



TD COST Action TD1306 Training School

What is peer review and why it matters

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Back and forth in time

The history of peer review explains its multiple meanings and functions

The present: why peer review matters and why we must protect it

Examples from my own research



What is peer review?

Peer review is an institution, a practice, a method, what?

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The institutional, sociological perspective in the 1970s

THE referee system in science involves the systematic use of judges to assess the acceptability of manuscripts submitted for publication. The referee is thus an example of status-judges who are charged with evaluating the quality of role-performance in a social system. They are found in every institutional sphere. Other kinds of status-judges include teachers assessing the quality of work by students (and, as a recent institutional change, students officially assessing the quality of performance by teachers), critics in the arts, supervisors in industry and coaches and managers in sports. Status-judges are integral to any system of social control through their evaluation of role-performance and their allocation of rewards for that performance. They influence the motivation to maintain or to raise standards of performance.

The four Mertonian norms (often abbreviated as the CUDOS-norms) can be summarised as:

- **communalism**: all scientists should have common ownership of scientific goods (intellectual property), to promote collective collaboration; secrecy is the opposite of this norm.^[3]
- **universalism**: scientific validity is independent of the sociopolitical status/personal attributes of its participants^[4]
- **disinterestedness**: scientific institutions act for the benefit of a common scientific enterprise, rather than for the personal gain of individuals within them
- **organized scepticism**: scientific claims should be exposed to **critical scrutiny** before being accepted: both in methodology and institutional codes of conduct.^[5]

Harriet Zuckerman & Robert Merton (1971). Patterns of evaluation in science: Institutionalisation, structure and functions of the referee system, *Minerva*, 9, 66-100.

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From refereeing to peer review in the 1970s

n	years	referee	peer	review
1	-1970	180	5	6
2	1971-1980	116	321	315
3	1981-1990	159	698	731
4	1991-2000	217	1054	1182
5	2001-2005	184	592	872
6	2006-2010	219	974	1753
7	2011-2015	276	1321	3588

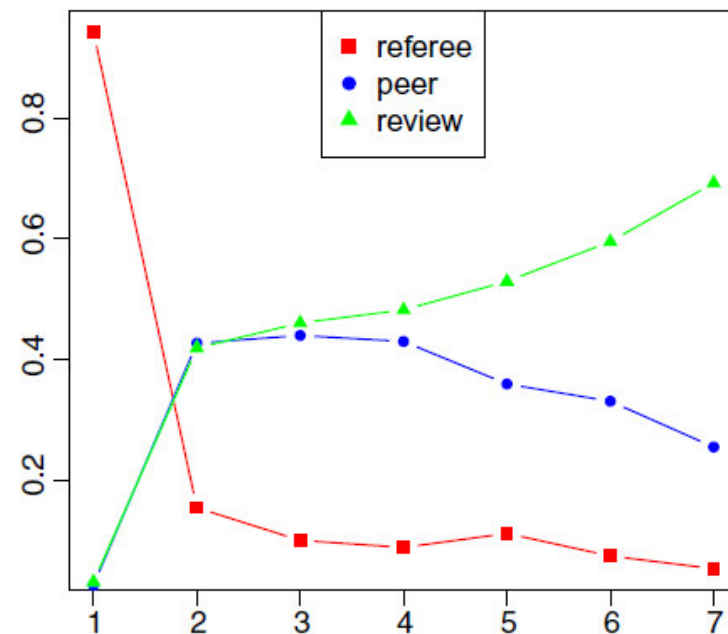
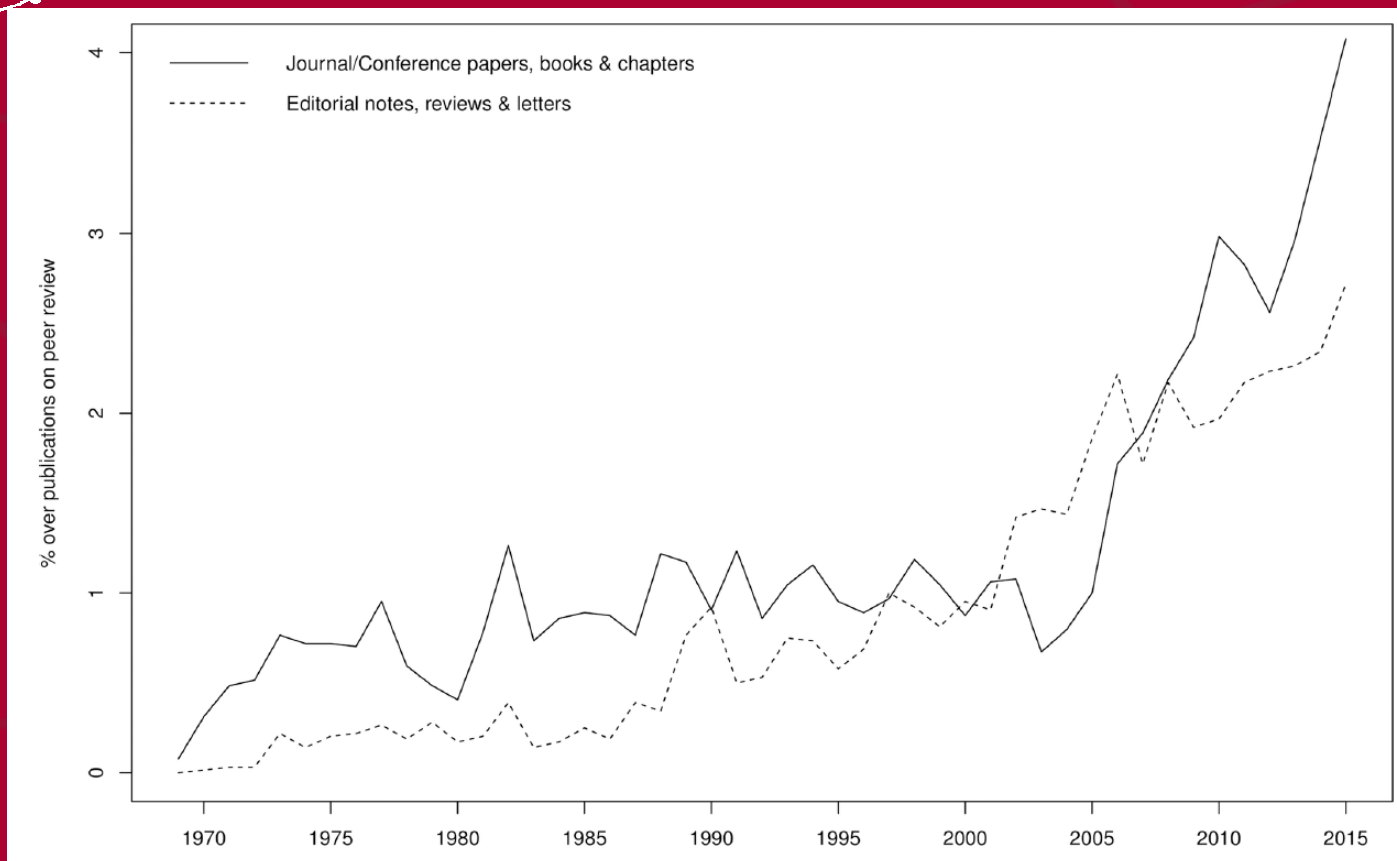


