



USC University of  
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# Recipe for Scientific Paper Peer Review: Mixing fairness and objectivity with criticism

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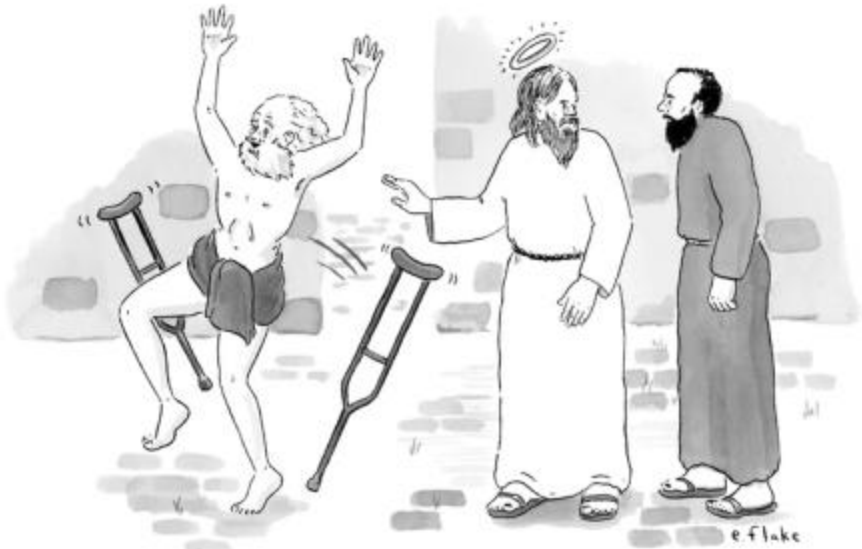
## Disclosure:

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?



*"Yeab, but good luck getting it peer-reviewed."*

**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?

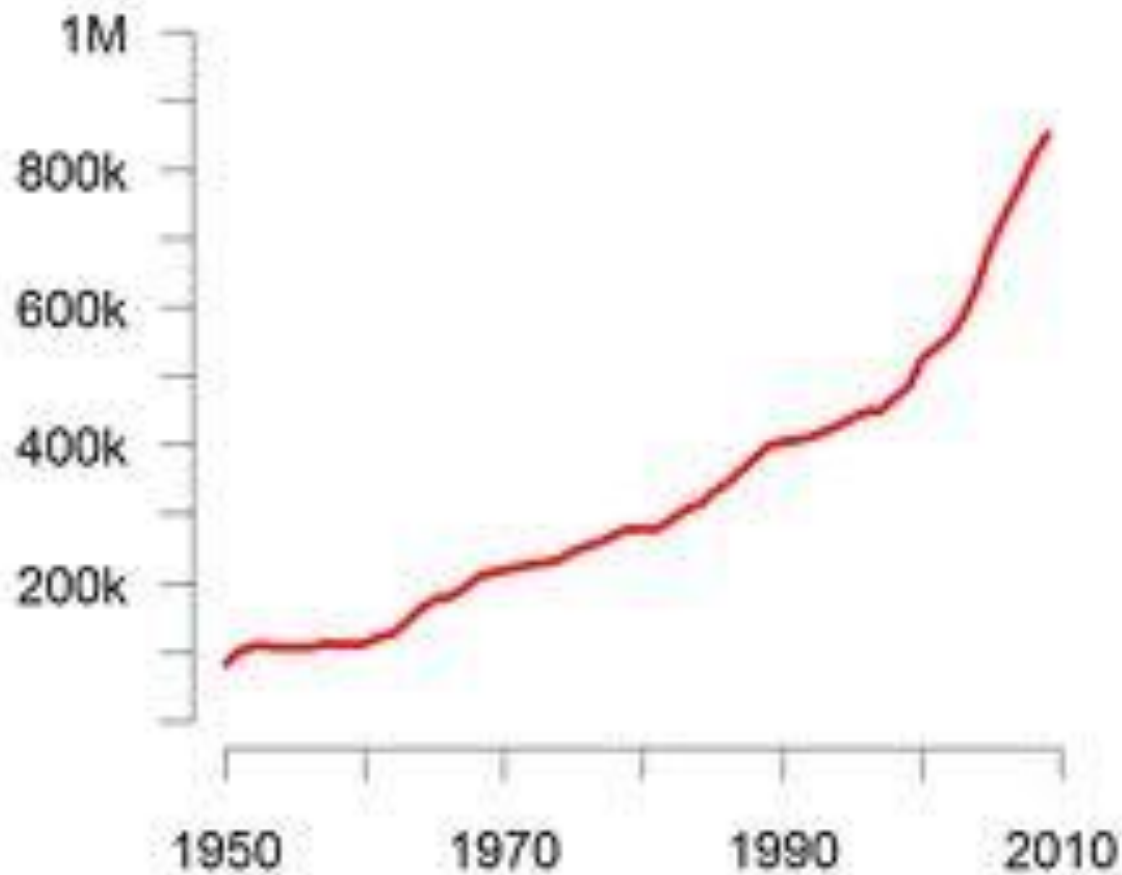


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# Editors need you!

