House of Commons Select Committee on Science and Technology Enquiry into PEER REVIEW

A submission by the International Association of Scientific, Technical and Medical Publishers (STM)

STM is delighted to have the opportunity to make a submission about the role, value and functioning of peer review. STM is the leading international association representing academic and professional publishers who publish research level materials. Our members cover all areas of scholarly, scientific, technical, medical and social science research and represent all types of publisher in this area: university presses, learned society publishers and commercial companies; primary, secondary and tertiary publishers; large and small organisations; established publishers and new start-ups; publishers using all types of business model including open access. Collectively our membership is responsible for 65% of all the peer reviewed journal articles that appear each year and 55% of all the journal titles that publish them.

Some General Observations About Peer Review

Peer review is probably the most important defining characteristic of the modern academic journal. Each published paper will generally contain a series of dates indicating the progress of the article through the journal's peer review system. Almost all will record a "received date", the date the manuscript was received by the journal editorial office, and an "accepted date", the date the peer review process concluded with the acceptance for publication of the article in the journal. It is also common for journal issues (and increasingly single articles published online) to contain a final publication date as well.

Peer review itself, as commonly practised, involves the systematic, critical review of a submitted paper by two or more scholars from the same academic community as the author. These academic "peers" are selected by the journal editor and are asked to critique the paper in respect of its originality, methodological soundness, the significance and strength of its conclusions, the degree to which the evidence presented supports the conclusions given, and proper attribution of original sources. While peer review cannot prove that a paper is "correct" or that the data presented is not fraudulent, it is widely accepted by both authors and readers as greatly improving the quality of reported research. The correctness or otherwise of the conclusions of a paper readily become apparent as further investigations of that field are undertaken.

Peer review is conducted as a reciprocal *pro bono* activity. As every active researcher expects to publish and through peer review receive constructive critical comments on their work, so they too must expect to act as a peer reviewer for others. When surveyed, researchers have been unequivocal that such an important scholarly function should not be biased by payment.[i] It is also clear that publication costs would become unsupportable if the full cost of peer reviewer time and expertise were to be factored in. It is important to recognise that although the actual act of peer review is conducted for free, the support and organisation of the *peer review process* (the existence and maintenance of journal titles and their reputations, the support of an editor and editorial office, the administration, transformation and movement of files, the creation and maintenance of peer reviewer databases, the introduction of time- and cost-saving electronic peer review management systems) is not without considerable costs that are borne by the publisher.

Further details on the current practice of, and research into, peer review can be found in a recent report by STM[ii] and the work of the publishing consultant Mark Ware[iii]. Its history is dealt with by Rennie[iv]

STM Responses to the Specific Questions of the Committee

1. *the strengths and weaknesses of peer review as a quality control mechanism for scientists, publishers and the public;*

   The peer review system is widely regarded by the majority of editors and researchers as an essential component of any serious and well-functioning scheme to assess academic validity. It is vital for the secure advancement of knowledge and while it has some flaws, in line with Churchill's remarks about democracy[*], scholars recognise it as the "least worst" system for improving and filtering research.

   Peer review assists editors in their decisions. It draws experts in the field into the wider academic body. Reviewers learn about their subject and about scientific criticism. Authors appreciate the help given to them by constructive criticism. Readers have reading eased and are reassured by the seal of quality that peer review confers. Publishers appreciate a quality assessment system that is deeply embedded in academic practice, allowing them to concentrate on making the processes work as smoothly

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[*] "democracy is the worst form of government except all those other forms that have been tried from time to time" Winston Churchill, House of Commons, 11 November 1947

as possible and on the whole leaving quality decisions to the academic domain[†]. Peer review raises the epistemological status of an article, from the mere expression of an author to a community justified statement, moving it along the axis from belief to knowledge, from scepticism to trust, and makes the article a more dependable source for the public to consult.

The weaknesses of peer review are often overstated but consist mainly of the weaknesses of any human system (abuse of trust and position, overly aggressive criticism, political or personal biases, being expensive and time-consuming, occasionally unsystematic or unreliable), and a tendency toward overly consensual outcomes reflecting the scientific status quo. Many of these criticisms can be addressed by a more systematic approach and by recognising human frailties in the fine tuning of the system. See the answers to 2.

