Getting it transparent or keeping it obscure?

Potential implications of open peer review on scientist competition and collaboration

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A hot issue

SCIENTIFIC RESEARCH

End of the peer review show?

Several recent high profile cases have raised questions about the effectiveness of peer ensuring the quality of published research. **Mark Henderson** investigates

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Peer review: a flawed process at the heart of science and journals

Richard Smith

J R Soc Med 2006;99:178–182

RESEARCH

Uncovering misconduct

Cases of scientific wrongdoing seem to be rising. But when should researchers blow the whistle?

BY VIRGINIA GEWIN

EDITORIAL

Bruce Alberts is the Editor-in-Chief of *Science*.

Brooks Hanson is Deputy Editor for physical sciences at *Science*.

Katrina L. Kelner is Deputy Editor for life sciences at *Science*.

Reviewing Peer Review

PEER REVIEW, IN WHICH EXPERTS IN THE FIELD SCRUTINIZE AND CRITIQUE scientific results prior to publication, is fundamental to scientific progress, and the achievements of science in the last century are an endorsement of its value. Peer review influences more than just science. The Intergovernmental Panel on Climate Change and other similar advisory groups base their judgments on peer-reviewed literature, and this is part of their success. Many legal decisions and regulations also depend on peer-reviewed science. Thus, thorough, expert review of research results—without compensation—is an obligation that scientists shoulder for both science and the general public.

Retraction Watch

Retraction count grows to 35 for scientist who faked emails to do his own peer review

with 8 comments

Hyung-in Moon, the South Korean plant compound researcher who made up email addresses so he could do his own peer review, is now up to 35 retractions.

The four new retractions are of the papers in the *Journal of Enzyme Inhibition and Medicinal Chemistry* that initially led to suspicions when all the reviews came back

Hyung-in Moon

RETRACTED

SCIENTIFIC AMERICAN

Scan Uncovers Thousands of Copycat Scientific Articles

Opening the black box!

A timeline of open and transparent review

Within the life sciences in particular, several journals have opened their peer review process to address some of the issues discussed above. Sometimes this involves publicly naming reviewers and/or editors. Other journals publish some or all reviewer comments.

1999	After **studying** various peer review models, *BMJ* starts **revealing reviewer names** to authors
2000	BioMed Central launches, and soon after that starts **including reviewer names and pre-publication history** for published articles in all **medical journals** in their BMC series of publications
2001	*Atmospheric Chemistry and Physics* introduces a **system** where manuscripts are placed online as a "discussion paper", which is archived with all comments and reviews, even before approved and peer-reviewed articles appear in the journal.
2006	**Launch of *Biology Direct*,** which includes reviewer comments and names with published articles.
2007	Frontiers launches, and includes **reviewer names** with articles.
2010	*EMBO journal* starts publishing **review process file** with articles. Editors are named, but referees remain anonymous.
2011	*BMJ Open* launches, and includes all **reviewer names and review reports** with published articles.
2012	Several journals launch with an open peer review model: • *GigaScience* – publishes **pre-publication history** with articles and names reviewers (opt-out system) • *PeerJ* – Peer review reports published with author approval, reviewer names published with reviewer permission. (**Info**) • *eLife* – **Decision letter** published with author approval. Reviewers anonymous. • *F1000Research* – All peer review reports and reviewer names **are public**, and appear after article is published online.

At *F1000Research* our goal has been to champion transparency in the peer review process: Each article we publish includes all peer review reports, reviewer names, and author responses – even for articles that are still under review or revision.

Benefits of open review

Benefits for authors and readers

- Author can see who reviewed their work
- Reviewer comments put paper in context which is useful additional information for readers
- Reduces bias among reviewers
- More constructive reviews
- Published reports can serve as peer review examples for young researchers.

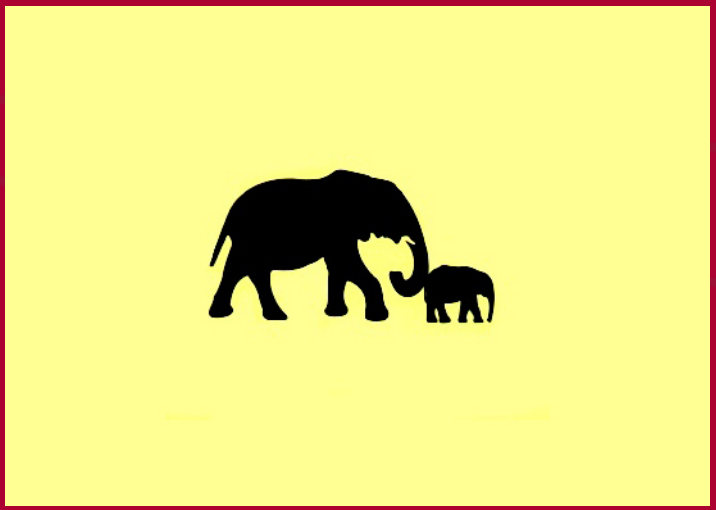
Benefits for reviewers

- Shows the reviewer's informed opinion of the work
- Demonstrates experience as a reviewer
- Can take credit for the work involved in conducting the review