**MEDLINE-indexed articles  
published per year**



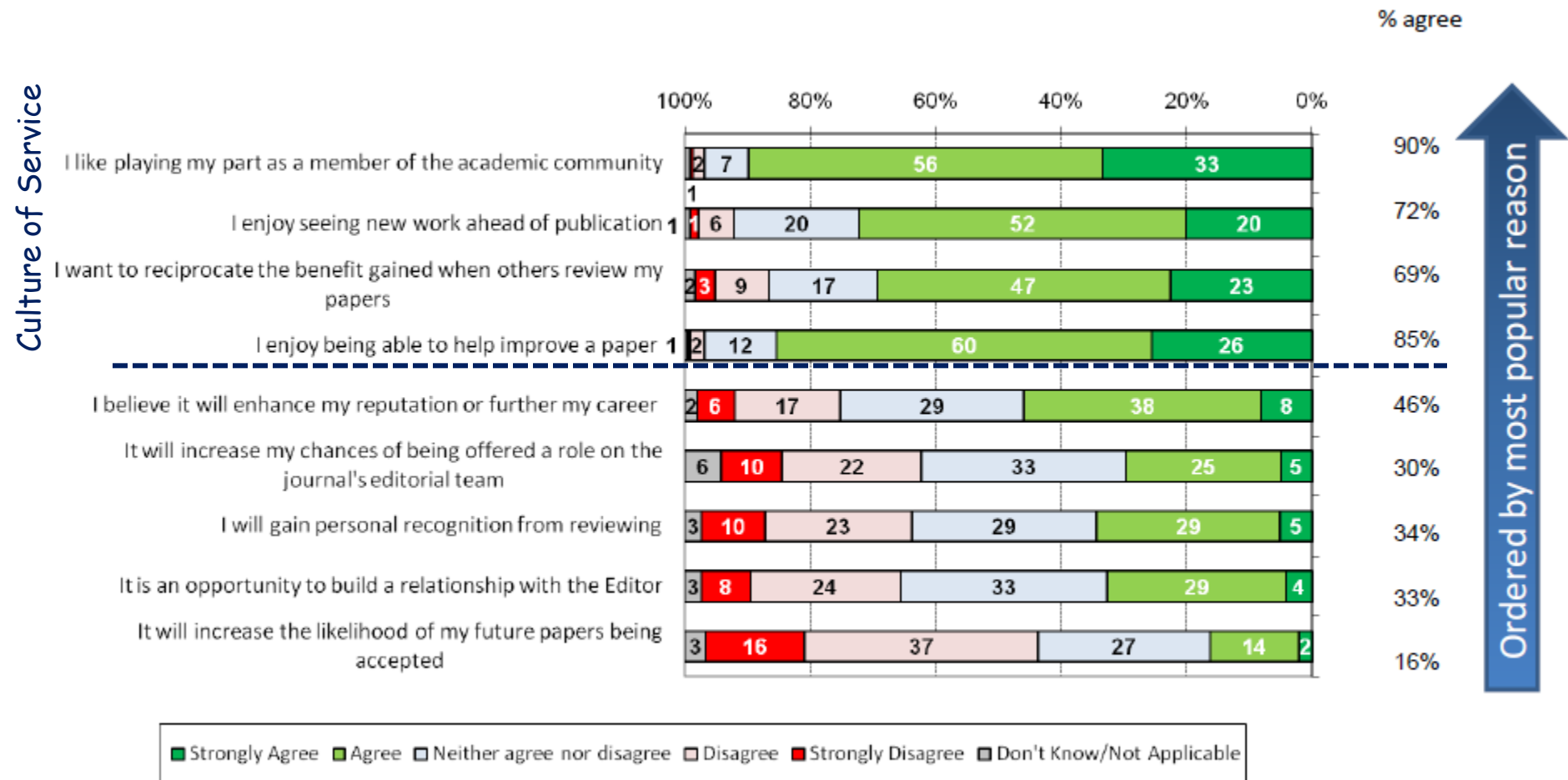
# Personal reasons to review?