Fig. 5 Referee: peer: review

Vladimir Batagelj, Anuska Ferligoj & Squazzoni Flaminio (2017). The emergence of a field: a network analysis of research on peer review, *Scientometrics*, 113, 503-532.



Growing interest on peer review In the 1970s



Francisco Grimaldo, Ana Marusic & Flaminio Squazzoni (2018). Fragments of peer review: A quantitative analysis of the literature (1965-2015), *PLoS ONE*, 13(2), e0193148.

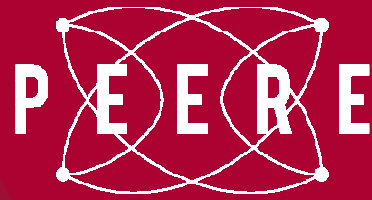
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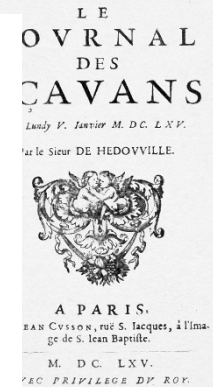
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Back in time: the licensing system for Royal Academies

Both of the first two state-sponsored or state-chartered academies, the Royal Society of London (1662) and the Académie Royale des Sciences of Paris (1699), were granted the privilege to publish their own works. This was an extraordinary exception from the licensing and censorship systems that since the 16th century had been established by political and religious authorities throughout Europe in response to the perceived political and religious threats posed by the printing press.⁹ All texts, scientific or not, had to be reviewed and licensed in order to be printed and sold legally. The first scientific academies were not exempted from these requirements, but were allowed to administer them on their own. Instead, in the case of scientific academies we see that, as in book censorship, risk was the driving concern behind the review. However, the notion of 'danger' was reframed as it was transferred from the state to its academies. Book censorship was designed to prevent the publication of news or views that could destabilize the state. The aim of peer review was more modest: to avoid the publication of claims produced by academicians that could bring disrepute to the academies themselves and point to their failure to live up to the book licensing privileges granted by their royal patrons. So while state censors did