To make it easier for referees to take credit for their work, some journals, including *F1000Research*, now provide unique identifiers (DOIs) for referee reports. In addition, *F1000Research* is **co-chairing a working group** investigating how to include peer review output in ORCiD profiles.

The problem

- Transparency is viewed as a means to avoid selfish behaviour by scientists, who could exploit their gatekeeping position under the shadow of confidentiality, and increase science accountability and credibility
- Open peer review is a “nudge” social experiment on the scientific community



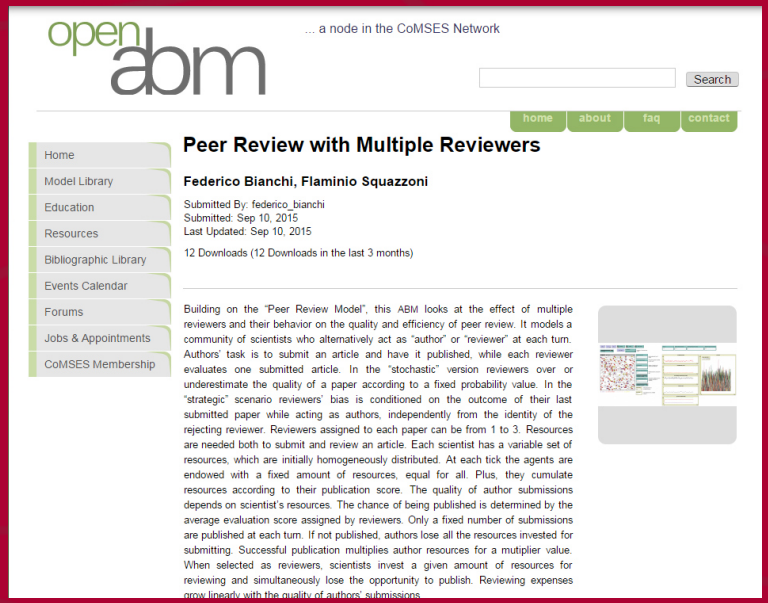
The model

- A population of *N* agents (authors & referees)
- Resources and quality
- Evaluation process:
  intrinsic vs. perceived quality
- Publish or perish