- 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

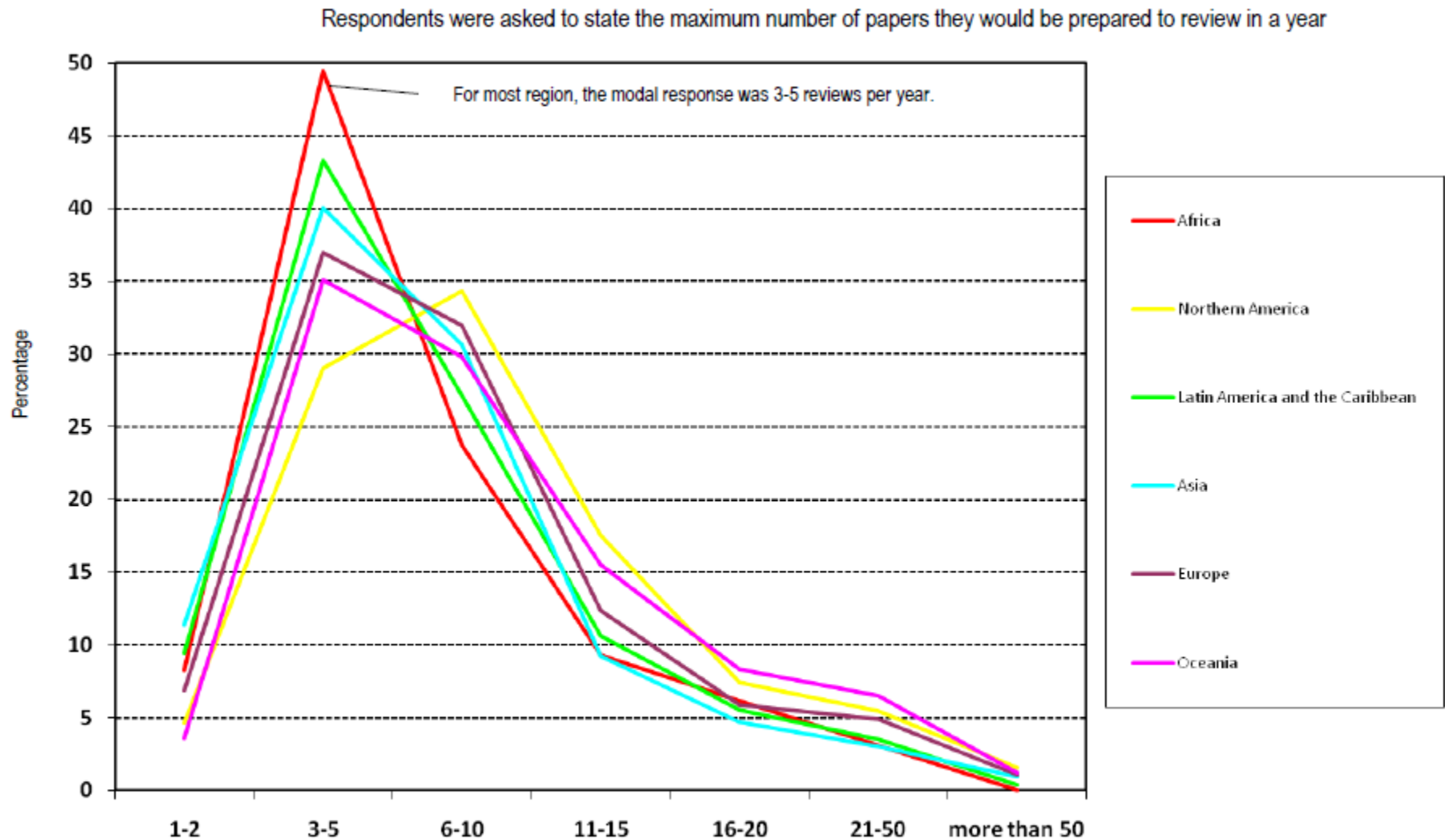


# Many reasons to review...

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



# Some are more willing than others



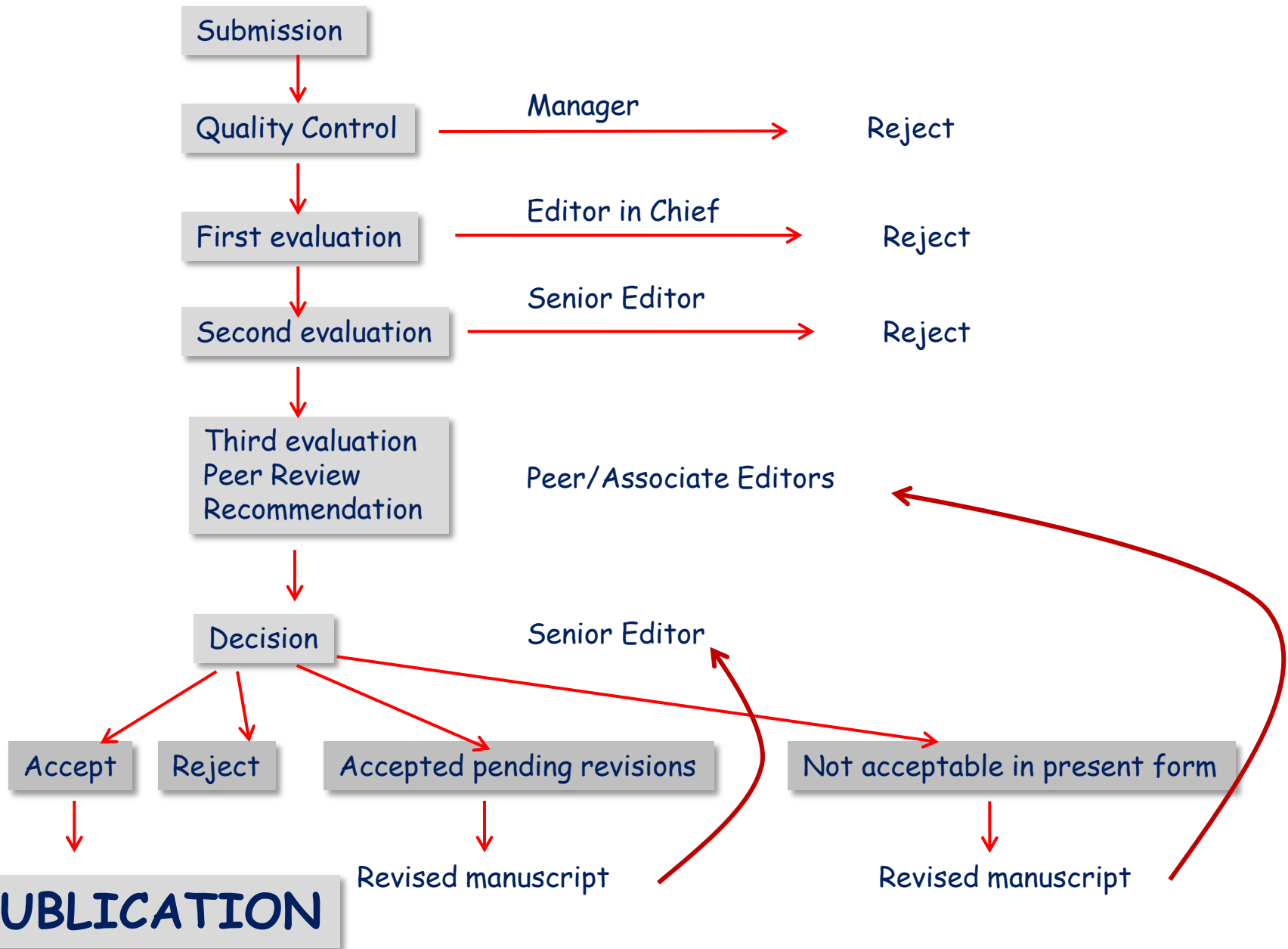
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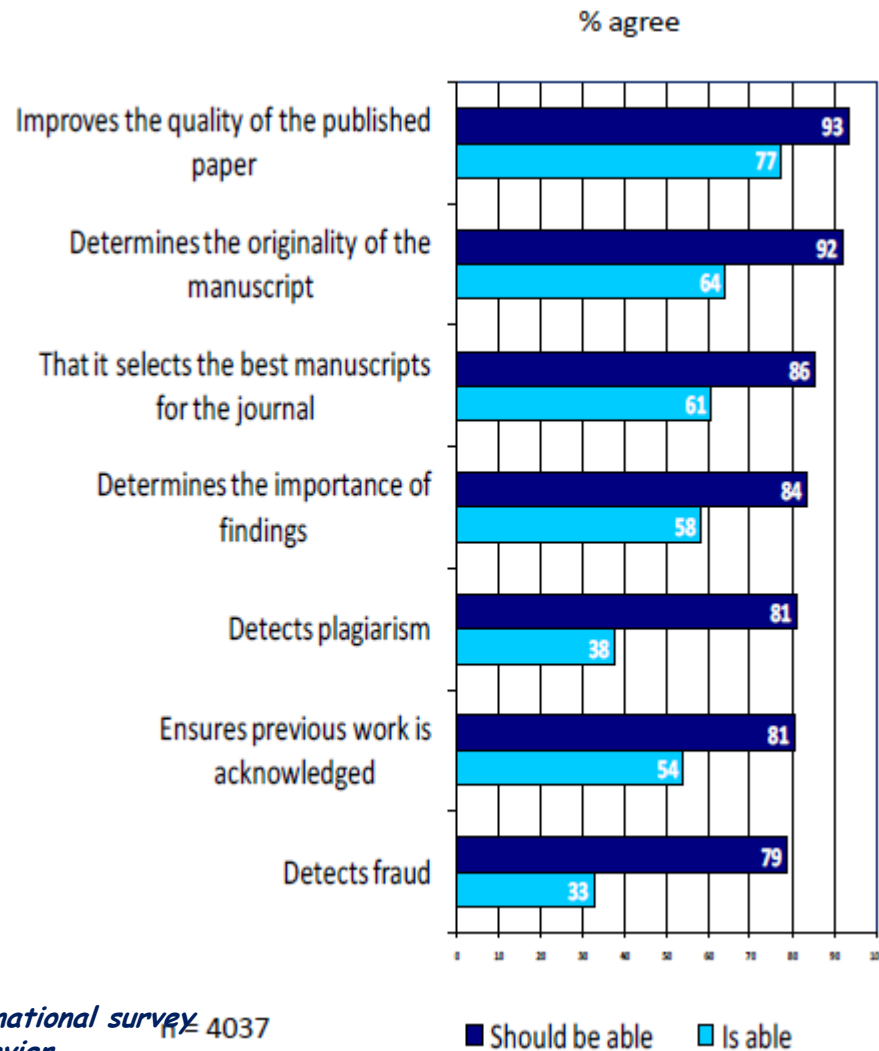
The decision

by who?

