Overview of Trends in Peer Review in Scientific Publication
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Affiliations and Disclosures

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Peer Review

- Definition and Purpose
- Types, Practices, and Models
- Weaknesses and Threats
- New Models and Services
- Value

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"; first known use 1969 (http://www.merriam-webster.com)

"Evaluation of scientific, academic, or professional work by others working in the same field." *OED.* (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

What is peer review?

Chubin DE, Hacket EJ. *Peerless Science.* 1990

- Peer review is a process and a product.
- "As a *process* peer review is expected to operate according to values of fairness and expediency, yet its *product* is to be trustworthy, high-quality, innovative knowledge."
- Peer review "simultaneously serves several values that are not entirely in harmony…There is no assurance that the process will yield the product; to the contrary, the process may interfere with efforts to secure the product."
- "Peer review is often under siege and yet, remarkably, while the peer review system may absorb severe damage, the peer review concept emerges with renewed support from all parties. When the disputatious moment has passed, the system returns to business as usual."…

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

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

– more of the same

- 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

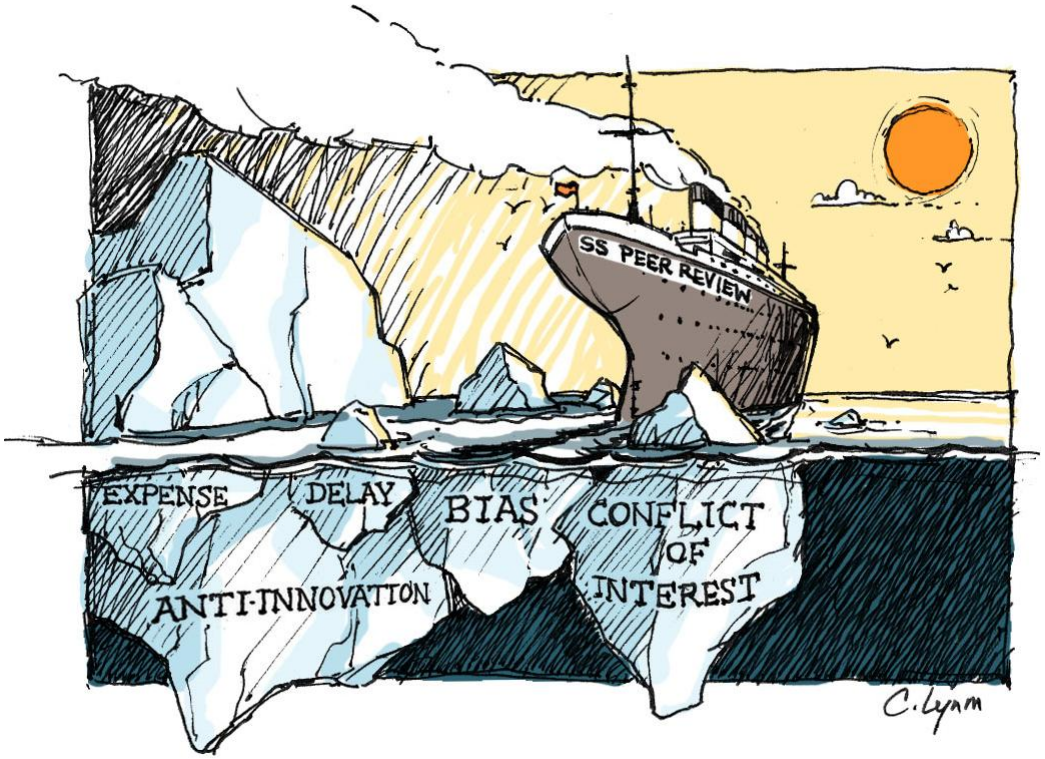
- technologic advances, rapidly accelerating
- open access and demands for more transparency and reproducibility
- new models and approaches
- new businesses and services
- new threats

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 peer review

- Unfair
- Slow
- Expensive
- Inefficient
- Secret
- Biased
- Stifles innovation
- Does not prevent error or fraud
- Causes unnecessary delay publication
- Mismatch between scientific productivity, number of publications, and number of qualified reviewers