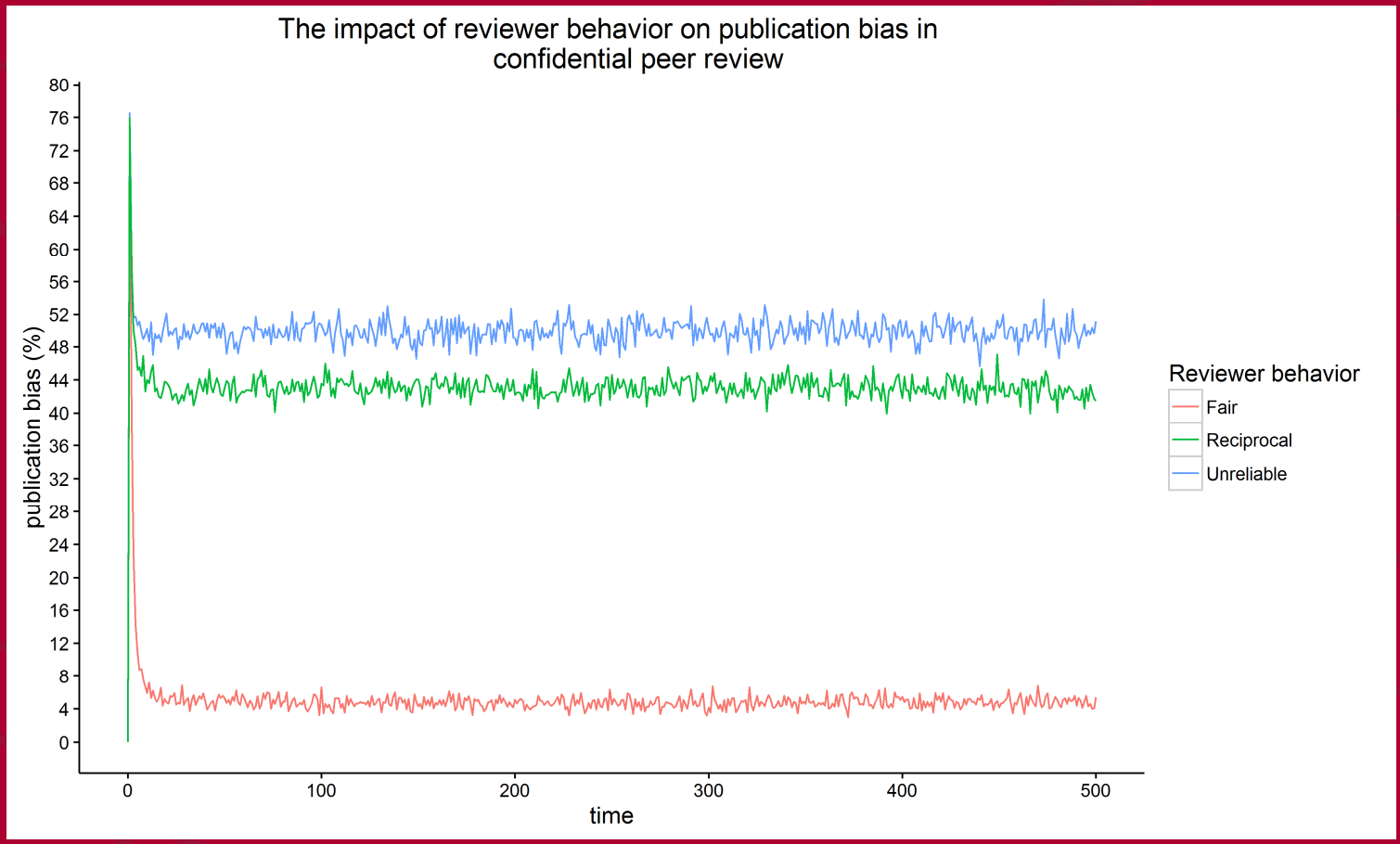
Parameter	Value
Number of agents	240
Number of reviewers per author	[1, 2, 3]
Initial scientist resources	0
Fixed productivity gain	1
Number of accepted publications	30
Publication productivity multiplier	1.5
Evaluation bias by default	0.1
Author investment for publication	1
Reviewing expenses of unreliable reviewers	0.5
Underrating by unreliable reviewers	0.1
Overrating by unreliable reviewers	1.9
Velocity of best quality approximation	0.1