2. *measures to strengthen peer review;*

Peer review is a human system and therefore most of the improvements lie in this area:

a. avoiding conflicts of interest and breaches of confidentiality between reviewers and author:

the commonest forms of peer review allow the reviewers to remain anonymous to the author while allowing them advance sight of the paper of a potential competitor in their field. This has led occasionally to accusations that reviewers have used this privileged position to bring out their own similar results before the author or to delay the review process to allow this to happen. The introduction of codes of conduct or ethics has made it clear that such behaviour is unethical. Other approaches have been to remove the anonymity of reviewers to the author, and even to publish the reviewer names and their comments at publication.

b. avoiding human bias and prejudice:

authors are often asked to suggest reviewers and those to avoid, with whom they may have conflicts. Some journals have decided to make the author unknown to the reviewers as well as the other way round (often called "anonymous double-blind" peer review), although in most cases reviewers can probably judge who the author is, either because they know their work or because of the number of citations in the bibliography.

[†] There are of course a number of leading journals, mostly deriving from a magazine model, that have the editor and some elements of peer review employed and run in house. Examples would be *Nature, British Medical Journal, Lancet* etc. These are not typical of the vast majority of the 25,000 peer reviewed titles in the world.

Having two or more reviewers also helps ensure that *ad hominem* biases are avoided.

c. incentivising reviewers for prompt turn-around of reports:

while the majority of researchers think that reviewing should not be a professionally paid activity, they do believe that recognition can have an effect[v]. Regular reviewers for some journals receive certificates of recognition from the journal, have their names published in the journal, get invited to join the editorial board, or are given limited free access to the electronic platform of the journal's publisher.

d. providing a systematic framework for the assessment of papers, and

e. encouraging constructive and helpful comments for feedback to authors

most journals now provide a checklist of things that they wish their reviewers to comment on; some go further and ask for numerical assessment or tick-box responses. These are important to provide for consistency between reviewers but most authors say that they still find the free form commentary on parts of their paper the most effective and useful.

3. *the value and use of peer reviewed science on advancing and testing scientific knowledge*

The scholarly community are overwhelmingly in favour of peer review, based on a series of surveys, both as authors and as readers and in terms of their commitment to continue to act as reviewers[vi] [vii]. Research into peer review has shown that it improves manuscript quality and readability[viii] [ix].

4. *the value and use of peer reviewed science in informing public debate*

The organisation Sense about Science[x] has raised the level of public debate by pointing out the value of peer review in examining the quasi scientific claims in advertising cosmetics, over alternative medicine and food additives. There have been several instances in recent years of research results being announced via press conferences and press releases before peer review[‡]. These have usually led to public confusion. STM believes that a greater understanding of the processes whereby experimental observations can eventually become established public

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[‡] The most famous example being that of "cold fusion". See Taubes, G 1993 *Bad Science. The short life and weird times of cold fusion*. New York: Random House

knowledge would help the public understanding of science and how to distinguish fact from fantasy.

5. *the extent to which peer review varies between scientific disciplines and between countries across the world*

   Peer review can differ substantially between disciplines, even though the process will be essentially the same. For the experimental and empirical subject areas there is a lot of commonality, and the content of any review will concentrate on methods, reporting, and the extent to which the data collected support any conclusions. For disciplines like theoretical physics or mathematics, peer review may actually involve re-doing part of the work, leading to clear "right", "wrong" assessments. For computer science, it may involve viewing an actual simulation. The further one moves away from the objective and empirical, the greater the chance of subjective biases creeping in, or reviewer assessments being affected by the degree to which practitioners in a discipline do not agree on a common conceptual framework. This can be seen in the range of average rejection rates, from 20-30% in the physical sciences, up to 70-90% in the social sciences and humanities[xi].

   Most scientific disciplines are international, so the pool of reviewers will come from all over the world and few if any national differences will be perceived. For subjects that have a strong national or regional focus, like general medicine, differences can be greater and relate to accepted practice in those countries.

