biomedical journals first appeared in the 19th century as personal or society organs, following the model of more general journalism, and few used any system of peer review with regularity

• Journal peer review developed independently of grant peer review.

• Journal editors viewed themselves primarily as educators and the practice of peer review as we know it today was not generally used until after World War II, and even then was resisted by some prominent journal editors

• More formal institutionalization of journal peer review followed increases in the numbers of submitted articles, greater specialization, and the demands for more expert authority and objectivity

Evolution of peer review from the 20th to the 21st century – more of the same

What drove the institutionalization of traditional peer review in the 20th century is likely stimulating its further evolution and calls for improvement in the 21st century

- increases in the numbers of submitted and published articles
- greater specialization
- demands for more expert authority and objectivity
- increasing complexity of scientific methods and statistics
- the need to address weaknesses and biases

– and some of what’s new

- technologic advances, rapidly accelerating
- open access and demands for more transparency and reproducibility
- new models and approaches
- new businesses and services
- new threats
Purposes of traditional peer review

• To assess the quality of reports of research and other types of work
• To evaluate the scientific and technical soundness of the report
• To help detect flaws in methods, analysis, interpretation, and presentation
• To assess originality, importance, and suitability for publication in general or for a specific journal/audience
• To help authors improve the quality of their reporting, readability, and usefulness of their work
• To help editors make decisions
Weaknesses of traditional peer review

- Unfair
- Slow
- Expensive (but peer reviewers are generally unpaid)
- Inefficient
- Causes unnecessary delay in publication
- Secret
- Biased
- Stifles innovation
- Does not prevent error or fraud
- Mismatch between scientific productivity, number of publications, and number of qualified reviewers
3 Common types of peer review – many flavors

- **Double-blind review**: authors’ and reviewers identities are both hidden from each other in an attempt to minimize bias.

- **Single-blind review**: authors names and affiliations are revealed to all but reviewers identities are not revealed to authors (also known as anonymous review)

- **Open review**: author and reviewers are identifies are revealed
  - **Prepublication open/collaborative review**: reviewers are identified to the authors and perhaps other reviewers during the process but are not made public
  - **Postpublication open review**: reviewers, editors, decisions and all comments are identified to all and made public
  - **Perpetual open review**: Interactive open collaborative review before and after publication
## Variations in peer review models and methods

<table>
<thead>
<tr>
<th>Process/Task</th>
<th>Traditional/Conservative</th>
<th>New/Liberal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of review</td>
<td>Double-blind</td>
<td>Single-blind</td>
</tr>
<tr>
<td>Reviewer assignment</td>
<td>By editor</td>
<td>Automated from defined database</td>
</tr>
<tr>
<td>Acceptance criteria/quality control</td>
<td>Soundness, importance, originality, contribution, fit, and presentation</td>
<td>Technical soundness only</td>
</tr>
<tr>
<td>Transparency of peer review</td>
<td>None; or perhaps only lists of peer reviewers published</td>
<td>General stats about journal acceptance rates and turn-around times</td>
</tr>
<tr>
<td>Reuse of reviews</td>
<td>None</td>
<td>Shared within family or group of journals</td>
</tr>
</tbody>
</table>

Traditional peer review process
What’s inside the box?
Example: JAMA’s single-blind peer review process

1. Manuscript submission
2. Preliminary editorial review and assignment to reviewing editor
3. Evaluation by reviewing editor
4. Reject or refer
5. Send out for peer review
6. Present to editorial staff at manuscript meeting
7. Editorial review before revision
8. Request revision
9. Submit revision
10. Provisional acceptance
Accept for publication
The open box - example of an interactive, open peer review from Copernicus Publications

http://publications.copernicus.org/services/public_peer_review.html
Sample of top-ranked journals in medicine, science, and biology by 3 types of peer review

<table>
<thead>
<tr>
<th></th>
<th>Double-blind</th>
<th>Single-blind</th>
<th>Open</th>
<th>Options/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEJM</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lancet</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>JAMA</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annals</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMJ</td>
<td></td>
<td>X</td>
<td></td>
<td>For research articles, attributed reviews and all editorial comments posted with publication</td>
</tr>
<tr>
<td>Nature</td>
<td>X</td>
<td>X</td>
<td></td>
<td>Authors can choose single- or double-blind review</td>
</tr>
<tr>
<td>Science</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PNAS</td>
<td></td>
<td>X</td>
<td></td>
<td>NAS members can choose a limited number of papers for which they select their reviewers</td>
</tr>
<tr>
<td>PLOS Biology</td>
<td>X</td>
<td>X</td>
<td></td>
<td>Reviewers can sign their reviews if they wish</td>
</tr>
<tr>
<td>eLife</td>
<td>X</td>
<td>X</td>
<td></td>
<td>Collaborative, open, reviewers choose to have their names known to authors/be public or not</td>
</tr>
</tbody>
</table>
Studies on quality of blinded vs open review

• Most trials report no differences in quality of double-blind, single-blind, or open review

• But some have found conflicting differences in quality

• And some studies have identified biases that may be better managed with double-blind review
Studies on feasibility of blinded vs open review