New threats to peer review

- **Predatory journals and publishers:** charge unknowing authors APCs to publish in journals of dubious reputation or experience and without real peer review or editorial or publishing services
- **Hijacked journals**: counterfeit website that pretends to be the website of a legitimate scholarly journal
- **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. - *Science*. 2013;342(4):60-65.
- **Fake peer review**: Authors submit fake email addresses for nonexistent reviewers and review their own papers. *Retraction Watch* reports hundreds of articles as having been retracted because of fake peer review across a number of prominent publishers.
- **Fake editors:** 48 of 360 journals accepted request from a sham unqualified scientist, Anna O. Szust, to become editor of their journal; 40 predatory and 8 DOAJ journals appointed her as an editor. –*Nature*. 2017;543:481-483. doi:10.1038/543481a
- ***Are these really threats – or do they reinforce the need for quality peer review?***

Common types of peer review

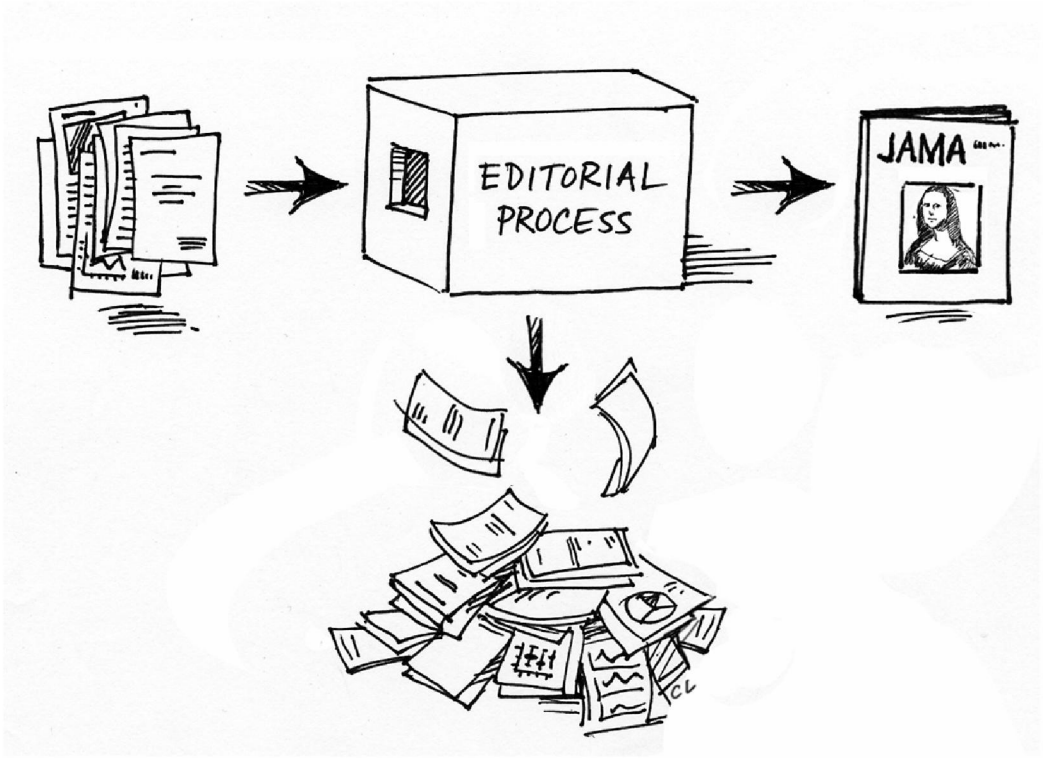
- **Double-blind review:** authors' and reviewers' identities are hidden from each other in an attempt to minimize bias.
- **Single-blind review:** authors identities are revealed to all but reviewers identities are not revealed to authors (also known as anonymous review)
- **Open review:** author and reviewers are identifies are revealed
  - **Prepublication open 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
- **Experiments with new models**
  - **Triple-blind peer review**: *Matters*
  - **Results-blind peer review**: *BMC Psychology*

