

Is the peer review system in scientific publishing broken?

Philosophical discourses have been a dominant force behind the advancement of knowledge through human history. We have examples of such discourses happening in many parts of the world, and thereby the emergence of great learning centres in Egypt, Greece, India, China and Peru, among others. For example, in India some of the greatest learning centres were Nalanda, Taxila and Vikramshila. In all the cultures, the central theme in such learning centres was discourses by learned people, debates on the current status of knowledge and passing on the contemporary views of our understanding from generation to generation. Even preceding the emergence of these learning centres, there are examples of the famous unbroken 'guru-shishya' tradition in India, which led to the scholarly works such as the *Vedas*, *Upanishads*, grammar of Panini and *Arthashastra* of Kautilya. The emergence of new knowledge and its transfer from generation to generation, therefore arose out of the gatherings of learned people, where discourses happening therein offered platforms for an elegant peer-review system. Individuals had an opportunity to share their views before the learned audiences at such platforms. If these views were agreed upon by all those concerned, they would be accepted, only to be further enhanced in subsequent such gatherings.

Although philosophy and science were synonymous in ancient times, starting from the 18th century, the term 'science' started to be used to distinguish it from the larger perspective of 'philosophy'. However, the methods of novel scientific discoveries continued to be their acceptance in the first instance by a larger body of scientists, who subjected such discoveries to rigorous debates and scrutiny. Only after these were accepted by a larger body of peers, the purported thoughts of individual scientists came to be accepted as novel discoveries. Mere thoughts, premises or hypotheses did not necessarily lead to the accepted principles of science. The commonly accepted principles of science, also referred to as exemplary instances among scientists, such as scholarly texts, books and scientific principles, are referred to as paradigms, according to the highly influential book *Structure of Scientific Revolutions* by Thomas Kuhn. Shifts in paradigms occur during the course of time, but these shifts

have to become acceptable to the scientific fraternity after scholarly discourses, debates and peer-review. Indeed, among the many aspects that modern science has adapted as methods of acceptance of paradigms, arguably the most influential has been the peer-review system. Despite the many differing opinions on the process and value of the peer-review system, by and large, the scientific body world over has acknowledged this as a method of acceptance and advancement of scientific views.

Learned societies offered a powerful platform for the peer-review system in the early days of modern scientific discourses. This continued until the 20th century, although a few scientific journals already made their debut earlier¹. Arguably, as the number of persons practising scientific research as a profession grew, the learned societies became more and more exclusive, thus denying the opportunity to the less-endowed scientists to present their results before these societies. The process of presentation of new scientific ideas therefore changed distinctly in favour of scientific publishing in print journals in the mid-20th century². Surely, soon the scientific world witnessed the emergence of many private houses publishing results of research carried out around the world. The printed journals added to those managed and operated by many societies, including the journals which emerged in the 20th century. All the journals adopted similar principles of the peer-review system for the acceptance of results and publishing them. Thus, we now have an established peer-review system in all the journals, which by and large consists of sending a submitted article to a few peers – typically 2–3, whose expertise matches closely with the research field of the article under consideration. This is for obtaining their views and a valid criticism of the article. In the ideal world, this is a powerful tool for the advancement of knowledge, and indeed modern science has considerably progressed by adopting such a system. Although the modern peer-review system, which has evolved in the last 100 years or more, has continued, has it been free of personal biases of the 2–3 selected peers? Moreover, do such personal biases lead to the exclusivity of research findings and their publication, much as the learned societies fell into the trap 100 years ago?

Another phenomenon that has emerged in recent times is the 'author-pays' model in journals, due partly to pervasion of the internet across all endeavours. The on-line publishing adopted by many journals combined with author-pays has by far challenged most aspects of modern methods of dissemination of scientific discoveries. Commercial interests have driven these models hard leading to proliferation of many predatory journals. The penetration of this model has been complete with many leading journals beginning to offer on-line and author-pays articles, if these are rejected by their respective mainstream print journals. Indeed, this makes tremendous commercial sense. But if commerce were to drive scientific discoveries, or their acceptance to the larger scientific bodies, would the world of knowledge perhaps have reached thus far? It is our opinion that editorial and peer processes have been affected significantly during the course of emergence of print journals, and subsequently accelerated due to the emergence of on-line and author-pays models of scientific publishing.