6. *the processes by which reviewers with the requisite skills and knowledge are identified, in particular as the volume of multi-disciplinary research increases;*

   Traditionally, peer reviewers would have been selected from the personal knowledge or contacts of the editor of the journal. Most fields have grown way beyond this, especially as scholarship has internationalised. Multiple editors looking after regions of the world initially helped overcome this problem, as well as extending the range of expertise of the editorial office. For very broad spectrum journals, a large number of editors have also been used. However, in most cases now, each journal with the help of its publisher has developed an electronic database of experts with links to fields of interest. This usually includes details of all those who have reviewed for the journal before and can also be used as a management tool to ensure the same reviewer is not overburdened with requests. The identification of new reviewers for new fields has been significantly aided by the existence of abstracting and indexing databases that allow all those working in a field to be identified.

7. *the impact of IT and greater use of online resources on the peer review process;*

As indicated in answer 6 above, the widespread availability of abstracting and indexing databases has greatly aided in the identification of appropriate reviewers. In addition, editorial management systems have been introduced that allow the journal editor to identify, contact, and monitor the progress of a review. These systems have generally reduced the time taken for peer review and its management. They do represent considerable financial investment on the part of the publisher. As journals have increased in size, such facilities have become increasingly essential to keep track of very many documents at various stages of their review.

8. *possible alternatives to peer review.*

Quality assessment of papers can really only occur in two ways: qualitative judgement by others; or looking at the ways in which the paper has impacted on the discipline. Peer review assessments fall into the former category, while citation and download metric analyses are in the latter category.

Experiments have been conducted by a number of publishers on variants of the traditional peer review process, involving the masking of reviewer to author and vice versa, the stage at which review takes place, or allowing public comment on submissions. Some have suggested using only quantitative methods based upon citation analysis or the construction of other metrics.

Non double-blind, pre-publication peer review, where author and reviewers know each other's names, is commonly practiced in highly competitive, fast moving fields. There have been concerns that as reviewers have advanced access to new results they might rush out their own work to beat the author to publication. It is believed that a system where authors and reviewers are named will prevent this. There is some anecdotal evidence, however, that younger reviewers will be reluctant to be sufficiently critical in public of an older or better established researcher in this system: such older scholars are often on tenure or grant awarding committees important for the younger reviewer's career.

A development of the last approach is to publish the reviewer's name and reports alongside the final article. This doesn't get round the problems noted above but does mean that reviewers are more careful to be constructive and polite in their comments.

Post publication "open" peer review has been proposed as an alternative. Here the submitted paper is made publicly available for anyone to comment. Critics have often noted that this "crowd-sourcing" approach can combine all the disadvantages of list serv discussions (which get quite combative even under moderation) with those of a conference question and answer session that never ends. Publishers' experience has shown that most authors value expert and constructive criticism not only because it improves the quality of their work but also because it brings the review process to a timely close – allowing them to return to the advancement of knowledge. Concerns have been raised about the quality, relevance, tone and knowledge opportunity cost of the "crowd sourcing" approach.

Metrics-based assessments have been around since the 1960s with Eugene Garfield's Impact Factor based on citations and more recently the use of downloads and citations in novel ways. The literature on these approaches is large but the majority of academics tend to critique these initiatives along the lines of Einstein's quote "not everything that can be counted counts, and not everything that counts can be counted."

STM's view is that research should continue into enhancing peer review, removing some of its grosser problems, and finding new ways of assessing the quality of an author's contribution. Regrettably, none of the alternative methods recently suggested is without serious drawbacks for their universal applicability. The essential service of peer review, in all its variations and with all their faults, still provides the most practical and meaningful outcomes for the research community.

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[iii] Ware, M. 2008 Peer Review: benefits, perceptions and alternatives PRC Summary Paper 4 London:PRC available at www.publishingresearch.net

[iv] Rennie, D. 2003 Editorial peer review: its development and rationale. In: Godlee, F., Jefferson, T., eds. *Peer Review in Health Sciences*. Second Edition. 2003. (London: BMJ Books) p 1-13

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[viii] Kassirer, J. P. and Campion, E. W. 1994 Peer review: Crude and understudied but indispensible *JAMA* **272**.96-7

[ix] Goodman, S. N. *et al.* 1994 Manuscript quality before and after peer review and editing *Ann. Internal Med*. **121**. 11-21

[x] See www.senseaboutscience.org.uk

[xi] Meadows, A. J. 1998 *Communicating Research* London: Academic Press, p.184