Variations in peer review models and methods

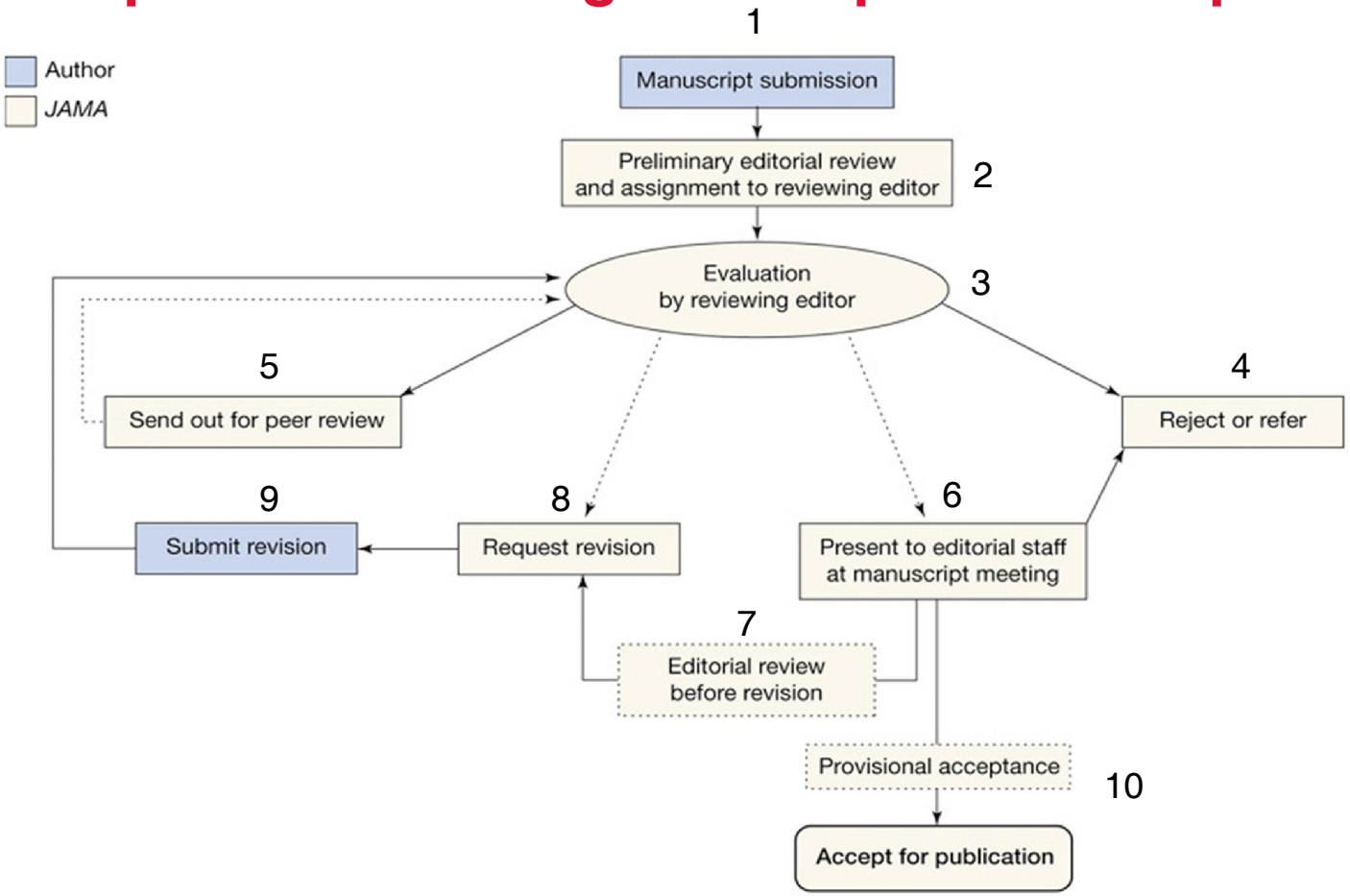
Process/Task	Traditional/Conservative →		New/Liberal →
Type of review	Double-blind	Single-blind	Open/collaborative
Reviewer assignment	By editor	Automated from defined database	Post-publication and open to all
Acceptance criteria/quality control	Soundness, importance, originality, contribution, fit, and presentation	Technical soundness only	Cursory check
Transparency of peer review	None; or perhaps only lists of peer reviewers published	General stats about journal acceptance rates and turn-around times	Specific information on reviewers, history, and comments available during peer review and published with articles
Reuse of reviews	None	Shared within family or group of journals	Pre-obtained reviews from services and published with articles

Based on Bjork BC, Hedlund T, Emerging new methods of peer review in scholarly journals. *Learned Publishing.* 2015; 28(2)85-91.