- All types are feasible
- But double-blinding is not always successful
  - Trials report failure in blinding in 10% - 32% of manuscripts
- Reviewers who are asked to sign their reviews
  - May be more courteous or positive in their recommendation
  - May take longer to complete
  - Are more likely to decline invitations to review
- Authors may not be interested in participating in open review if given an option to do so or not
  - See results of *Nature*’s trial of author option for open review in 2006
  - [http://www.nature.com/nature/peerreview/debate/nature05535.html](http://www.nature.com/nature/peerreview/debate/nature05535.html)
  - Low author uptake - Of 1,369 papers, authors of 71 (5%) agreed to their papers being displayed for open comment and low perceived value by editors
- Full circle - NPG’s ongoing trial of permitting authors the option of single- vs double-blind review
  - [http://www.nature.com/news/nature-journals-offer-double-blind-review-1.16931](http://www.nature.com/news/nature-journals-offer-double-blind-review-1.16931)
Variations in open review

- **Unattributed peer review**: If reviewers agree, their comments are published with accepted articles but without their names (*EMBO Journal*)

- **Optional open peer review**: Single-blind review, but reviewers are given the option to have their names and comments published with accepted articles (*PLOS Biology, PeerJ*)

- **Private, open peer review**: Reviewers are given the option to have their names revealed to authors (*PLOS Medicine, Learned Publishing, eLife*)

- **Pre-publication open peer review**: Identities of all players are known before publication, and names, comments, and peer review history is published with accepted articles (Biomed Central journals, *BMJ*) – what about rejected articles?

- **Post-publication open peer review**: Open peer review occurs after publication, and reviewer names and comments are always made public (F1000Research, ScienceOpen)

Evolving peer review practices and services

• **Pre-traditional peer review/evaluation commenting**: e-print/pre-print archives (ArXiv, BioXriv)

• **Overlay peer review and publication**: selects from articles/preprints that are already freely available in online repositories (Episciences, Lund Medical Faculty Monthly, Discrete Analysis)

• **Post-publication peer review**: formal, invited evaluation by selected experts after the work is published (F1000Research)

• **Post-publication commenting**: letters to the editor/online comments within a journal ecosystem vs informal commenting after publication, independent of the journal (PubMed Commons, PubPeer)

• **Collaborative peer review**: discussion between reviewers and editor/facilitator to reach consensus on revision and comments (Copernicus publications, eLife)

• **Portable/cascading peer review**: rejected manuscripts and reviews are shared with other journals in a group (NPG, BMC, JAMA Network journals, eLife, Neuroscience Peer Review Consortium)

• **Decoupled peer review**: formal, fee-based peer review conducted by a third-party that authors can submit to journals with their manuscripts (Rubriq, Peerage of Science)

• **Recommendation services**: formal evaluation by selected experts who highlight and recommend selected articles after publication (F1000Prime)

• **Meta-data about process on articles**: type of peer review, dates (submission, revision, acceptance), information on editors and reviewers (JBJS, PER-val, Science journals)

• **Annotation**: comments embedded into a work and displayed privately or publicly during peer review or after (Hypothes.is software tools in use by AGU and eLife)

Evolving practices and models for rewarding and crediting peer review activities

- Journals publicly listing peer reviewers
- Journals providing reviewers with letters about specific or general peer review activities (editors writing letters of recommendation)
- Journals providing reviewers with free journal subscriptions, books, services
- Journals providing annual best reviewer awards
- Journals providing formal continuing education credit for peer reviews
- **New:** Public compilation of reviewer activity (e.g., Publons)
- **New:** Use of ORCID for reviewers (e.g., Publons, AGU, F1000 Research) and dois for reviews (e.g., F1000 Research, eLife)
- **New:** Citations for published reviews (CASRAI Working Group on Peer Review Services) - recommendations for data fields, descriptors, persistence, resolution, and citation and options for linking peer review activities with a person identifier (http://ref.casrai.org/Peer_Review_Citations_V1)
New Threats to peer review….and new watchdogs

- **Predatory journals and publishers:** charge unknowing authors APCs to publish in journals of dubious reputation or experience and without peer review or editorial or publishing services.

- **Hijacked journals:** counterfeit website that pretends to be the website of a legitimate scholarly journal.
  - See Beall’s lists of predatory and hijacked journals: [http://scholarlyoa.com](http://scholarlyoa.com)

- **Failed peer review:** Bohannon’s sting – 157 of 304 OA journals accepted a completely bogus paper; 16 after substantial peer review, 59 after superficial peer review, and 82 with no peer review.