Simulation scenarios

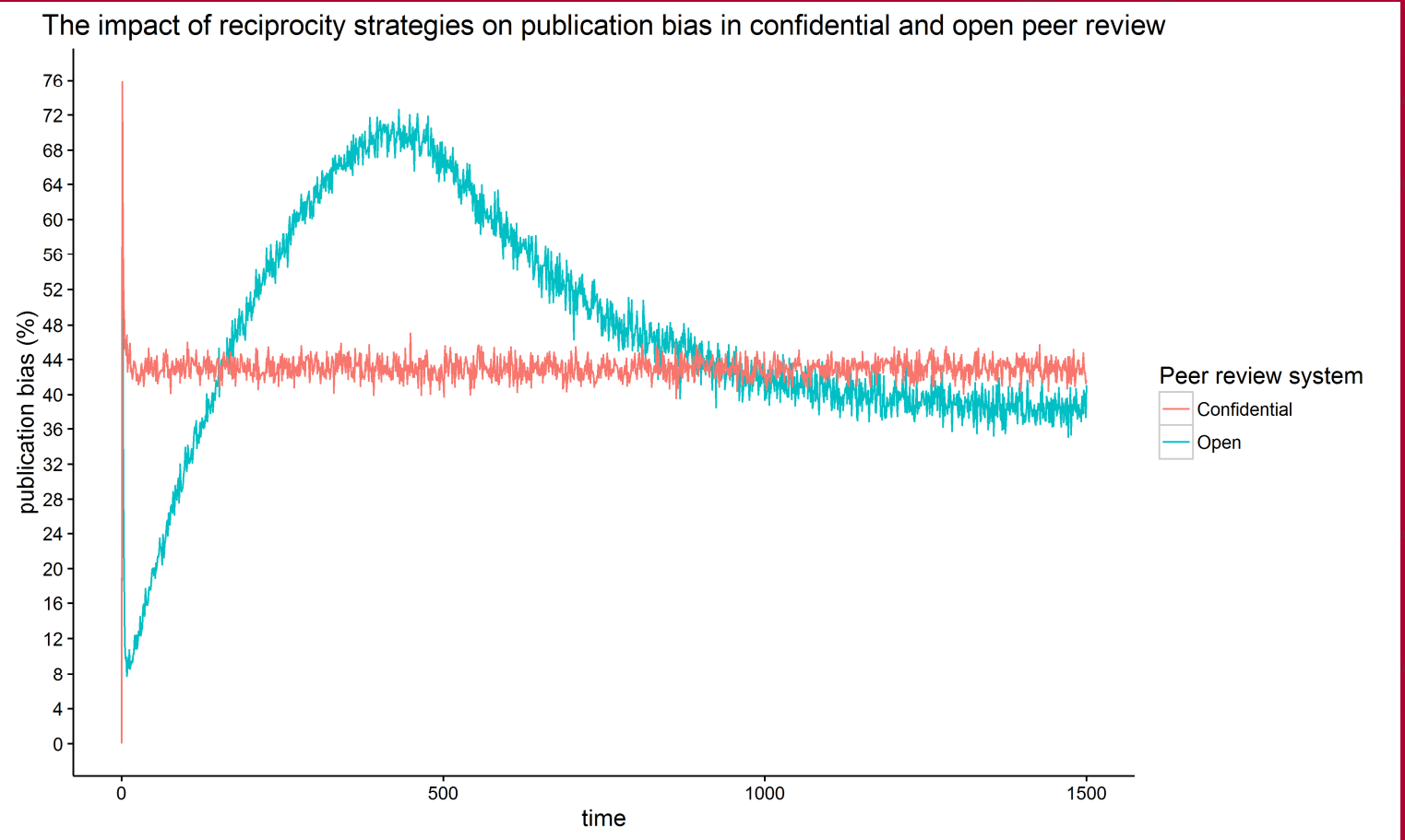
- ❑ Confidential peer review
- ✓ All referees are fair
- ✓ All referees are unreliable
- ✓ Scientists strategically reciprocate their previous publication/rejection when casted as referees (i.e., indirect reciprocity)
- ❑ Open peer review
