Quantifying Peer Review

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Outline of talk

• Some publication statistics
• Citation impact statistics for journals
• APS Referee statistics
• [Rejection Without External Review (RWER)]
• *Physics – how we select what to highlight*
• **New metrics for journal-ranking**
• **Anecdotes**
Proliferation of scientific work

Papers published in select set of physics journals

GDP (current US$)

papers

0 10000 20000 30000 40000 50000 60000


3
APS publications vs. GDP

~2.5 bn $/paper
Proliferation of scientific work: PRL

Reinvigorated standards

Letters published, by year

Letters only. No Comments, Replies, Errata, Pub. notes.
Citation impact – the caveats

- Citations are not everything (more to life than this!)
- ‘Sleeping beauties’, negative citations
- Hot fields, hype
- 41st Chair effect → exclusive jnls always miss some great papers
- Matthew effect → new impact is easier for established players

41st Chair Effect
“The French Academy decided that only a cohort of 40 could qualify as members [...] Occupants of this 41st chair include Descartes, Pascal, Moliere, Bayle, Rousseau, Saint-Simon, Diderot, Stendhal, Flaubert, Zola, and Proust.
What holds for the French Academy holds in varying degree for every other institution designed to identify and reward talent.”


Matthew Effect, from the biblical gospel of Matthew 25:29:

"...τῷ γὰρ ἔχοντι παντὶ δοθήσεται καὶ περισσευθήσεται, ἀπὸ δὲ τοῦ μὴ ἔχοντος καὶ ο ἔχει ἀρθήσεται ἀπ’ αὐτοῦ.”

"For to all those who have, more will be given, and they will have an abundance; but from those who have nothing, even what they have will be taken away.”

Sam Goudsmit, Editorial, PRL 28, 331 (1972)
“Acceptance of a Letter is somewhat similar to selection to an Academy: For every one selected there are always a few equally qualified candidates who lost by a couple of votes.”
Competition among publishers for the most cited physics papers

Top-50 cited in physics, by publisher
Appeal to all scientists:
Let’s quote Impact Factors to just ONE decimal digit please!

“I keep telling journal people that they should never even mention JIF beyond the first decimal place. I mean, to quote a JIF like "12.345" is ridiculous. Its JIF is "12.3"; why do you need these two extra digits? It gives a false idea of precision.”

Eugene Garfield
Founder & Chairman Emeritus
Institute for Scientific Information - now Thomson Reuters
http://www.garfield.library.upenn.edu/
Large Journals cannot have high Impact Factors

“Is PRL too large to have an ‘impact’?”, Antonoyiannakis & Mitra, PRL 102, 060001 (2009)
Impact: IF vs. citation histograms

Citation Histograms (PY=2007-2008, CY=2009)

2009 “Impact Factor” (WoS)

Data: Web of Science (WoS). Impact Factors are reproduced from WoS Citation Reports and differ from official numbers reported in Thomson Reuters Journal Citation Reports.
Impact: IF vs. citation histograms

Citation histogram of *Physics Viewpoints* is similar to *Nature Photonics*.

Citation histogram of *PRL Suggestions* is similar to *Nature Physics*.

Data: *Web of Science (WoS)*. Impact Factors are reproduced from WoS Citation Reports and differ from official numbers reported in Thomson Reuters *Journal Citation Reports*. 
We have > 50,000 referees in the database, but we are using “only” 1500 heavily (*)

Referee usage statistics

\[ y = 71098e^{-0.4276x} \]

\[ R^2 = 0.9902 \]

(*) > 10 papers/year
We grade reports –
Over time, referees build their profile
Physics – why?

• We (APS) publish about 18,000 articles each year

• Some articles are important, but can only be understood by an expert

• We want to make the **most important new results** accessible, with an introduction by an expert scientist at a level that all physics students and researchers can understand
The *Physics* review process: 4 steps of *post-acceptance review*

1. **Handling editor** nominates manuscript to a PRL committee
2. **PRL committee** studies all nominees and chooses 2-3 to nominate to a *Physics* committee
3. **Physics committee** considers nominees from all PR journals & decides to ask outside experts for a possible Viewpoint for *Physics*
4. **Two-three outside experts** provide rapid post-acceptance “review” of manuscript for *Physics*

An outside expert contributes a Viewpoint for *Physics*

**“Impact Factor” of *Physics Viewpoints* ~ 20**
Why the impact factor does not say it all: It is an average.

Citation profile, Nano Letters (PY=2004-5; CY=2006)

\[ IF_{2010} = \frac{\text{citations}_{2010}}{\text{papers}_{2008-9}} = \frac{\sum_{1}^{N} c(n)}{N} \]

The IF is the number of citations over a 2-year window, averaged over the whole journal.

Not all papers are created equal!
Distinguish between the 
H-index and the S-index

For a set of papers
H-index: full publication window, full citation window
S-index (for 2009): 2007-8 publication window, 2009 citation window
Journal rankings

S-index, 2010

Editors’ utopia, part I

Competent scientists are available and eager to:

– Review every paper we send to referees
– train younger referees
– provide feedback to the editors

7 APS *Outstanding Referees* in WavePro:
E Economou, R Merlin, S Pantelides, D Papaconstantopoulos, JB Pendry, M Schreiber, Costas Soukoulis
“Dear Editor,
I apologise for the mistake. You are right, the paper should appear in a specialised journal.”

The PRL editorial grail

“Dear Editor,
Thank you very much for your message. I accept completely your suggestion. Your judgment is very suitable. I am clearly know that this manuscript is not enough for publication in PRL. I am very sorry to give you trouble.
When I finished this manuscript, I tell my collaborator submit this manuscript to PRA. However, it is very regretful that he submits this manuscript to PRL for himself. I have rigorously criticizing Him.”

“We agree with referee 1.
We drastically failed in our literature search.
We would like to remove our paper from consideration.
Thank you for your attention.”
Dear Editor,

I apologise for the mistake. You are right, the paper should appear in a specialised journal.

The PRL editorial grail

“For a grail the author has to express deep and impassioned relief that the editor saved him or her from publishing an ignominious piece of scientific research by his own hand, which, by dint of editorial rescue, has saved his or her professional skin.

Please note however, one of the points of the grail is that it is something we strive for. 

No editor will ever obtain the grail, by definition.

But keep up the good work!”

George Basbas, PRL
What is RWER?

An editorial rejection letter, sent upon initial receipt, on the basis of the editor’s judgement of impact, innovation, interest, significance.

RWER includes the following form letters:

• S8 (“soft” rejection)
• R8 (“hard” rejection)
• R4 (“hard” rejection, laconic letter)
Rejection Without External Review (RWER)

How do editors make an assessment?

1. Introduction
   - clear and concise?
   - adequate citations to previous work?
   - clear rationale for the work and description of findings?

2. Conclusions (are the findings important?); context

3. Presentation (quality of text & figures? is it readable?)

4. References
   - enough progress made from past work?
   - is the journal readership likely to be interested in this work or maybe a specialized journal is more appropriate?
RWER manuscripts - PRL

- RWER sent
- RWER then reviewed
- RWER published

2001: 734
2002: 827
2003: 778
2004: 907
2005: 1779
2006: 2215
2007: 2511
2008: 2867

2001: 288
2002: 404
2003: 319
2004: 386
2005: 969
2006: 1253
2007: 1130
2008: 143

2001: 31
2002: 42
2003: 25
2004: 44
2005: 93
2006: 110
2007: 130
2008: 143
RWER & acceptance rates - PRL

Quality of receipts decreasing?