Mario Biagioli (2002). From book censorship to academic peer review, *Emergences*, 12(1), 11-45



Back in time: From risk protection to discipline

Unlike what we see today, all early journals were not just written by and for academics but were also institutionally tied to academies. It was because of the continuous link that connected royal academies, their journals, their statutory requirements for peer review, and their publishing privileges, that peer review became an inherent part of early academic journal publishing and, by extension, of the publication protocols of the 18th-century academy-based 'republic of letters.' The extension of the jurisdiction of academic review outside of the membership circle of early academies marks what, I believe, was a crucial point in the genealogy of what we now call peer review. It is the first step toward redefining 'peer' in non-local terms, as well as toward establishing a broad scientific publication system hinged on review by academic peers, not state censors.

Along with the institutionalization of scientific disciplines, peer review also moved from a filtering function (to stop 'unsuitable' books from being printed) to an editorial function (to intervene on texts to make them conform to disciplinary standards). The development of such parameters of quality or publishability did not represent a simple freeing of science from the legalities of censorship but the articulation of a new, more specialized and internalized kind of disciplining.

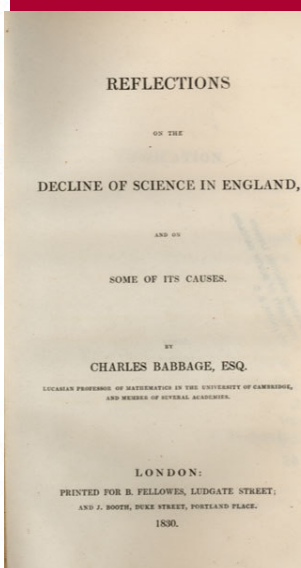
Mario Biagioli (2002). From book censorship to academic peer review, *Emergences*, 12(1) ,11-45



Back and forth in time

Pivotal moments in the history of peer review have occurred when the public status of science was being negotiated

Current attempts to reimagine peer review rightly debate the psychology of bias, the problem of objectivity, and the ability to gauge reliability and importance, but they rarely consider the multilayered history of this institution. Peer review did not develop simply out of scientists' need to trust one another's research. It was also a response to political demands for public accountability. To understand that other practices of scientific judgement were once in place ought to be a part of any responsible attempt to chart a future path. The imagined functions of this institution are in flux, but they were never as fixed as many believe. ■



1665 Henry Oldenburg, secretary of the Royal Society in London, creates the *Philosophical Transactions* to simplify his correspondence. He uses no referee system.

1699 France's Royal Academy of Sciences is given power by Louis XIV (pictured centre, with academy members) to report on and approve books for publication and bypass the royal censors.

1752 After vicious satires of the *Philosophical Transactions*, the Royal Society establishes a committee to vote on what to publish.

1831 Cambridge professor William Whewell convinces the Royal Society to commission public reports on manuscripts. Might referees increase the visibility of science?

1833 By now the reports have become private and anonymous.

1892 A pamphlet 'On the Organisation of Science' published in London by 'A Free Lance' kick-starts a movement to standardize the selection and distribution of scientific papers. Might referees be guardians of the literature?

1892 A paper surfaces that was rejected by a Royal Society referee in 1845, outlining the kinetic theory of gases more than a decade before James Clerk Maxwell's famous paper. Might referee systems be fundamentally flawed?

1968 British physicist John Ziman describes the referee as "the lynchpin about which the whole business of Science is pivoted". Outside the United Kingdom and North America, many editors and scientists remain largely unconvinced.

1973 External refereeing becomes a requirement for publication in *Nature*¹⁰.

1991 An e-mail/FTP server at xxx.lanl.gov for freely sharing unreviewed physics preprints goes live. Later relocated to the web at arXiv.org, it becomes a touchstone for discussions about the end of peer-reviewed journals.

2006 *PLoS ONE* launches as an open-access journal that eschews 'importance' as a factor in peer review.

2007-11 *EMBO Journal*, the *Frontiers* series and *BMJ Open*, among other journals, experiment with open peer review, publishing reviewers' names or notes alongside papers.

Alex Csiszar (2016) Troubled from the start. *Nature*, 532, 306-308

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Back in time: Refereeing before peer review

The function of refereeing was not originally about quality control or reliability or standards and emerged within the social practices associated with learned societies, as forms of collective editorial responsibility and shared collaboration

Compared with the long, labour-intensive, and comparatively inaccessible publishing processes at learned societies, the swift editorial decision-making and more rapid publishing frequency of the independent journals made them attractive to authors looking to publish quickly, especially in fast-moving fields like physics.⁸¹ Independent journal editors could follow their own instincts and interests, with no need to represent or protect the corporate reputation of a sponsoring organization through mechanisms for collective responsibility. Their desire for speedy publication was better served by making executive decisions than by seeking referees' reports. Thus, in the early twentieth century, the practice of refereeing could be seen, in some quarters, as an obsolete holdover from an age of amateur dominance, out of touch with the needs of the new professional scientist – a remarkable transformation from the 1830s, when refereeing had been one of the chief demands of a reform movement that championed the expansion of professional science and the imposition of more stringent qualifications upon men of science.