There is increasing uneasiness among scientists due to the personal bias introduced by referees and editors of journals. Most of the well-known journals and their powerful editors vehemently deny any bias in the selection of articles that are accepted to be published in their journals, or even more, those that have been rejected. Yet, journal policies and the very basis of their existence demand that only certain kinds of views be presented with little room for contrary ideas. Moreover, unknowingly, articles from lesser known institutions/locations get little or no attention from the editors/reviewers. Many journals being owned by private corporates also raise the possibility of catering to only limited views, despite camouflaging of the profile they have attained over the years. The recent case of the article published by Mehra *et al.*³ on the effect of hydroxychloroquine (or lack thereof) on COVID-19 cases in the *Lancet* is a good case in study. The article passed surprisingly through the so-called stringent editorial and peer-review system, despite glaring errors in it. Fundamental flaws in the analysis of the results, even while ignoring the dubious company which provided the data, were so glaring that any reasonable peer-review system

would have rejected it instantly. It is to the credit of the *Lancet* that corrective action was taken after pressure to retract the article mounted worldwide, and some of the participating authors offered to do so.

Peer-review systems in different subjects, e.g. mathematics, physics, biology and chemistry, have had their own share of uniqueness. For example, in purely theoretical subjects, the peers typically validate every result reported in a research article before it is accepted. This led to the establishment of arXiv in the early 1990s, which has now received wide acceptance. Such is not the norm in fields such as biological sciences, even with the presence of bioRxiv or medRxiv, as the experiments can be highly involved and impossible to reproduce before the paper is accepted. This has led to great concerns about reproducibility of data, even with suggestions of setting up consortia to reproduce some of the published work⁴.

So, is it a good time to go back to the old system of peer review, i.e. to present new scientific ideas to an audience and allow the audience to accept/reject the idea? Indeed, some fields allow papers to be published in meetings/conferences, and then be communicated to print journals. A small caveat associated with this is that the papers to be presented in such conferences are also peer-reviewed by a small number of referees – with the possibility of bringing personal biases. Thus, this chance to

present ideas to a much wider audience, instead of only 2–3 reviewers, and/or be subjected to even a smaller number of editors or the editorial board, allows for a better critical review system.

A possible way of engaging a larger audience by journals can be adopted by permitting the display of a submitted manuscript for open criticism for a reasonable period of time, say a month. This can be in addition to adhering to the peer-review process of 3–4 reviewers, wherein the reviewers can refer and collate the views and comments of a larger audience along with their critical comments. While such processes may have their challenges, these can evolve only when attempted. The present peer-review system needs breaking more shackles besides engaging a larger audience for discussions and debates. Needless to say, unprejudiced reviewing will also require freedom of journals from biases in accepting negative results or failed hypothesis, ignoring ‘less priority’ research fields or dubbing data as ‘uninspiring’, as research outcomes need not necessarily be ‘inspiring’ to be informative to the research community. It is also understandable that these are arduous goals for journals in view of the massive surge in the submission of research articles. Such processes and policies can be encouraged when the scientific career structure is less underlined by the quantum of publications, instead of its impact in terms of knowledge

and translation. Further, for developing a more inclusive peer-review system, concepts and opinions can be invited from a larger audience, subjecting the ideas to criticism and debate. At the end, one also requires to comprehend that an open review system will be as good as the commitment and involvement of the scientific community, which takes back the discussion to our old methods of peer reviewing, the ‘philosophical discourse of science’.

1. Fyfe, A. *et al.*, *R. Soc. J. Hist. Sci.*, 2015, **69**, 227–239.
2. <https://blogs.scientificamerican.com/information-culture/vestiges-of-print-publication-in-scientific-journals/>
3. Mehra, M. R., Desai, S. S., Ruschitzka, F. and Patel, A. N., 2020; doi:[https://doi.org/10.1016/S0140-6736\(20\)31180-6](https://doi.org/10.1016/S0140-6736(20)31180-6).
4. <https://www.ncbi.nlm.nih.gov/books/NBK547546/>

SHARMISTHA BANERJEE¹
SHEKHAR C. MANDE^{2,*}

¹*Department of Biochemistry,
School of Life Sciences,
University of Hyderabad,
Hyderabad 500 046, India*

²*Council of Scientific and Industrial
Research,
Anusandhan Bhavan,
2, Rafi Marg,
New Delhi 110 001, India*

**e-mail: shekhar.mande@gmail.com*