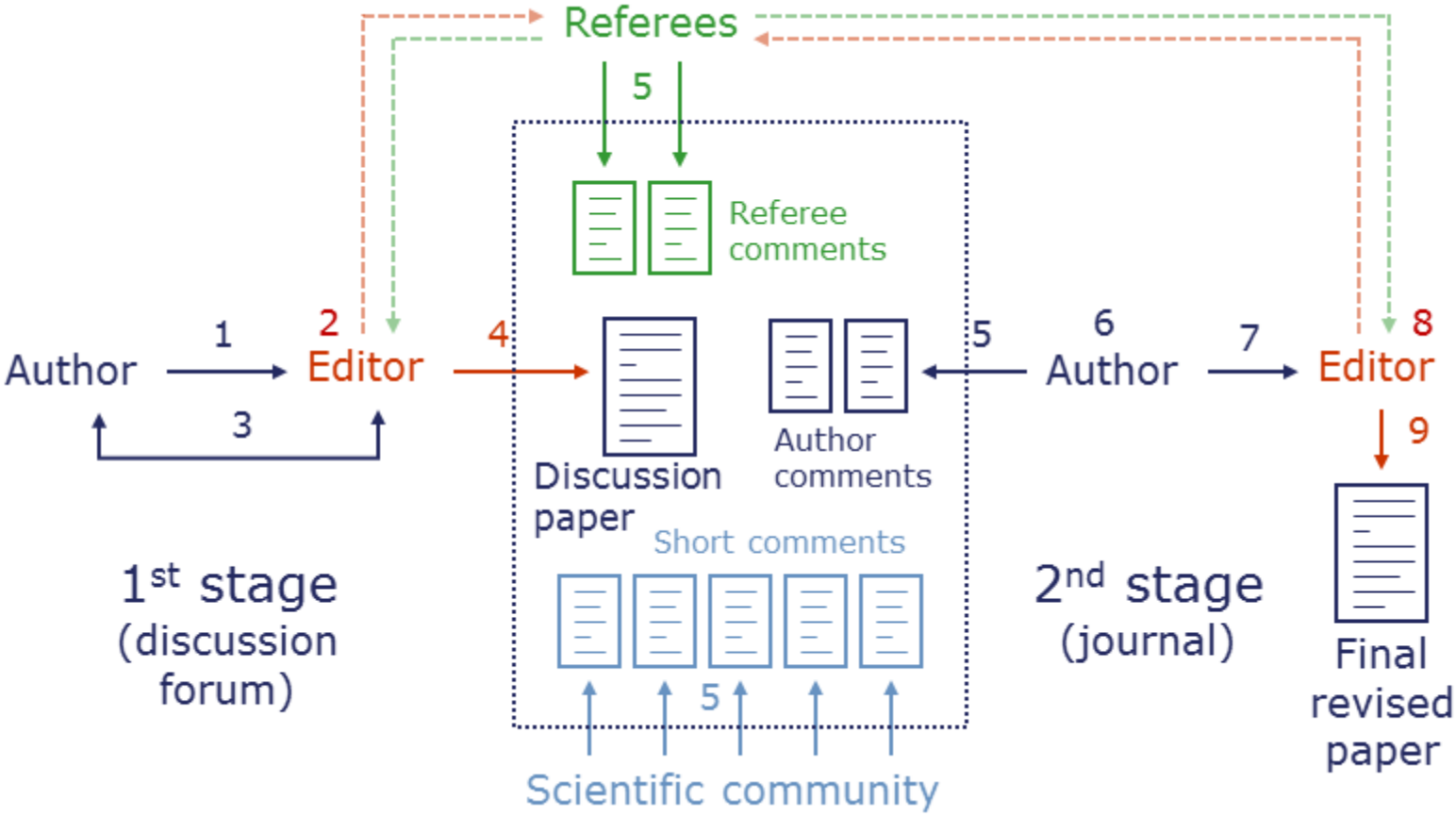
Traditional peer review process



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



The open box - example of an early interactive, open peer review from Copernicus Publications



http://publications.copernicus.org/services/public_peer_review.html

Sample of top-ranked journals by types of peer review

	Double blind	Single blind	Open	Options/Comments
NEJM		X		
Lancet		X		
JAMA		X	Very partial	Reviewers can choose to sign their reviews; reviews and names not published
BMJ			Post publication	For research articles, attributed reviews and all editorial comments posted with publication
Nature	X	X		Authors can choose single- or double-blind; Reviewers can choose to sign their reviews but *Nature* prefers an anonymous process
Science		X		Optional "cross review" process for reviewers
PNAS		X		NAS members can choose a limited number of papers for which they select their reviewers
PLOS		X	Very partial	Reviewers can sign their reviews if they wish
eLife		X	Partial	Collaborative process during review, reviewers choose to have reveal their names or not