Noah Moxham & Aileen Fyfe (2017). The Royal Society and the Prehistory of peer review, 1665-1965, *The Historical Journal*, Online in Press.

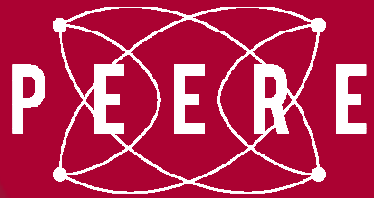
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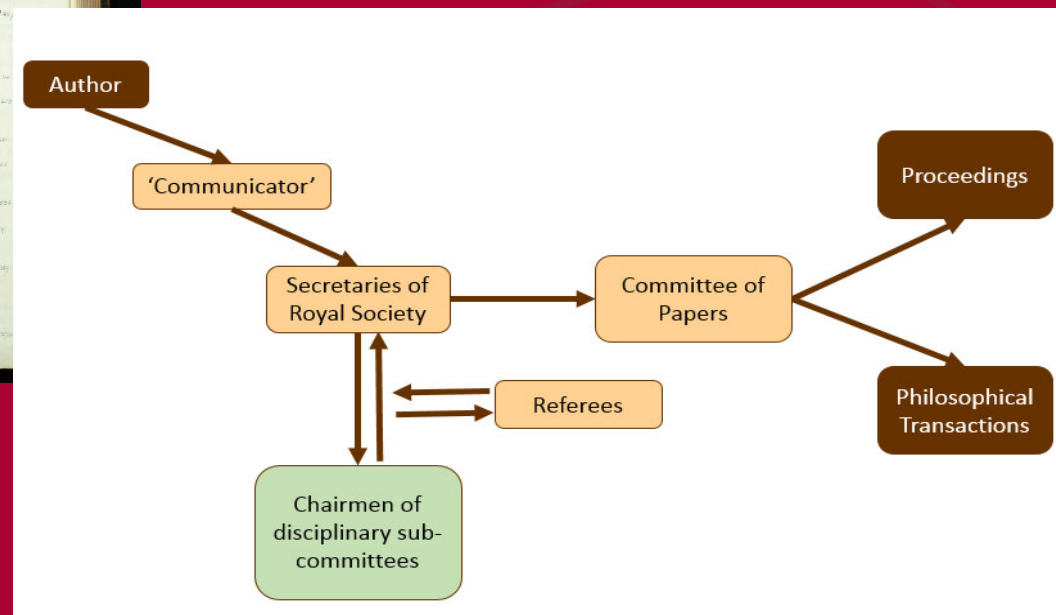
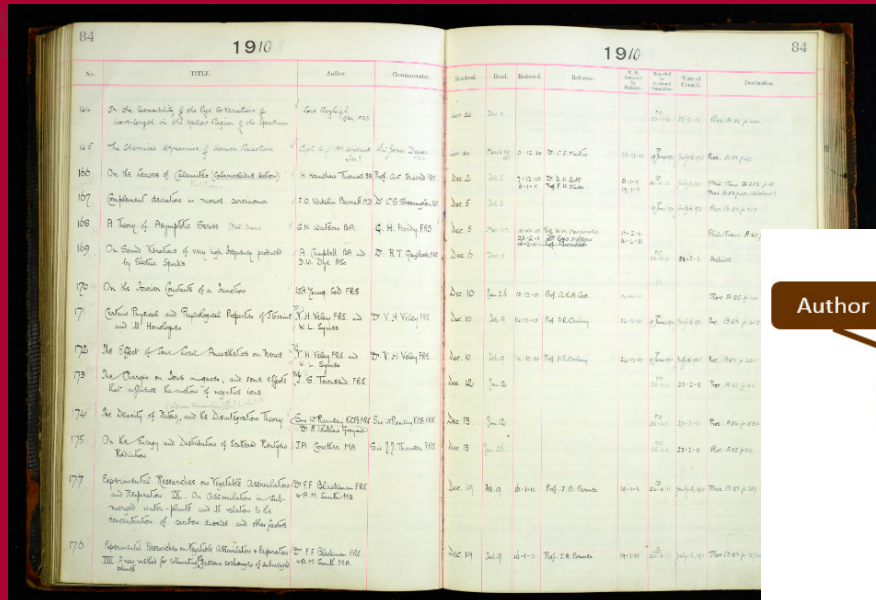
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The evolution at the Royal Society



Aileen Fyfe, Flaminio Squazzoni, Didier Torny, & Pierpaolo Dondio (2018). How the pressures on editorial management affect the evolution of peer review: The Royal Society journals, 1865-1965. Under preparation.