# The Process

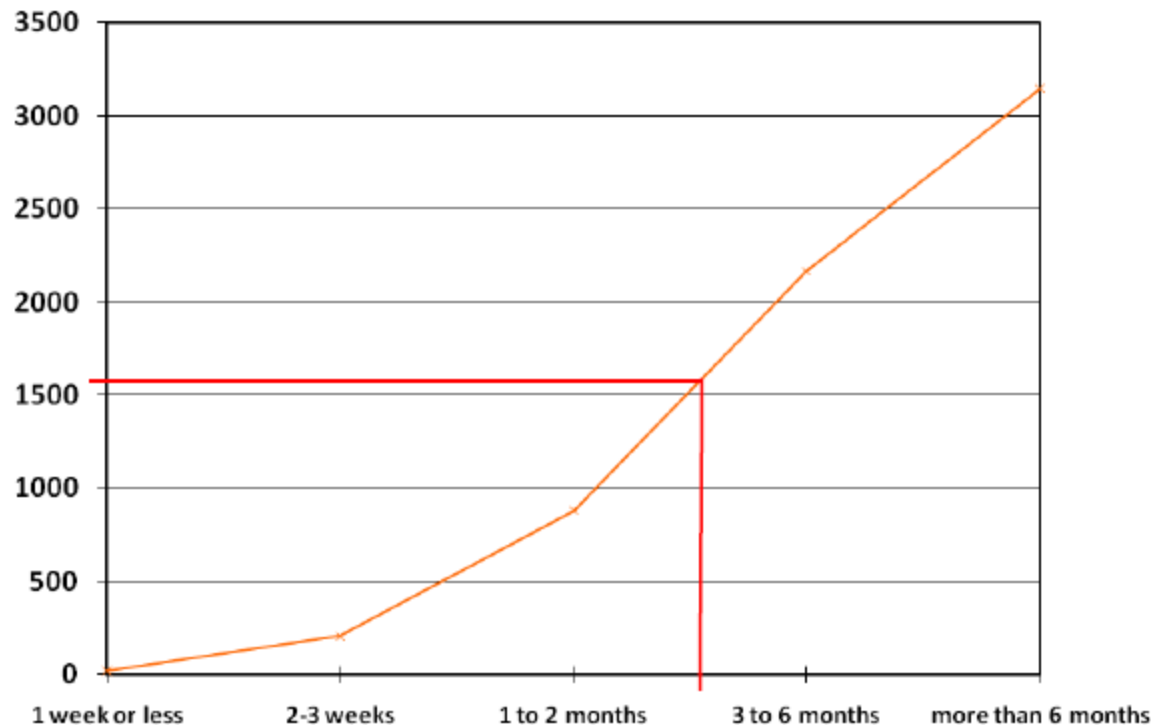


# What should /is peer review accomplishing?



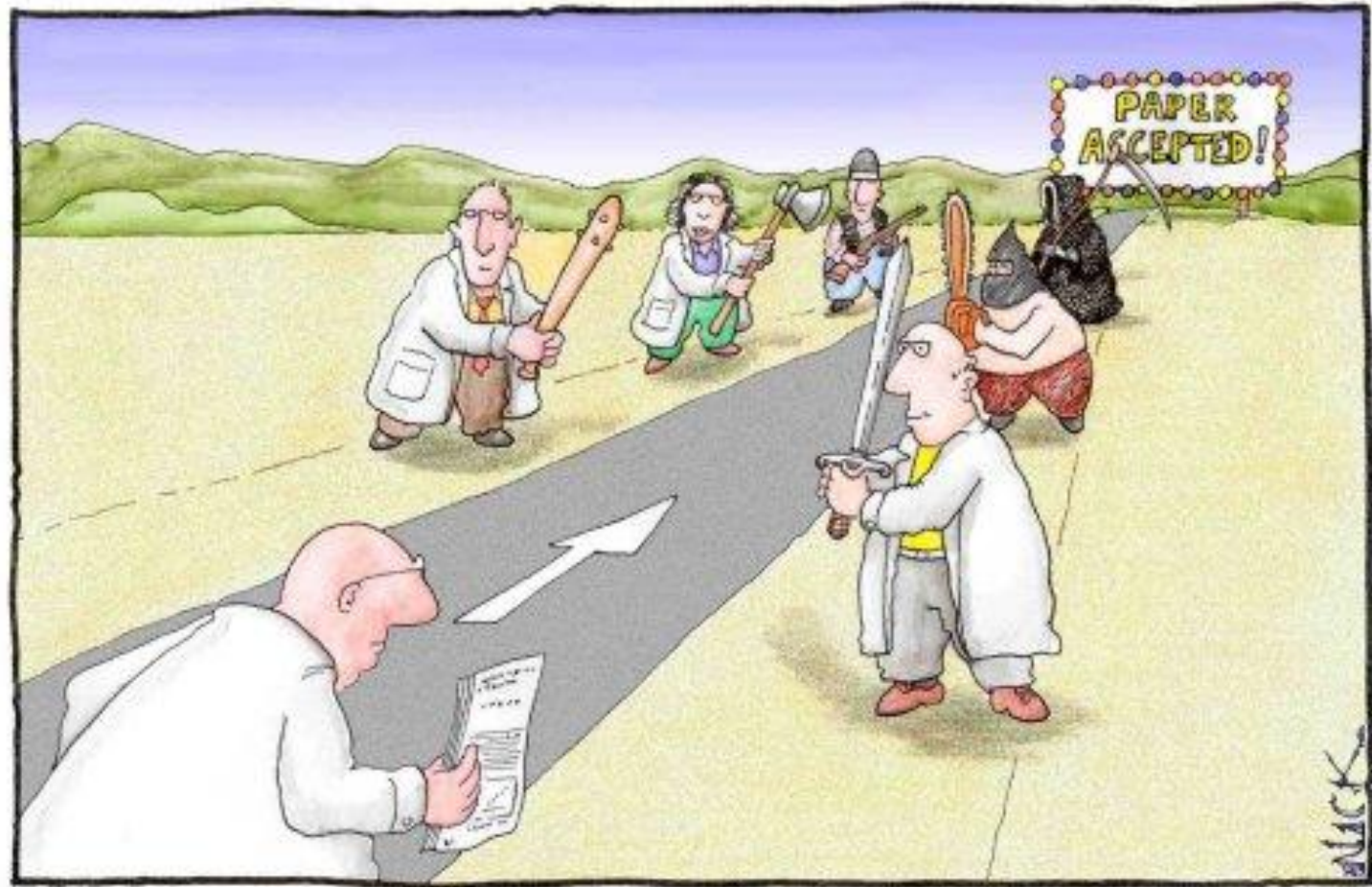
# How long does it take?