- ✓ Authors strategically reciprocate with previous referees when casted as referees (i.e., TIT for TAT direct reciprocity)
- ✓ Referees are influenced by the author status and are more positive with authors of higher status
- ❑ 1, 2, 3 referees



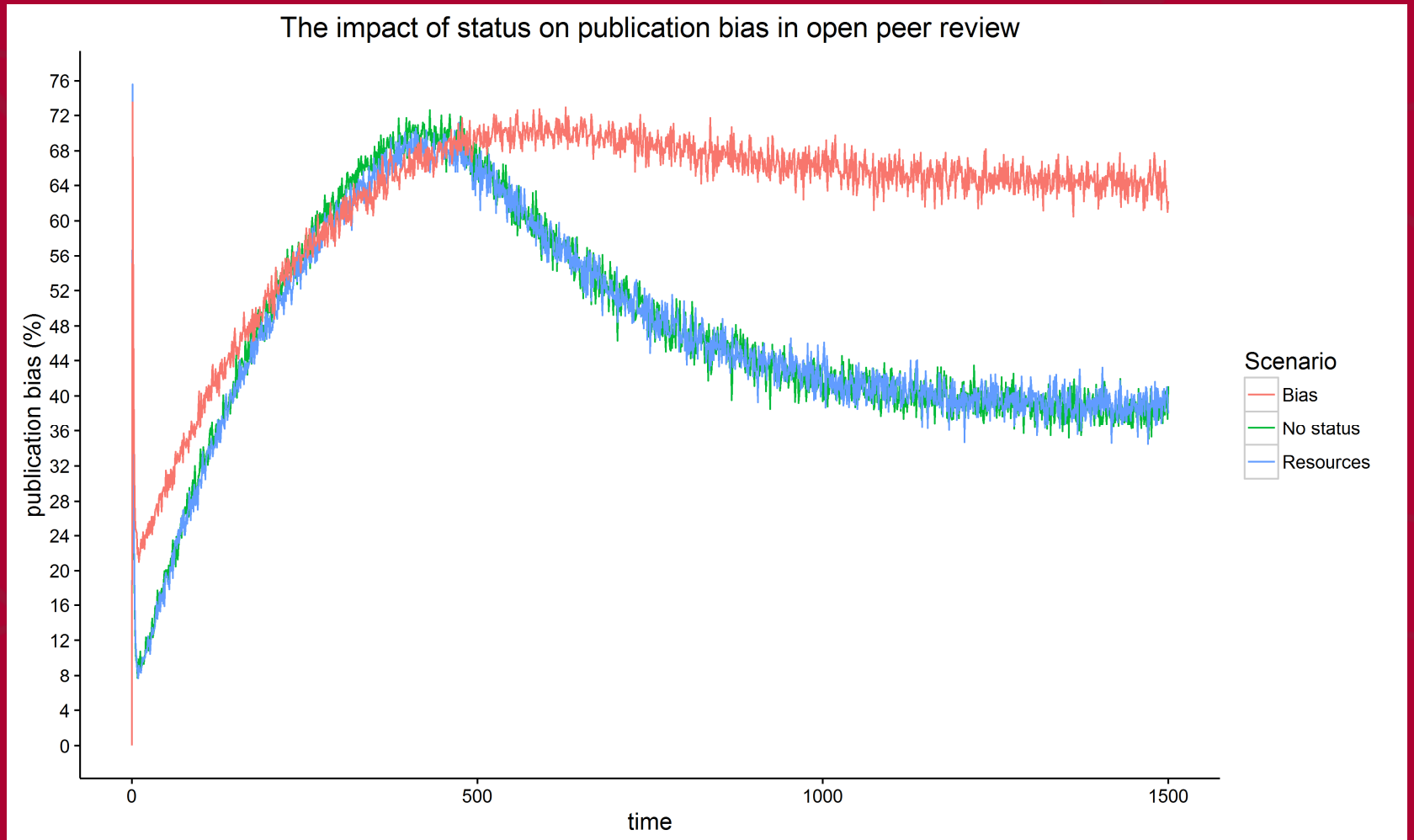
Publication bias with confidential peer review



