



Peer review steps out of the shadows

Some researchers believe that the Internet can be used to improve the transparency and quality of the peer-review process. But as **Edwin Cartlidge** discovers, “open peer review” has yet to catch on in the physics community

Peer review has traditionally been regarded as central to scientific progress. The scrutiny of scientific papers by other experts in the field is designed to prevent poor-quality papers from being published and also to improve those articles that are accepted for publication. It lies at the core of the vast majority of research journals, with those publications that have a more stringent peer-review process generally ending up with a better reputation than those where the barrier for acceptance is low.

But peer review has its limitations. It is a slow process, with typically many months passing between submission of papers and their publication. It can also fail to spot fraud, as several high-profile cases in recent years have shown, such as that of the physicist Jan Hendrik Schön, who published a string of papers in high-profile journals that were later found to contain fabricated data. Another issue is that the referees are anonymous, raising the possibility that someone with a vested interest could prevent a paper from being published.

The Internet can help address some of these problems. Using a process known as “open peer review”, which would have been practically impossible to implement in the pre-Internet age, scientists can post papers on a dedicated website that allows nominated referees and other interested researchers to add their comments for all to see. Only after this discussion is the paper accepted or rejected. This process offers a number of advantages over conventional peer review, such as increased transparency and an incentive for reviewers to make their comments as constructive as

possible. But for many scientists, used to the comforting cloak of anonymity, this transparency seems to be a step too far.

Going it alone

One of the few journals within the physical sciences to have so far adopted open peer review is *Atmospheric Chemistry and Physics* (ACP). Published by the European Geosciences Union since 2001, ACP uses a two-stage publication process. In the first stage, manuscripts are checked for minimum standards of scientific content and presentation by the designated referees, before being published as “discussion papers” on the journal’s website. There then follows a period of eight weeks during which the referees post their comments on the website and any other interested members of the scientific community are free to do so too. The paper’s authors can also reply, with all contributions shown alongside the original paper. The referees can either reveal their identity or remain anonymous, but other scientists must give their names.

At the end of the eight weeks, the authors revise their paper in the light of the comments that have been received and then send it to the journal’s editor, who might then forward it to the referees. Following any further modifications made in private, the editor then weighs up the referees’ comments as in normal peer review and decides whether the paper should be published in the journal. Every discussion paper and subsequent comment is permanently archived in order to provide a lasting record of the review process and to

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The screenshot shows the 'Atmospheric Chemistry and Physics' journal website. The main content area is titled 'Interactive Discussion' and features a 'Discussion Paper' section. The paper's title is 'Evaluation of a new convective cloud field model: precipitation over the maritime continent' by H.-F. Graf, J. Yang. The publication date is 12.10.2006. The paper is available in PDF format (2265 KB) and has an abstract. The discussion area shows a status of 'Open Discussion (until 07.12.2006)' and a list of comments from reviewers, including 'Referee comments' and 'Reviewer's Report'. The sidebar contains search options (Google, Article search) and a 'Personal Home' section with fields for User ID and Password. There are also links for 'Special Services' like 'Printer-friendly Version' and 'Download Acrobat Reader'.

Pioneer in open peer review

The website of the journal *Atmospheric Chemistry and Physics* showing a paper with its associated comments.

give the authors publication precedence.

According to physical chemist Thomas Koop of Bielefeld University in Germany, one of the editors of ACP, this process relieves editors and reviewers of the need to sift through large numbers of substandard submissions. Authors, he says, are less likely to submit low-quality papers than they would in a traditional peer-review system because their work is published in its raw form for all to see, thus keeping the standard of submitted papers high. Indeed, despite Koop and his fellow editors rejecting less than 20% of submitted papers, the publication's impact factor (3.5) is higher than that of any of the other 47 journals in the field of meteorology and atmospheric sciences.

Koop also points out that, in contrast to traditional peer review, the new system gives an incentive for referees and other commentators to provide carefully thought-out appraisals. Hans Graf, a climate physicist at Cambridge University in the UK, who has published a discussion paper with ACP on cloud modelling, agrees. "Even though referees can remain anonymous, they know that what they have to say can be read by others, so they give their comments more thought and refrain from being nasty," he says. "For an old boy like me the latter is no problem, but youngsters may well be struck by the reviews of quite harsh critics." Graf adds that he found the discussion of his paper "very stimulating" and that it prompted an invitation to collaborate with one of the reviewers.

Another researcher who has published a discussion paper with ACP agrees that open review has a number of advantages. Joel Savarino at the Laboratory of Glaciology and Environmental Geophysics in Grenoble says that the interactive discussion provides scrutiny of details within the paper that can be "easily underestimated" by the author and official reviewers, and that it helps the reader to "decipher the main issues and uncertainties related to a given manuscript". He also points out that the process helps speed up the dissemination of new results. However, Savarino cautions that the citation of a paper still under review can "lead to the propagation of wrong ideas".

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Indeed, he believes that such an article should therefore not be cited until it has passed through the full peer-review process.

In fear of potential enemies

Despite its attractions, open peer review has not yet found widespread acceptance among scientists. The publishers of *Nature* carried out a trial of the process between June and September last year, giving authors the option of having their unrefereed papers posted online for comment before undergoing the usual peer-review process. However, of over 3000 papers submitted during this period, only 71 went through open peer review.

"From informal feedback, it was clear that the trial generated a lot of casual interest," says *Nature* editor Philip Campbell, "but no hostility or enthusiastic endorsements in any quantity." Campbell adds that the unsolicited comments posted on the Web were less useful than those from the designated referees but believes that in principle the former could draw attention to something not spotted by the referees. According to Campbell, neither *Nature* nor any of its sister journals is likely to introduce open peer review in the near future.

As for ACP, while it has achieved success in terms of citations, it has not attracted large numbers of comments via its open-peer-review process. On average, scientists send one unsolicited comment for every four papers posted for discussion. Koop defends the new system, pointing out that in traditional journals there is roughly just one comment received for every 100 papers, and adds that the comments submitted to ACP span the full spectrum, from severe criticism to lavish praise. However, the figures hardly represent a flood, and while some papers do attract several unsolicited comments, many others receive none.

Graf points out that this reticence may be in part due to researchers being too busy writing grant proposals and attending to other administrative tasks. But another significant reason is likely to be fear of making enemies. People may be reluctant to submit negative comments during the process of open peer review in case the author of the paper under discussion then takes revenge when the commentator's own manuscript or grant application is up for review. Indeed, Tom DeCoursey, a biophysicist at Rush University Medical Center in Chicago who has taken part in open peer review several times, believes that most journals will not introduce the principle into the way they work. Instead, he says, publishers are likely to opt for a kind of half-way house in which reviewers suggest revisions only after the manuscript has been provisionally accepted for publication (meaning that they cannot be deemed responsible for having failed a paper). This is similar to the system used by the journal *Proceedings of the National Academy of Sciences of the USA*, in which editors remain anonymous unless the associated papers are published.

Unless there is a significant change of attitude among physicists, it therefore seems that anonymity will continue to play a major role in the judgement of their research. DeCoursey believes that scientists are simply too competitive, and therefore too afraid of losing out, to be fully open in their criticism of the work of others. Technology, it seems, will only get you so far.