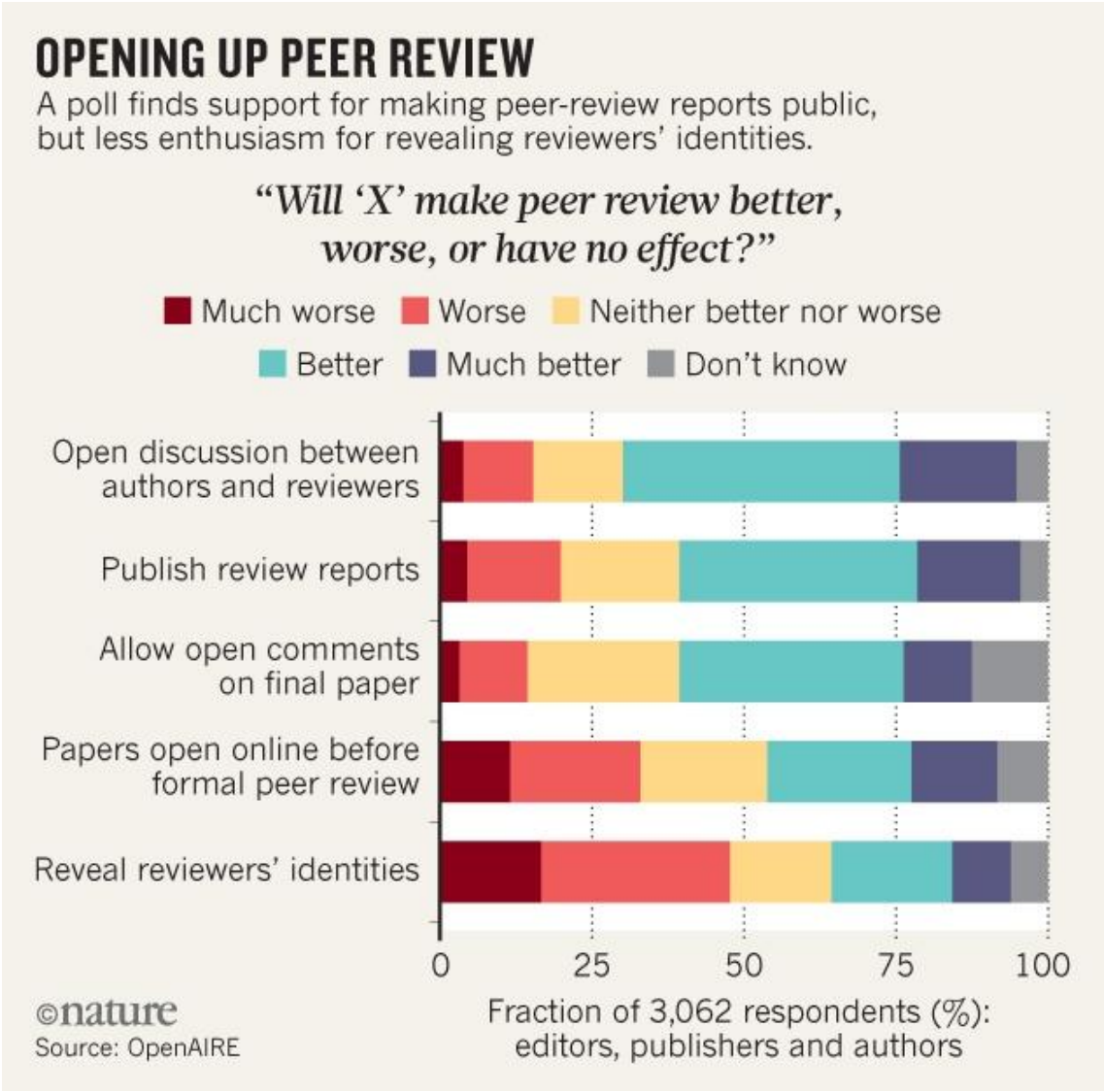
More to come - Elsevier will add optional open review for 1800 journals in 2020