- **Fake peer review:** Authors submit fake email addresses for nonexistent reviewers and review their own papers. *Retraction Watch* reports ~300 articles as having been retracted because of fake peer review across a number of prominent publishers.
What is the value of peer review? Results from 3 studies

• **International survey of 4037 multidisciplinary researchers in 2009**

• **Overall satisfaction with peer review:**
  - 69% high (mostly in chemistry, materials science, earth and planetary science)
  - 9% dissatisfied (mostly in astronomy, physics, humanities, social science, and economics)
  - 84% reported believing that peer review plays a vital role in scientific publishing

• **Improvement is needed**
  - 32% believe that the current peer review system is the best that can be achieved
  - 30% agree that journal peer review “needs a complete overhaul”
  - 19% agree that “peer review is unsustainable because there are too few reviewers”

• **Views on effectiveness – which model is most effective?**
  - 76% rated double-blind peer review as most effective
  - 45% rated single-blind peer review as effective
  - 20% rated open peer review as effective (mostly in medicine)
  - 15% agreed that post-publication usage statistics - in the absence of peer review - is effective
  - 47% agreed that supplementation of formal peer review with post-publication review is effective

Value of peer review – study #2

- Survey of 3650 researchers identified by 6 scholarly publishers + focus groups and interviews of 150 US and UK researchers, 2012-2013

- What researchers like about the peer review process:
  - It led to an improvement in quality
  - The fact that publishers organize it (no one wanted any changes in the arrangements)
  - Blind reviewing, because reviewers are freer to comment

- What researchers do not like about the peer review process:
  - Its slowness
  - Hands-off editors
  - Light touch peer review
  - Being misunderstood by the reviewers
  - The variable quality of reviewing
  - Reviewers coming up with completely conflicting views

- What they are unsure of:
  - The benefits of author-suggested reviewers
  - The practice of post publication peer review

Value of peer review – study #2

“Peer review is not only alive and kicking, but apparently increasing in influence, despite the many potential (or invented) threats posed by a rapidly unfolding and enveloping digital environment…”

<table>
<thead>
<tr>
<th>Mean rating</th>
<th>Items ranked on Likert scale (5 = strongly agree/extremely important and 1= strongly disagree/not important)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.13</td>
<td>Peer-reviewed journals are the most trustworthy information source</td>
</tr>
<tr>
<td>4.11</td>
<td>Importance of peer review when choosing where to publish</td>
</tr>
<tr>
<td>2.11</td>
<td>I tend to blog about findings of my research, which is a good way to test the veracity of my ideas</td>
</tr>
<tr>
<td>1.74</td>
<td>Practice of citing non-peer-reviewed sources (eg, personal correspondence, newspaper articles, blogs, and tweets)</td>
</tr>
<tr>
<td>1.52</td>
<td>Practice of citing sources disseminated with comments posted on a dedicated website (open peer review)</td>
</tr>
<tr>
<td>2.73</td>
<td>There is a less strict/less rigorous peer-review process now and as a result there is a flood of poor-quality material</td>
</tr>
<tr>
<td>2.35</td>
<td>There are more unethical practices around now (eg, plagiarism, falsifying, fabricating, citation gaming)</td>
</tr>
</tbody>
</table>

*Factors were ranked differently by different age groups

Study #3: NPG Annual Author Insights Survey, August 2015

Survey of 21,377 authors who published peer-reviewed articles in the last 3 years

What factors drive author choice of where to submit their manuscripts?

<table>
<thead>
<tr>
<th></th>
<th>Scientific, technical, medical (86%)</th>
<th>Humanities, social sciences (14%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2015</td>
<td>2014</td>
</tr>
<tr>
<td><strong>Most Important</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reputation of the journal</td>
<td>97%</td>
<td>96%</td>
</tr>
<tr>
<td>Relevance to my discipline</td>
<td>95%</td>
<td>96%</td>
</tr>
<tr>
<td>Quality of the peer review</td>
<td>92%</td>
<td>93%</td>
</tr>
<tr>
<td>Journal’s Impact Factor</td>
<td>90%</td>
<td>90%</td>
</tr>
<tr>
<td><strong>Least Important</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Location of the journal publisher</td>
<td>13%</td>
<td>NA</td>
</tr>
<tr>
<td>Funder influence</td>
<td>20%</td>
<td>15%</td>
</tr>
<tr>
<td>Journal having a transfer system</td>
<td>25%</td>
<td>NA</td>
</tr>
<tr>
<td>Option to publish OA</td>
<td>35%</td>
<td>37%</td>
</tr>
</tbody>
</table>

Eighth International Congress on Peer Review and Biomedical Publication

September 10-12, 2017
Chicago, Illinois

Start your research now!
Abstracts are due February 2017
peerreviewcongress.org

8th Peer Review Congress – general topics of interest

- Peer review and publication biases and efforts to manage or eliminate biases
- Models of peer review and decision making used by journals and funders
- Single-blind, double-blind, open, collaborative, interactive, social, pre- and post-publication peer review
- Quality assurance for reviewers and editors and the affect of different editorial policies and practices
- Research and publication ethics
- Evaluations of standards, mechanisms, services, and innovations for improving the quality of reporting, reviewing, and publication
- Open science; open and public access; data sharing, transparency, reproducibility
- Changes in readership and use of peer-reviewed published content
- Quality, use, and effects of publication metrics and usage statistics
- Threats to peer review/scientific publication and the future of scientific publication
- New technologies and methods for improving the quality and efficiency of peer review, publication, and the equitable distribution of scientific information

peerreviewcongress.org
Thank you.

Annette Flanagin
annette.flanagin@jamanetwork.org