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

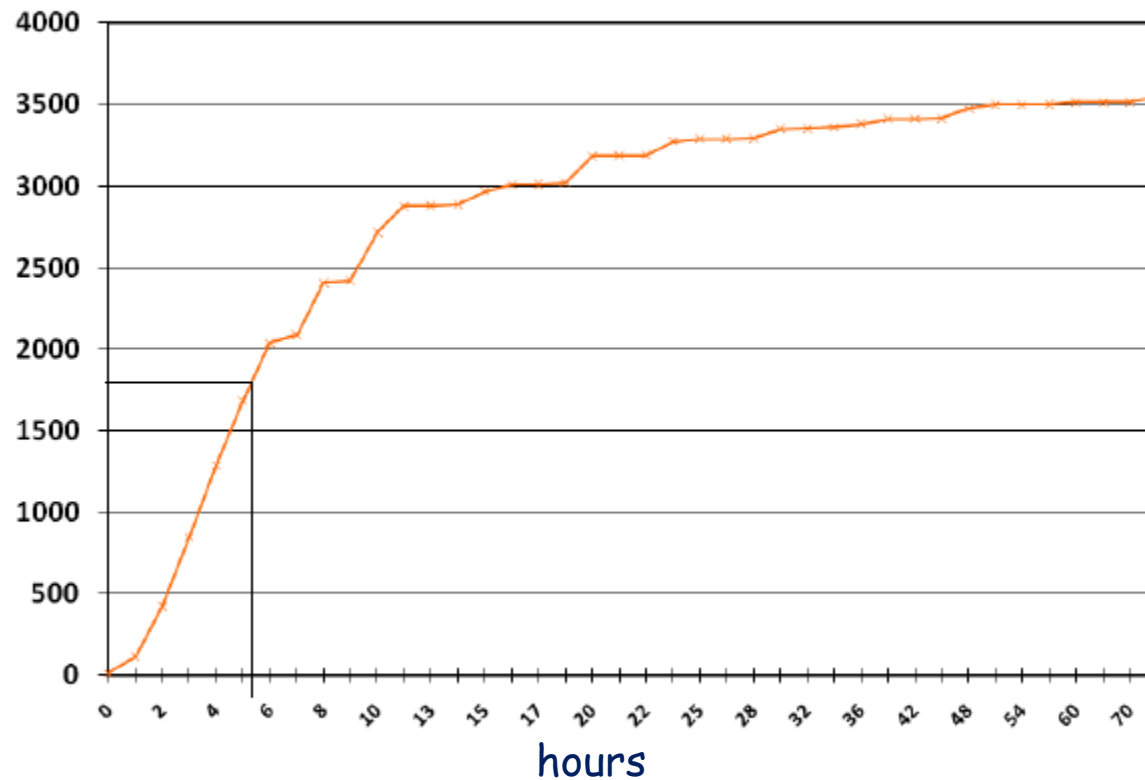
"It is written in a clear style and would be understood by any reader"

# 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



Credit: Sandra Catania

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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?