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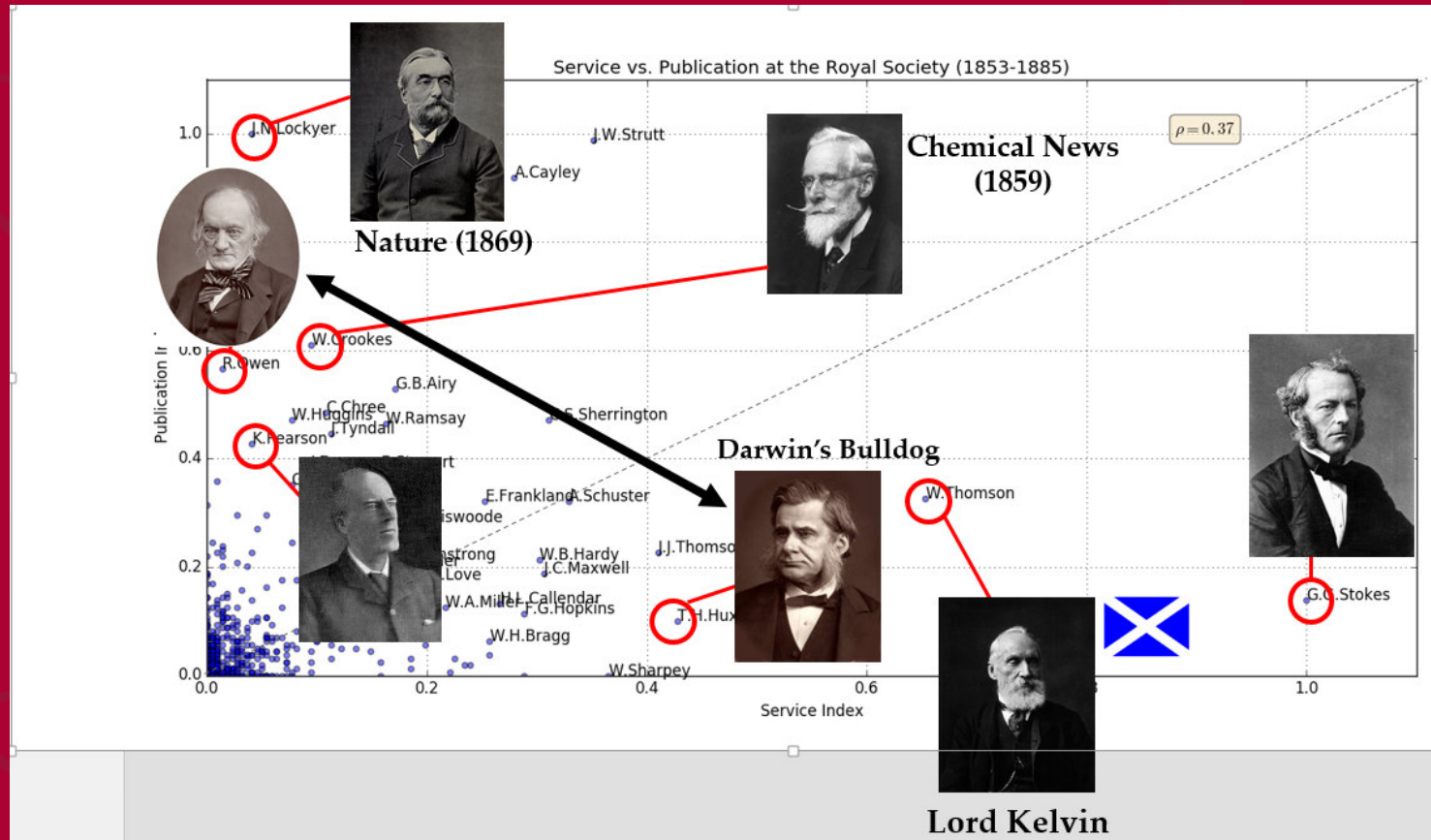
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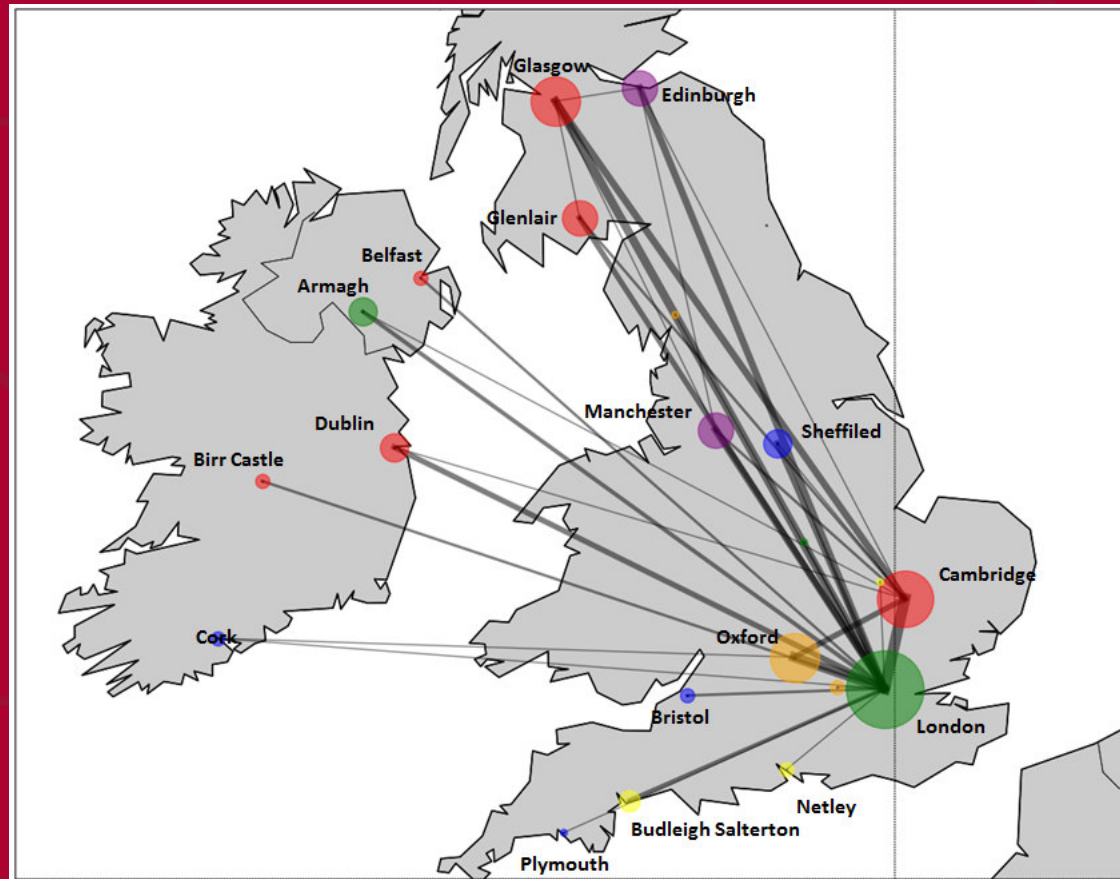
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The evolution at the Royal Society