Studies on quality of blinded vs open review in life sciences

- **Most trials report no differences in quality of double-blind, single-blind, or open review**
  - 5 medical journals: Justice AC et al. Does masking author identity improve peer review quality: a randomized controlled trial. PEER investigators. *JAMA*. 1998;20(3)240-242.
  - *BMJ*: van Rooyen S et al. Effect of blinding and unmasking on the quality of peer review: a randomized trial. *JAMA*. 1998;280(3):234-237.
- **But some have found conflicting differences in quality**
  - Quality higher for blinded manuscripts: McNutt RA et al. The effects of blinding on the quality of peer review: a randomized trial. *JAMA*. 1990;263(10):1371-1376.
  - Higher quality for signed reviews: Walsh E et al. Open peer review: a randomised controlled trial. *Br J Psychiatry*. 2000;176:47-51.
- **And some studies have identified biases that may be better managed with double-blind review**
  - Double-blind review favors increased representation of female authors. Budden AE, et al. *Trends Ecol Evol*. 2008 Jan;23(1):4-6.

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 first trial of author option for open review in 2006
    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 option of permitting authors the option of single- vs double-blind review
  - http://www.nature.com/news/nature-journals-offer-double-blind-review-1.16931



Callaway E. Open peer review finds more takers. *Nature*. 2016;549:343. doi:10.1038/nature.2016.20969

Variations in open review

- **Unattributed open peer review:** If reviewers agree, their peer review unsigned comments are published with accepted articles but without their names (*EMBO; Elsevier: International Journal of Surgery, Engineering Fracture Mechanics)*
- **Optional open peer review**: Single-blind review, but reviewers are given 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 during the editorial evaluation and after publication (*PLOS Medicine, 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*)
- **Informal, uninvited post-publication third-party commenting**: PubPeer, PubMed Commons
- **Post-publication open peer review:** Peer review and revision done publicly; invited referees judge if work is scientifically sound; those so determined are indexed in PubMed (F1000Research)

- Based on Paglione LD, Lawrence RN. Data exchange standards to support and acknowledge peer-review activity. *Learned Publishing*. 2015;28(4):309-316. http://dx.doi.org/10.1087/20150411

Evolving peer review practices and services

- **Pre-traditional peer review/evaluation commenting on posted articles**: e-print/pre-print archives (ArXiv, BioXriv, ASAPbio, ChemRxiv)
- **Overlay peer review and publication**: selects from articles/preprints that are already freely available in online repositories (Episciences, Lund Medical Faculty Monthly, Discrete Analysis)
- **Cascading peer review**: rejected manuscripts and reviews are shared with other journals in a group (NPG, BMC, JAMA Network journals, PLOS, Neuroscience Peer Review Consortium, and many publishers)
- **Collaborative peer review**: discussion between reviewers and editor/facilitator to reach consensus on revision and comments (Copernicus publications, eLife)
- **Annotation**: comments embedded into a work and displayed privately or publicly during peer review or after (Hypothes.is software used by AGU and eLife)

- Based on Paglione LD, Lawrence RN. Data exchange standards to support and acknowledge peer-review activity. *Learned Publishing*. 2015;28(4):309-316. http://dx.doi.org/10.1087/20150411

Evolving peer review practices and services

- **Recommendation services**: formal evaluation by selected experts who highlight and recommend selected articles after publication (F1000Prime)
- **Meta-data about peer review process published with articles and badges**
  - type of peer review, milestone dates, information on editors and reviewers (PRE peer review evaluation badge: *JBJS*, *Science* journals, ADA journals)
  - Levels of transparency/replication of results (ACM's *Transactions on Mathematical Software [TOMS*]
- **Decoupled peer review (portable/independent)**
  - formal, fee-based peer review conducted by a third-party that authors can submit to journals with their manuscripts (Editage, Rubriq, Peerage of Science, Peerwith)
  - Posting of prepublication reviews on websites external to the journal (Publons)
- **External commercial peer review management**: companies that offer peer review as a paid service to publishers/journals (Cenveo, J&J Editorial, KWF Editorial, Origin Editorial)

- Based on Paglione LD, Lawrence RN. Data exchange standards to support and acknowledge peer-review activity. *Learned Publishing*. 2015;28(4):309-316. http://dx.doi.org/10.1087/20150411