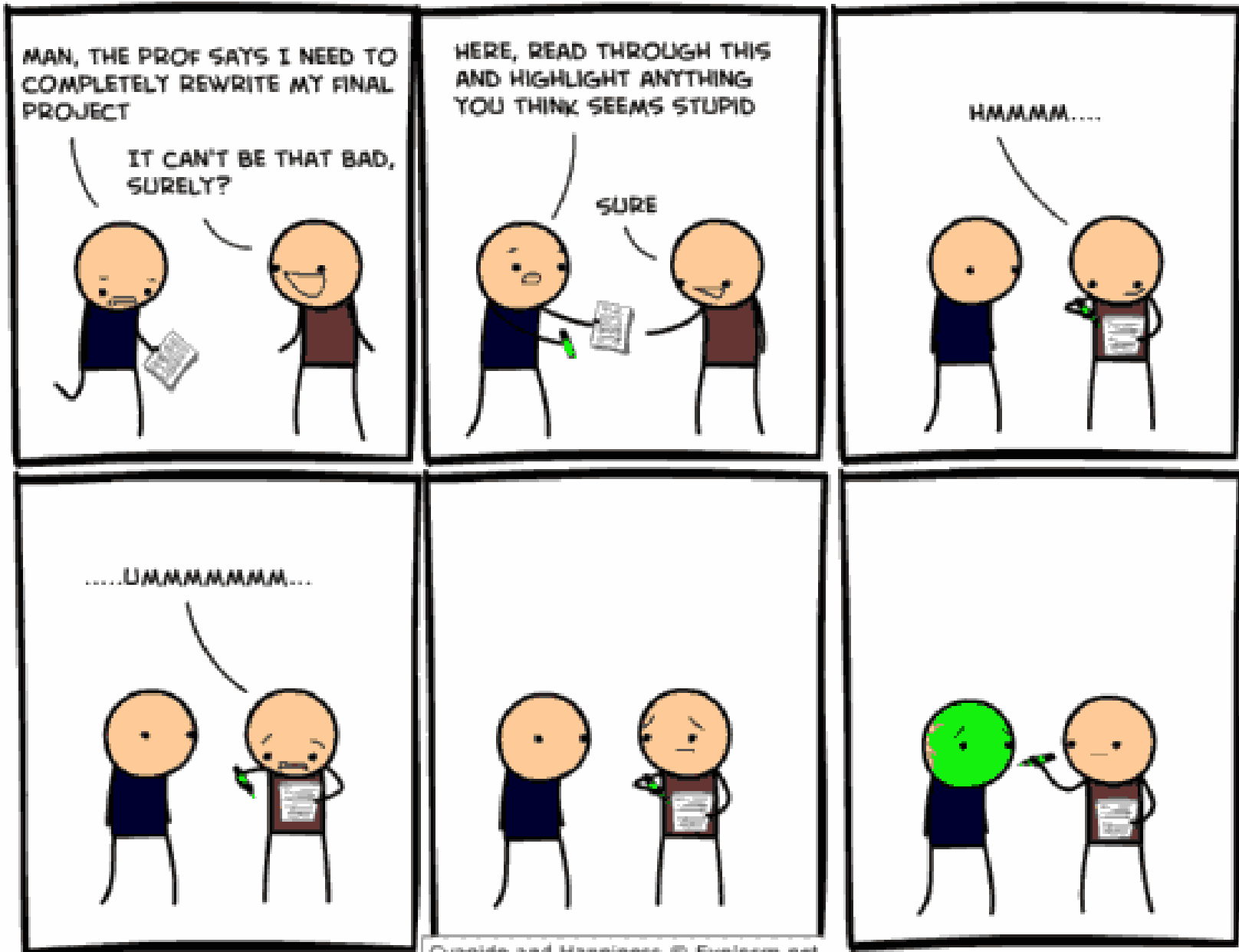
# Checklist for reviewers: the big 5

- ☐ 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)

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# Writing the review





# 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

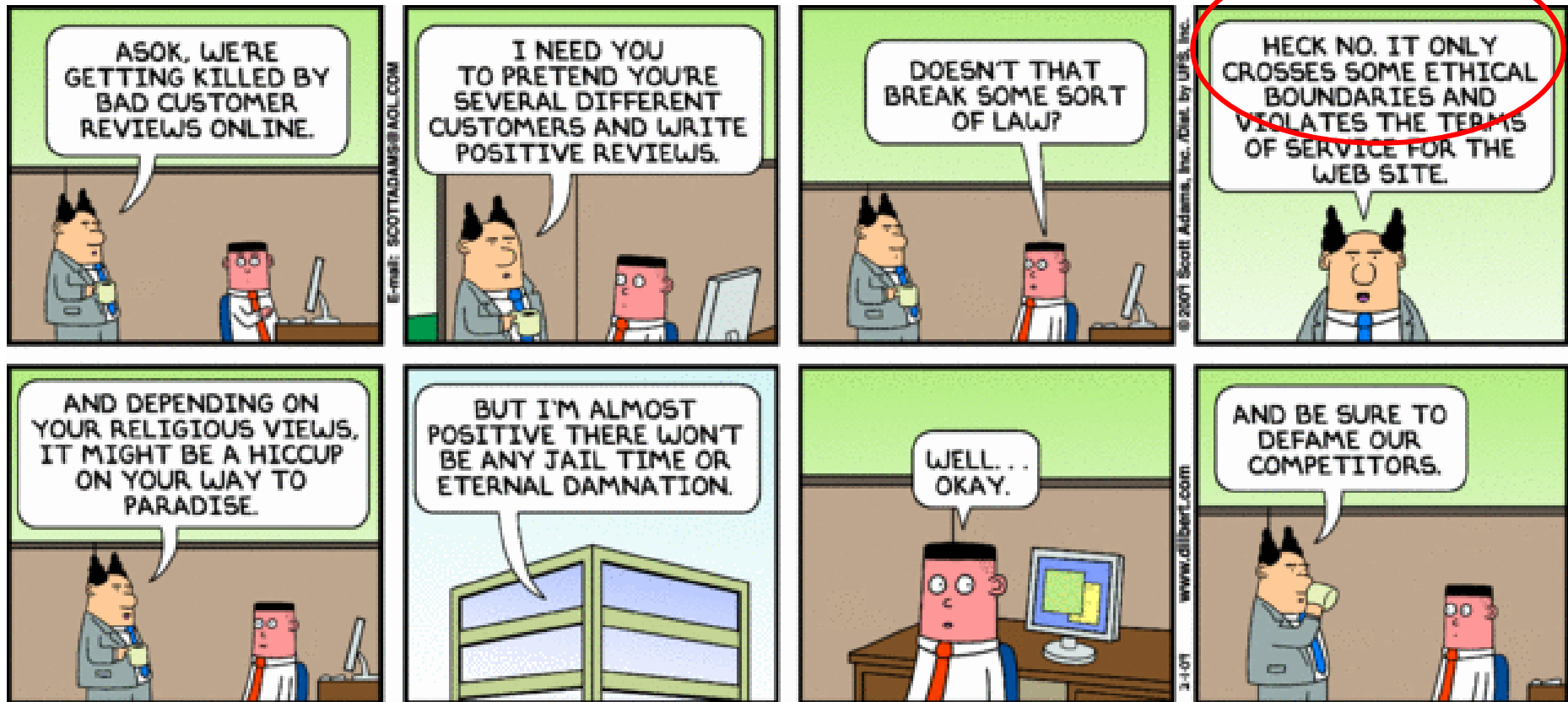
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# Reviewer's etiquette

- ☐ 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

# Etiquette and Ethics Heck





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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

