

Leading Opinion

Peer review as professional responsibility: A quality control system only as good as the participants[☆]

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Abstract

The peer-review process remains a central part of the value and validity of scientific and technical publishing and proposal assessment. The peer review mechanism has many delicate components that should function most professionally and effectively for best results. An important central tenet is that all who seek to publish should freely avail themselves to review a commensurate load, considering many elements of professional conduct, ethics and responsibility in this process. The review itself should provide timely, unbiased, quality feedback to improve contributions to the system reviewers are serving. An additional component involves follow-on policing of published literature to assert its validity through consensus and validation. This short essay examines our collective duties as contributors, reviewers, and readers to the integrity and safekeeping of this essential quality control process.

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Arguably, technical publishing lies at the heart of any science, medical or engineering field. Effective communication and results dissemination remain the most important tasks of any scientist, engineer or medical practitioner. Manuscripts and proposal submissions comprise the primary body of such communication, moving fields forward through dissemination of their progressive teachings and data-driven insights and claims to progress. Publishing thrives on this essential requirement. Through written, published communication, the contributor(s)

seek(s) to “sell” their ideas and data to “customer” (the journal’s readership), inspected and certified by professional publishing protocols and process. Over 1000 new papers appear daily in the scientific and medical literature alone, and this is increasing steadily. Certainly, the quality control mechanism by which such technical communication is validated, edited, improved and purged of bias, inaccuracies, or unsupported claims by the “seller” to the “customer” is important. Alas, *caveat emptor!* Quality assurance must be enacted on each such scientific transaction, a quality control process that is the collective professional responsibility of peer review [1,2]. Also called “refereeing,” the peer review process subjects scholarly products and proposals to the scrutiny and critique of peer experts in the field. Journal editors routinely use the process to facilitate selection and screening of newly submitted manuscripts for publication; funding agencies use it to prioritize grants for award. The process helps to enforce and maintain certain standards of the discipline, and of science in general, on the contributors. However, the process relies on availability and willingness of enlisted,

[☆] *Note:* Leading Opinions: This paper provides evidence-based scientific opinions on topical and important issues in biomaterials science. They have some features of an invited editorial but are based on scientific facts, and some features of a review paper, without attempting to be comprehensive. These papers have been reviewed for factual, scientific content.

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qualified and responsible reviewers. Those who contribute to the literature should also police the literature to ensure quality, relevance and impact.

To most effectively serve technical and scientific dissemination and informational needs, prevention of propagation of low-quality scientific literature is a first-pass measure, eliminating this technical “noise” from the intellectual radar screen and database. Additionally, insisting on data reliability, reproducibility, and communication clarity and accuracy is critical to publishing integrity. In the current era of seemingly limitless new publication venues, new journal launches and expanding cyberspace publishing, few scientists have sufficient time to canvass all content thoroughly to sieve the useful from the useless. Comprehensive database surveillance has simply become all-consuming, burdensome and problematic, especially for those in cross-disciplinary fields like biomedical engineering. Rapid and reliable identification (sieving) of the most important data and relevant information in our respective fields relies on credible scientific quality as a discerning criterion. Our most efficient time and effort as scientists, engineers and medical technologists spent searching the vast literature bases to selectively locate work of the highest relevance and quality to our specific interests requires vigilance to the peer-review process.

Journal publication quality is the collective responsibility of both those who read and those who compose it as contributors. Significantly, this is the same group from whom peer-review experts are drawn and where the standards for scientific quality and acceptance are established. Journal impact factor, appeal to the field and assessed technical quality are direct functions of published content, topical relevance, readership, exposure, circulation and the resulting influence on citation and subscription rates. However, responsibility for technical journal quality is often assumed to reside primarily at the editorial level, where the ultimate decision to publish or reject emanates [2,3]. This dangerous presumption ignores (1) the relatively limited expertise of most editors, (2) resulting inability to adequately judge quality and excellence without quality input from skilled reviewers and (3) the bias inherent within any system that relies on limited pooling of expertise to make decisions. With the tremendous expansion in topical breadth, interdisciplinary research and increasing technical methods’ sophistication and information content, no editor should be held hostage by the limited knowledge and relative ignorance of a single mind in this complex scientific system. Enter: the importance of collective assessment of our primary technical literature using credible peer review.

It is well within our prudent personal and professional interests (as well as time and efficiency of our literature surveillance) to ensure the best possible quality in technical publication of research and innovation. A critical determinant of any successful journal or technical communication in general is the sound, reliable capability to readily access a talented, adept, accomplished and reliable reviewer pool.

This is particularly necessary in interdisciplinary science and technology where individual expertise required for competent evaluation across diverse fields is limited. Additionally, a full understanding of the impact of proper peer-review protocols, and the components of quality reviews within this reviewer pool must also be established and enforced by the editors, and fully appreciated by reviewers. I know of no formal process beyond the classical “journal club” offerings at most institutions that didactically addresses the role of the reviewer/editor/contributor relationship and rigorously trains doctoral and post-doctoral trainees in methods and mechanics of peer review. It is simply a rite of passage where many of us are called and initially must act instinctively, often without much experience or formal training, to produce a good review (or not) of manuscripts and proposals. But quality peer review of a given technical communication or research grant is not simple, easy or quickly performed. It is a tedious, tenuous and difficult task. Significantly, cursory or poor quality reviews are a tremendous disservice to the community, with profound consequences to science beyond the article in question. Those who read or submit work to journals from the global body of scientists and engineers in universities, government labs, research foundations, or industry must continually re-evaluate their sense of commitment to professional technical reviewing obligations that directly affect journal and technical communication quality.

Merits or shortcomings of the peer-review process aside, this quality control process, for better or for worse, represents the *status quo* within which we currently work as practicing scientists, and, importantly, upon which we rely for continuous dissemination of high quality and reliable information that allows us to move our fields forward. All qualified scientists and engineers, as contributors, pedagogues or benefactors, have specific obligations to the peer-reviewing system to make it work. Reasonable professional rules of conduct are rarely explicitly described to recruited or enlisted reviewers to ensure quality journal reporting. Nonetheless, the Council of Science Publishing has produced an excellent white paper on proper roles and responsibilities in the peer-review process [4]. Other professional reviewer training and responsibility recommendations are also available [5,6]. These duties extend equally to three publishing constituencies for coordinated review management: the manuscript contributors, the journal editor and the scientific readership. Additionally, the International Congress on Biomedical Peer Review and Scientific Publication has promoted on-going discussions on merits and problems of the scientific peer review system, published in *Journal of the American Medical Association* in various forms for over a decade [7]. Given the magnitude of the technical literary base now expanding electronically and on paper, anyone not contributing to quality control creates extra burden for others to compensate.

I assert that professional duty obligates all who are research active, who read the scientific literature, or who

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