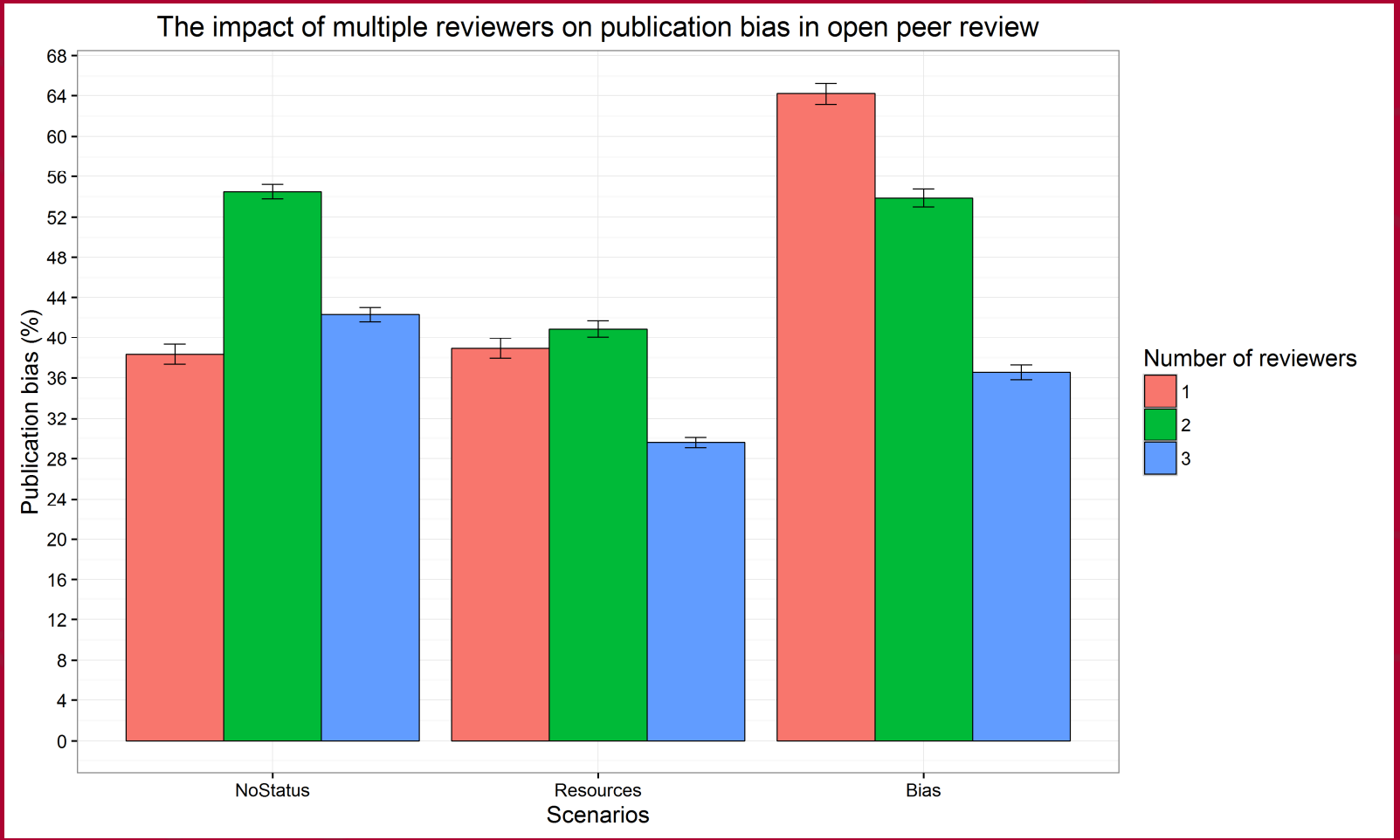
Publication bias with open peer review



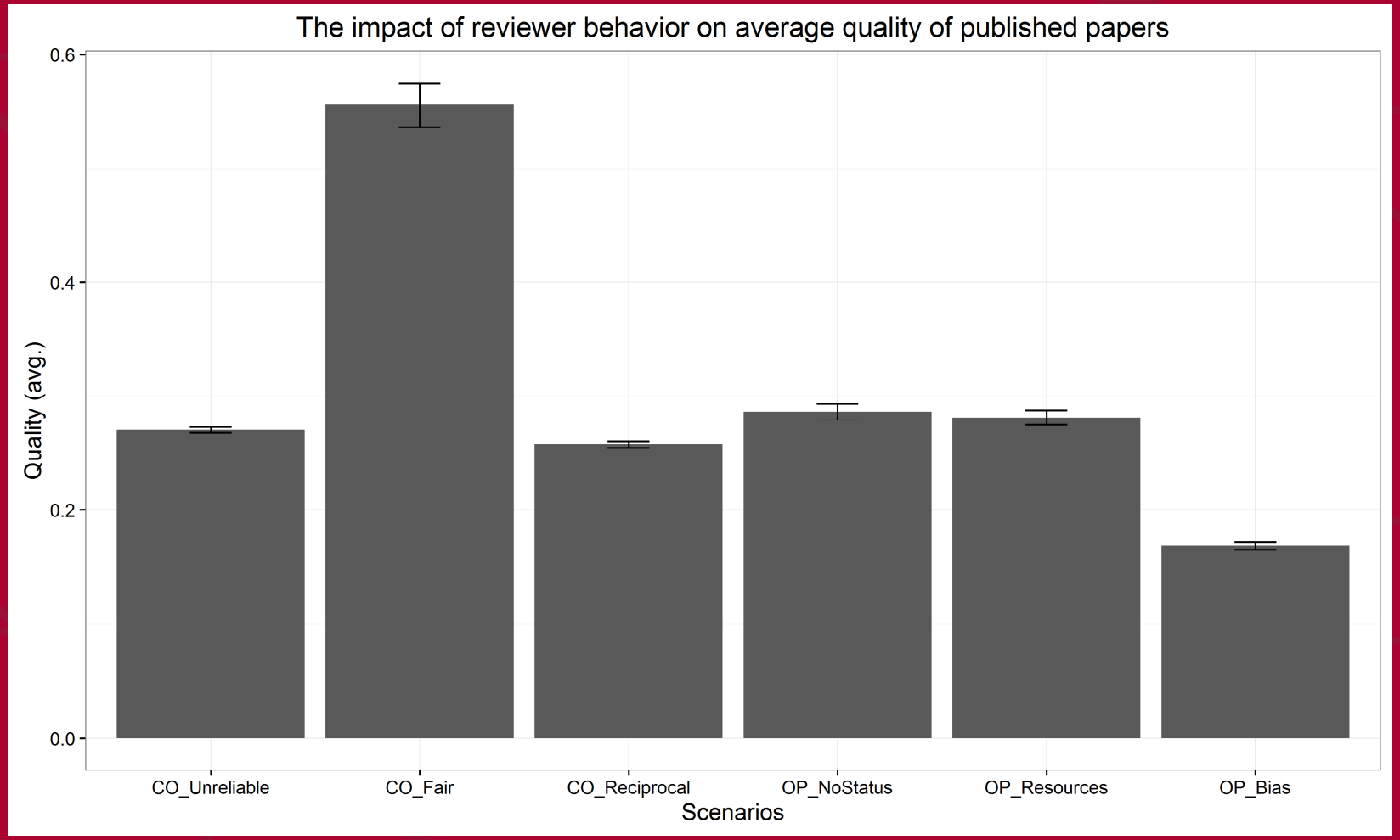