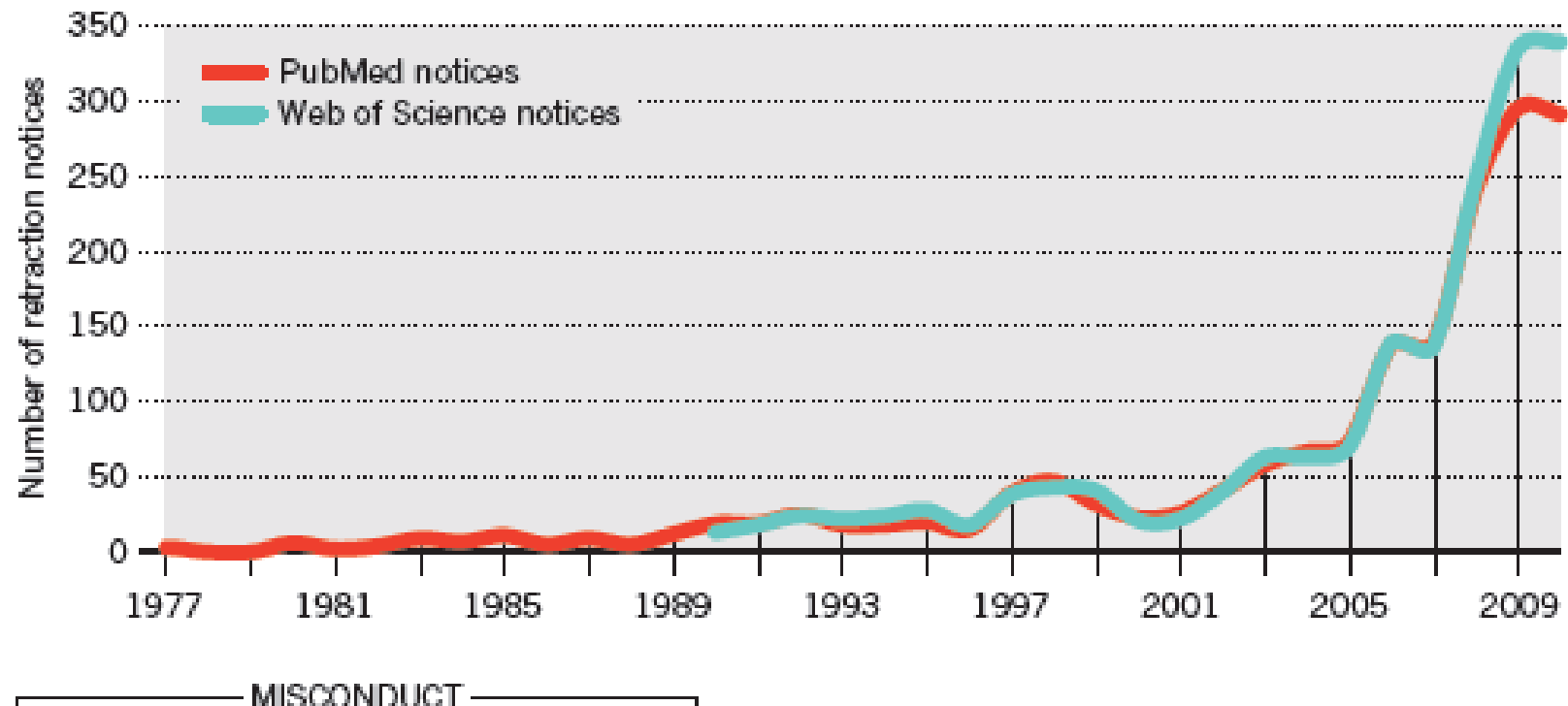
Peer review is like democracy: A  
system full of problems but the  
least worst we have