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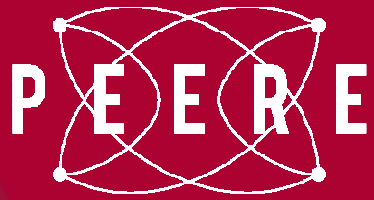
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The current querelles: does peer review add any value to manuscripts?



TABLE 11. Relationship between number of citations received by published articles and mono versus multidisciplinaryity of the referees.

Nature of the reviewing	Number	Mean citations	Std. Err.	[95% Interval]	Conf. Interval]
Mono-disciplinary	129	18.46	2.21	14.08	22.84
Multidisciplinary	48	29.43	6.49	16.36	42.50

Casnici Niccolò, Francisco Grimaldo, Nigel Gilbert, & Flaminio Squazzoni (2017) Attitudes of referees in a multidisciplinary journal. An Empirical Analysis. *JASIST*, 68(7), 1763-1771

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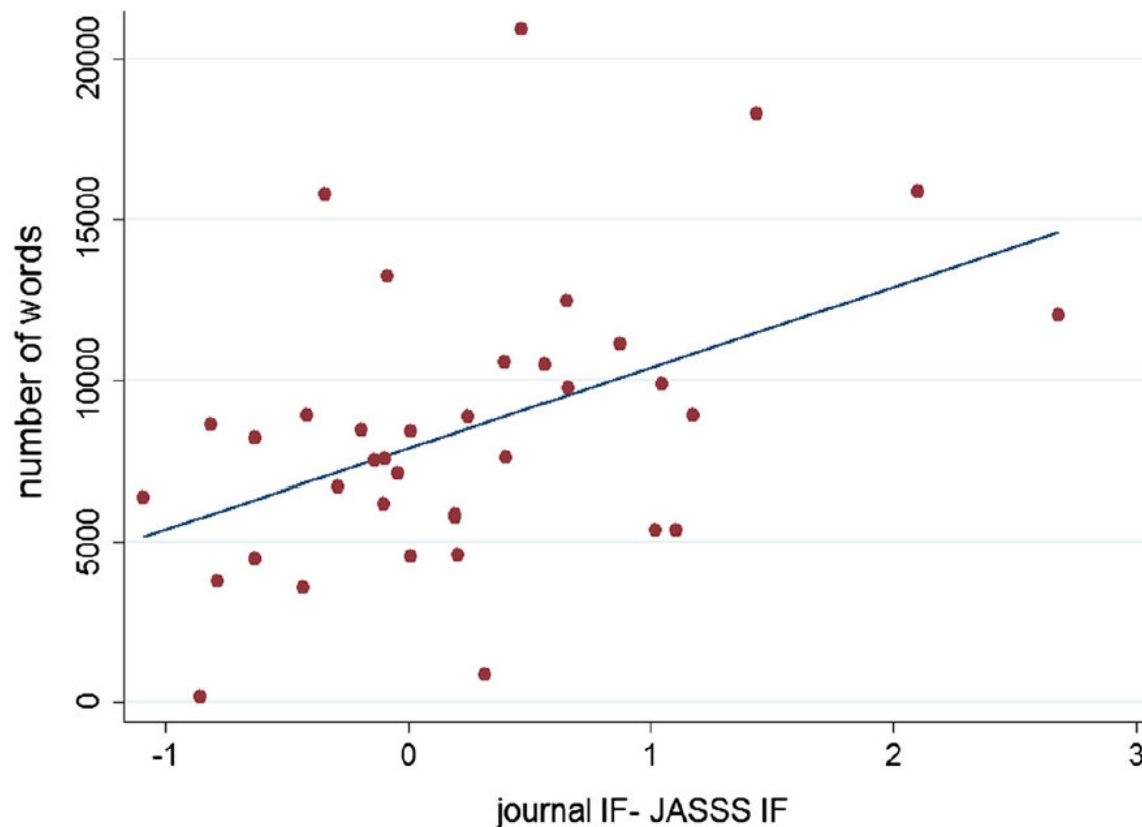
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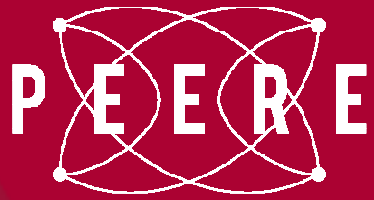
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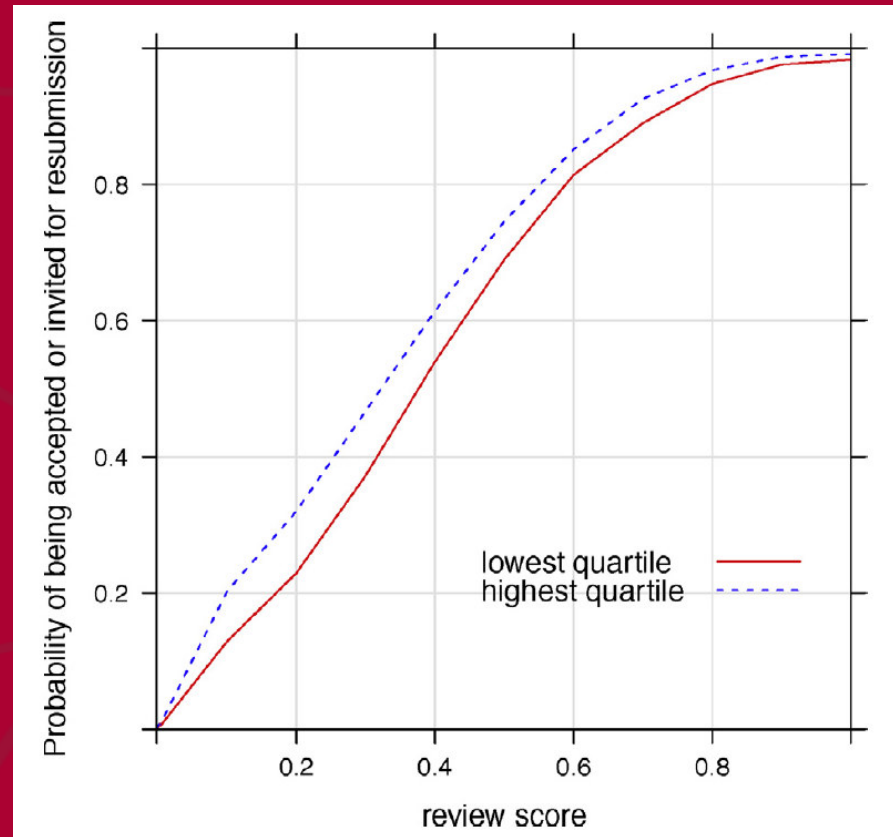
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The current querelles: Does peer review payoff prestigious authors?