Status bias in open peer review



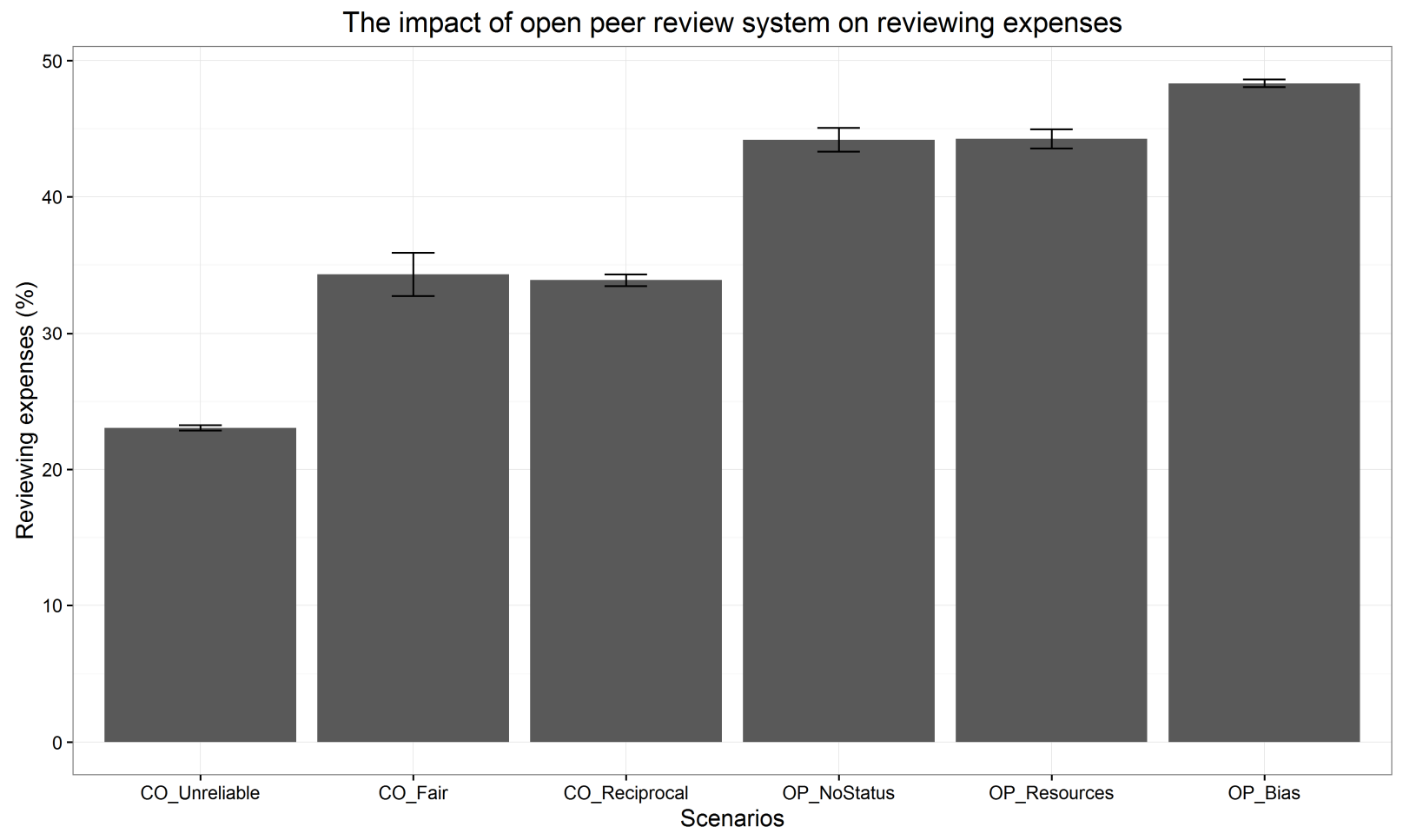
The impact of multiple reviewers on publication bias