R. Smith, 2009  
Editor BMJ

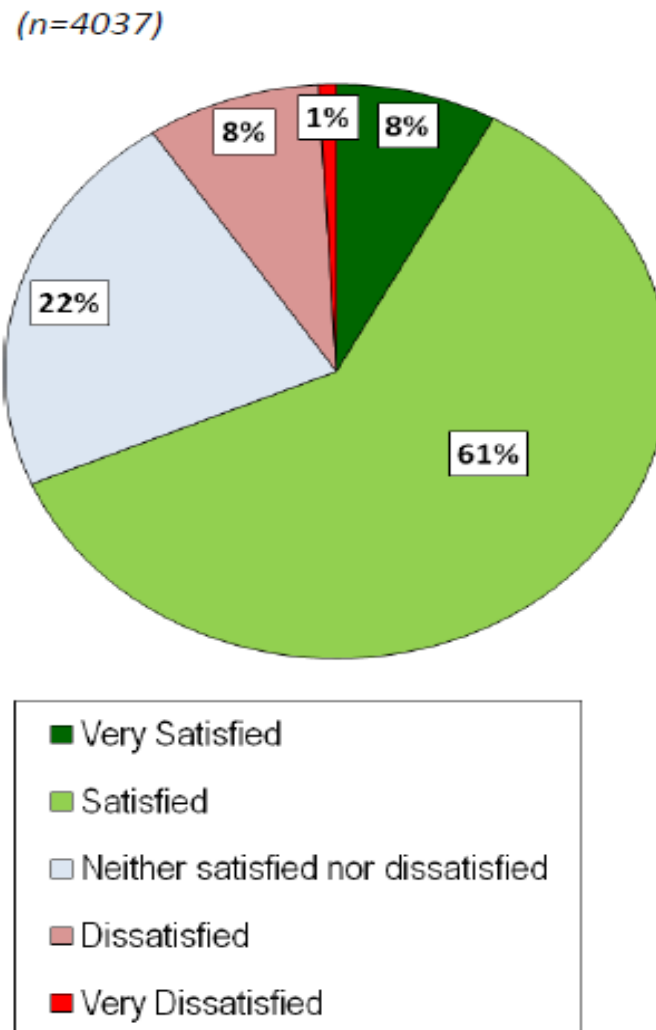
# Arguments

- 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



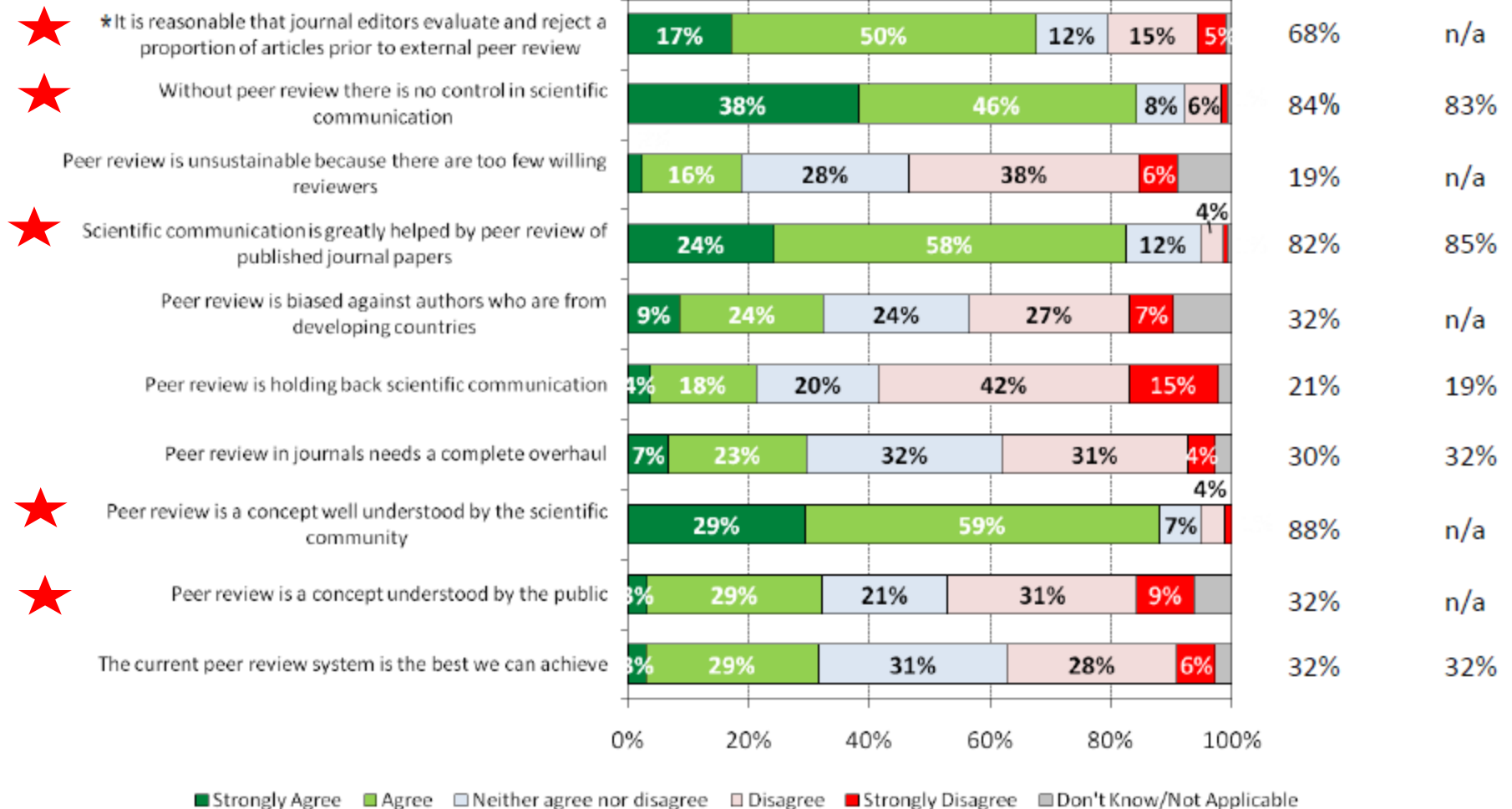
# Opinions vary

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

% Agree

2009

2007



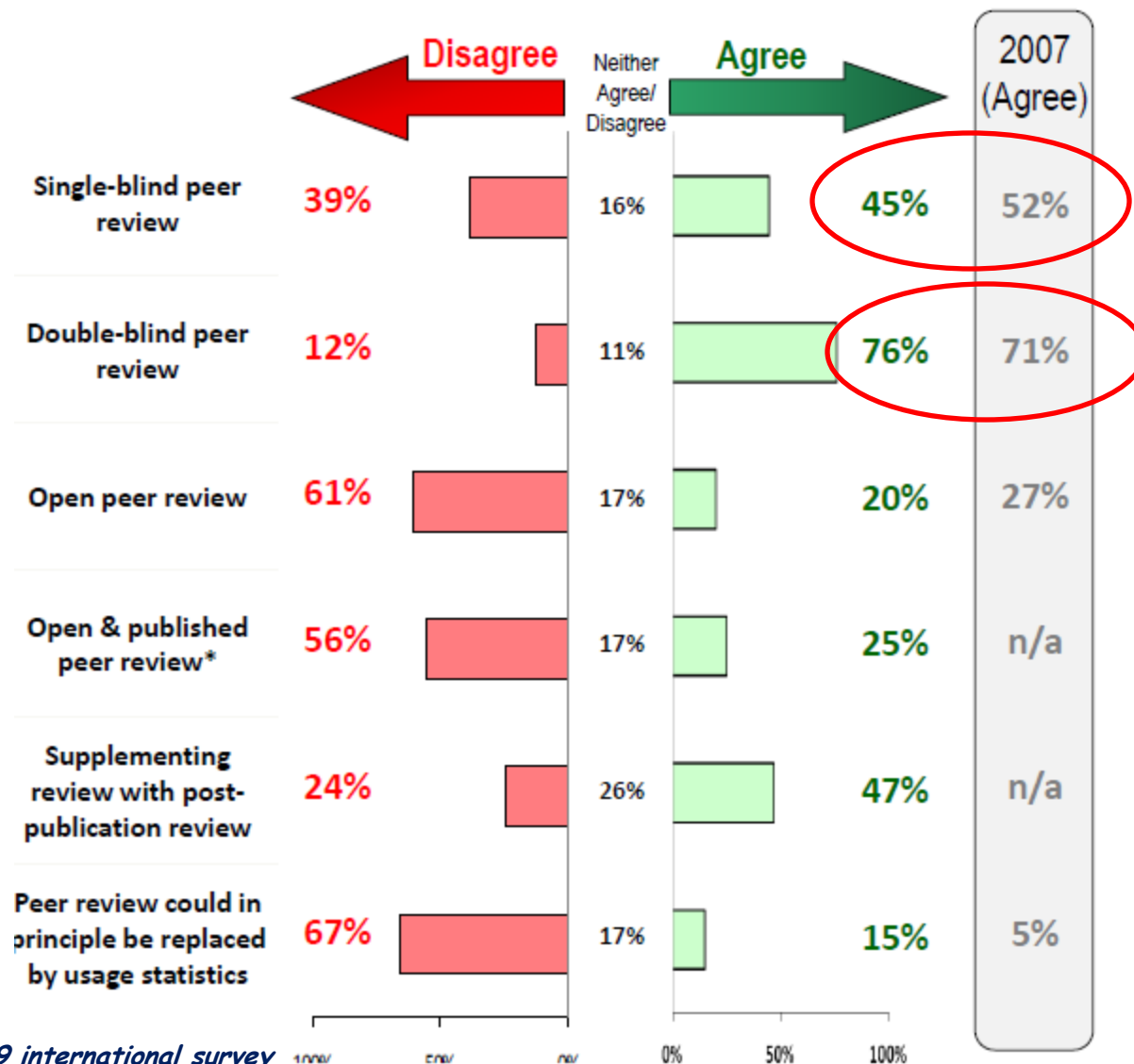
\* n=3964 (added after pilot stage so number is slightly lower)

n=4,037

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



# Alternate approaches



# How to improve peer review?

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

# Acknowledgments/References

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- Smith R. J. Royal Soc. Med. 178-182, 2006
- Benos, DJ, Kirk, KL, Hall, JE. Adv. Physiol. Educ. 2003
- Sense about Science 2009, international survey