Giangiacomo Bravo, Mike Farjam, Francisco Grimaldo, Aliaksandr Birukou, & Flaminio Squazzoni (2018) Hidden connections: Network effects on editorial decisions in four computer science journals. *Journal of Informetrics*, 12, 101-112

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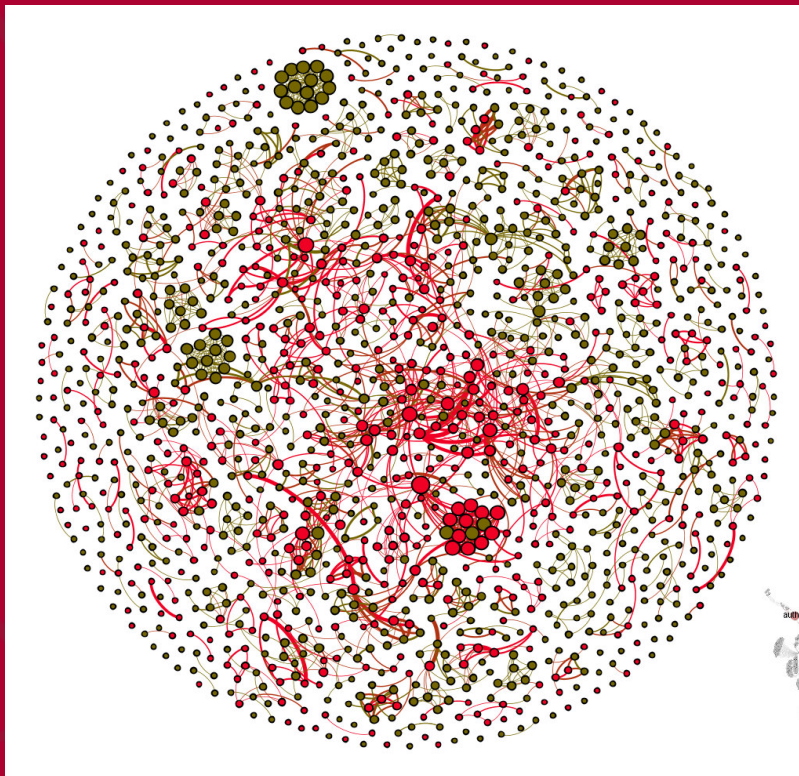
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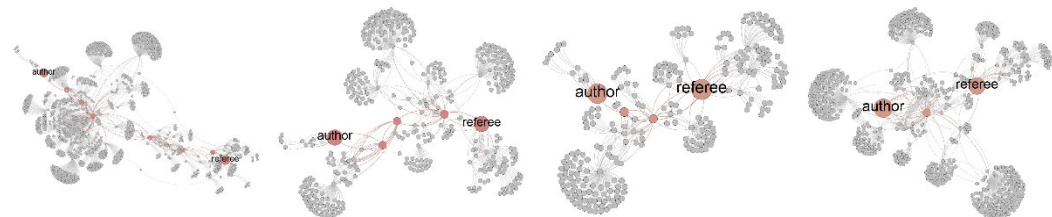




The current querelles: Does peer review stimulate collaboration?



Average reduction in number of steps by year			
Year	Journal	Random	t-test
1	0.45	0.29	4.65
2	0.78	0.56	4.37
3	1.03	0.84	2.88
4	1.43	1.21	2.75
5	1.60	1.45	1.53
10	3.32	3.08	1.73



Pierpaolo Dondio, Niccolò Casnici, Francisco Grimaldo, & Flaminio Squazzoni (2018) The invisible hand of peer review. *Under submission*

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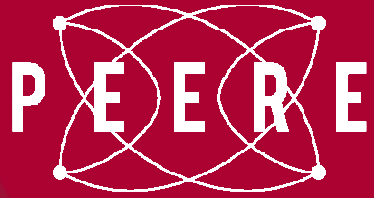
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Conclusions

Peer review has multiple functions which have evolved over time and co-exist also today

It preserves self-regulation and autonomy of science, while reflecting tensions around its «social contract», both within and outside the community

It reflects the changing meaning of «peers» in hyper-competitive contexts («publish or perish» culture, academic organisational hierarchies, individual and institutional rankitude)

Learned societies, publishers, independent associations and journals are experimenting with innovations, so adding ecological/functional diversity

Jonathan P. Tennant et al. (2017) A multi-disciplinary perspective on emergent and future innovations in peer review. *F1000*, 6, 1151