What is the value of peer review? Results from 3 studies

- **Study #1: International survey of 4037 multidisciplinary researchers in 2009**
- Mulligan A et al. Peer review in a changing world: an international study measuring the attitudes of researchers. *J Am Soc Inf Sci Technol.* 2013;64(1):132-161. http://onlinelibrary.wiley.com/doi/10.1002/asi.22798/full
- **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”
- **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**
- Trust and Authority in Scholarly Communications in the Light of the Digital Transition. Univ of Tennessee and CIBER Research Ltd for the Sloan Foundation. http://ciber-research.eu/download/20140115-Trust_Final_Report.pdf
- **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 and 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

Mean rating*	Items ranked on Likert scale (5 = strongly agree/extremely important and 1= strongly disagree/not important)
4.13	Peer-reviewed journals are the most trustworthy information source
4.11	Importance of peer review when choosing where to publish
2.73	There is a less strict/less rigorous peer-review process now and as a result there is a flood of poor-quality material
2.35	There are more unethical practices around now (eg, plagiarism, falsifying, fabricating, citation gaming)
1.74	Practice of citing non-peer-reviewed sources (eg, personal correspondence, newspaper articles, blogs, and tweets)
1.52	Practice of citing sources disseminated with comments posted on a dedicated website (open peer review)

*Factors were ranked differently by different age groups

Nicholas D et al. Peer review: still king in the digital age. *Learned Publishing*. 2015;28(1):15-21.

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?

Scientific, technical, medical (86%)	2015	2014	Humanities, social sciences (14%)	2015	2014
Most Important			**Most Important**		
Reputation of the journal	97%	96%	Relevance to my discipline	97%	97%
Relevance to my discipline	95%	96%	Reputation of the journal	96%	97%
Quality of the peer review	92%	93%	Quality of the peer review	88%	89%
Journal's Impact Factor	90%	90%	Readership of the journal	89%	NA
Least Important			**Least Important**		
Location of the journal publisher	13%	NA	Funder influence	15%	14%
Funder influence	20%	15%	Journal having a transfer system	18%	NA
Journal having a transfer system	25%	NA	Location of the journal publisher	24%	NA
Option to publish OA	35%	37%	Option to publish OA	24%	25%

(NPG), Nature Publishing Group (2015): Author Insights 2015 survey. figshare. https://dx.doi.org/10.6084/m9.figshare.1425362

Eighth International Congress on Peer Review and Scientific Publication

September 10-12, 2017
Chicago, IL

Our aim is to encourage research into the quality and credibility of peer review and scientific publication, to establish the evidence base on which scientists can improve the conduct, reporting, and dissemination of scientific research

peerreviewcongress.org

Thank you.

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The JAMA Network

Common practices and models for rewarding and crediting peer review activities

- Journals publicly listing peer reviewers (in aggregate or with published articles)
- Journals providing reviewers with letters about specific or general peer review activities (editors writing letters of recommendation)
- Journals providing certificates of appreciation
- Publishers providing reviewer profile and histories across multiple journals (eg, Elsevier' Reviewer Recognition Platform)
- Journals providing annual best reviewer awards (eg, The Optical Society's Annual Outstanding Reviewer Recognition)
- Journals providing formal continuing education credit for peer reviews
- Journals providing reviewers with complimentary online journal access, free journal subscriptions, books, services, discounts on APCs in exchange for reviews
- Few pay – mostly for specialized reviews (eg, statistical review)
- **Providing feedback on quality of reviews, decisions, and copies of other reviews

New practices and models for rewarding and crediting peer review activities

- Public compilation of reviewer activity (eg, Publons, many publishers)
- Use of ORCID for reviewers (eg, Publons, AGU, eJournal Press, F1000 Research) and dois for reviews (eg, F1000 Research, eLife, ScienceOpen)
- 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)

Wiley's survey of reviewers – what do they want?

- 3000 reviewers in 115 countries, multiple disciplines, July 2015
- 77% want further reviewer training
- Most peer review training comes from journal guidelines or advice from supervisors or colleagues
- Reviewers believe that reviewing should carry more weight in their institutions' evaluation process
- Reviewers would rather receive feedback and recognition from journals over financial rewards
- Journal rank is important to potential reviewers
- There is a need to increase the reviewer pool especially in high-growth and emerging regions of the world and among early career researchers

Warne V. Rewarding reviewers – sense or sensibility? A Wiley study explained. *Learned Publishing*. 2016;29(1):41-50. doi:10.1002/leap.1002