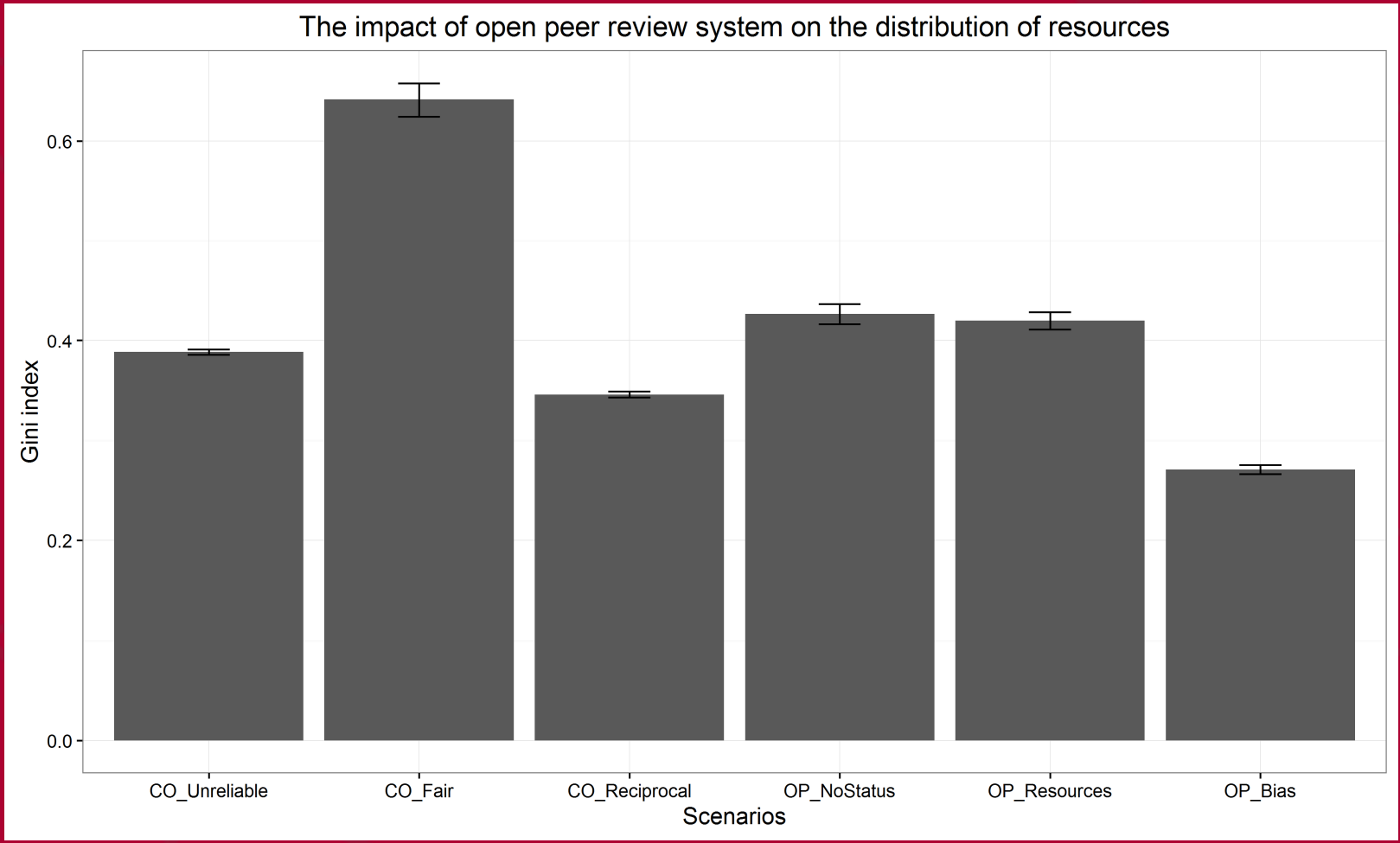
Impact of reviewer behaviour on quality of publications



Resource drain



Resource allocation



Simulation findings

- If reviewers are strategic and identities are revealed, status effects can lead to distortions in publication and the quality of publications is not significantly better than the confidential model with strategic reviewers
- By imposing higher reviewing cost, e.g., writing better reports as they get published, elegantly cooking the report to avoid risky opinions, OPR is excessively resource demanding
- OPR may be improved by increasing the number of reviewers but this comes at a serious cost, i.e., a resource drain from researching to reviewing, which could even achieve abnormal, unsustainable levels, whereas the same positive effect of multiple reviewers can be found in confidential peer review with less resource allocation

Food for thought

- Is there a technology determinism in peer review?
- Does OPR maximize requests of accountability by stakeholders, e.g., taxpayers, and is this the real point?
- Are transparency and fairness conflicting values?
- Are we really only “peers” of scientific community or also employees of scientific organisations competing for positions, status and power?