

Driving Science With One Eye on the Peer Review Mirror

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We would like to share some insights from recent experiences in defining the ethical and procedural framework governing peer-reviewed scientific publishing. These insights ultimately point to the need for greater "enfranchisement" [participatory democracy] for scientific authors.

"Publish or Perish" is a phrase that may have originated with Kimball C. Atwood, then of Columbia University, sometime during or shortly before 1950¹. It is the scientists' equivalent of "The buck stops here; Cherche' la femme; and Live long and prosper" all rolled into one maxim. And yet the story of its utterance is a lesson unto itself. For today its origin with Atwood can only be documented anecdotally. Atwood never published the phrase, and as the story goes, had only to wait a month before he heard it delivered in an address by a visiting lecturer, who afterward told Atwood he heard the phrase from a participant in Atwood's originating conversation.

Publication documents the precedence of ideas. It documents the stewardship of research funds. It documents the productivity of scientists, justifies our salaries and our reputations, and allows the cultivation of our egos. But most importantly, it liberates information and knowledge from the imprisonment of chaos and file cabinets to the free access of other scientists and for the betterment of mankind. The publication ethic was being evoked as early as the mid-18th century by Benjamin Franklin, who exhorted scientists simply "To study, to finish, to publish."²

But, writing does not come easily to most scientists. Writing is certainly less gratifying than doing experiments, and it is certainly anticlimactic compared to the epiphanal experience of watching data being plotted for the first time on a computer screen. And as the protocols of refereed scientific publishing have evolved over its brief two hundred or so years of formal history, many scientists have developed significant concerns over the capriciousness of the process itself.

We have been immersed in the topic of scientific ethics and peer reviewing for over five years. In 1990 we organized a symposium on "Research Ethics, Manuscript Review and Journal Quality." The symposium has had a lasting impact on these issues within our 13,000-member American Society of Agronomy, Crop Science Society of America, Soil Science Society of America, known collectively as the Tri-Societies.

In Forum Proceedings, "Ethics, Values, and the Promise of Science," 25-26 Feb. 1993, San Francisco. Sigma Xi, The Scientific Research Society, Research Triangle Park, NC. 1993.

¹Personal communication R.C. von Borstel, 30 October 1991.

²Mackay, A.L. 1992. *A Dictionary of Scientific Quotations*. IOP Publishing Ltd., Bristol and Philadelphia. p. 94.

Also, in the fall of 1989 one of us (R.E.S.) was appointed to the U.S. Department of Agriculture, Agricultural Research Service's (ARS) agency-wide "Committee on Misconduct in Science"; and over the course of three years that committee has developed a "Code of Scientific Ethics" for ARS's 2500 scientists and established the formal protocols for dealing with allegations or evidence of scientific misconduct. The committee also proposed a variety of measures for reinforcing the ethical climate within ARS's scientific work force.

From these involvements we have come to realize that "Peer Review" also bears a pivotal relationship to the entire spectrum of related ethics and misconduct issues. And while we will focus our remarks on peer review vis-à-vis the refereed journal publication process, the insights are essentially the same with reference to other uses of peer review; for example, review of funding proposals or project plans and personnel promotion and tenure evaluation.

The merits and pitfalls of scientific peer review can be roughly segregated into two broad categories. One encompasses what might be regarded as "the art of scientific communication." It includes the procedural idiosyncracies of journal editorial and review policy, the concern for effective presentation, and even the quality and accuracy of data interpretation. We would also include simple courtesy and reviewer/author professionalism and competency.

The second broad category encompasses what might be regarded as the "ethics of scientific communication." This category of merits and pitfalls is involved with recognizing or obscuring conflict of interest. A simple analogy might be worth stating at this point. If integrity is the glue of science, then conflict of interest is the solvent. The promotion of integrity and the curbing of conflict of interest define the essential ethics of scientific communication.

We should clarify our concern about publication ethics. The ethical framework we are attempting to define is the one related to the process of communicating, and is essentially separate from the content being communicated. We are deliberately sidestepping the issue of defining what is ethical or unethical research. That topic is undoubtedly a valid concern, but most would probably agree that it is an issue separate from the ethics of the peer review process per se.

The information data base used in developing this ethical framework was derived from both the symposium and from experience on the ARS Committee on Misconduct in Science. Symposium papers were compiled in a special publication.³ It contains a fine collection of articles that touch on many aspects of the same issues considered in the Sigma Xi Forum held in San Francisco.

The symposium provided information on journal stature, on government interference with scientific freedoms, administration of ethical standards in the ARS, scientists' perceptions of the peer-reviewing and editing process, and the history of peer reviewing and editing. We feel that one of the most important

³Mayland, H. F. and R. E. Sojka. 1992. *Research Ethics, Manuscript Review and Journal Quality*. ACS Miscellaneous Publication. American Society of Agronomy, Madison, Wisconsin, Publishers.

things we did in the symposium was to ask questions and not formulate our opinions from personal supposition. This came in the form of 1) soliciting quantitative information about our profession's core journals, 2) analyzing the demographics of our membership related to involvement in the peer review process, and 3) conducting a scientific survey of essential peer-review-related issues within a balanced sample of our Tri-Society's membership.

Information gathered from the surveys and from papers presented at the symposium, plus interactions with other scientists was then summarized in a report which we prepared for the Tri-Society's governing board. The report included a series of recommendations relating to the peer review process of technical papers which we felt relevant to the Tri-Societies. The recommendations, which are shown below, are also germane to the Sigma Xi forum on "Ethics, Values, and the Promise of Science" and to other scientific societies.

1. Strive for demographic balance among editorial boards and reviewers.
2. Promote robust institutional review before journal submission to improve manuscript quality and possibly discourage misconduct.
3. Adopt dual anonymity (author and reviewer) for peer reviews.
4. Proactively cultivate author recognition of his/her primal responsibility for accuracy and quality of published manuscripts.
5. Investigate vehicles to limit journal liability for publication of flawed, inaccurate or fraudulent manuscripts.
6. Select competent reviewers and allow authors fair opportunity for critique and rebuttal of reviewer remarks.
7. Provide reviewer training and feedback to reviewers.
8. Recognize the publication validity of neutral and negative results, and of unconventional, innovative ideas.
9. Be vigilant against the bias of influence networks; i.e., bias resulting from political, academic, geographic, or technical interests.
10. Promote university requirements for training in technical writing, reviewing, and editing that simulates target journals.
11. Promote institutional and professional codes of scientific ethics.

The most important product of the ARS agency-wide Committee on Misconduct in Science was publication of USDA-ARS Directive 129.0 "Procedures for Reporting and Dealing with Possible Misconduct in Science," which contains an agency code of scientific ethics for use in judging conduct. In addition, a list of general recommendations was given to the ARS administrator on ways to enhance the ethical climate of the ARS.

That code of scientific ethics follows. You will recognize that many of its elements impact upon or are impacted by the peer-reviewing, editing, and publication process:

Code of Scientific Ethics

for the

United States Department of Agriculture,
Agricultural Research Service

I dedicate myself to the pursuit and promotion of beneficial scientific investigation, consistent with the mission of the Agricultural Research Service.

I will never hinder the beneficial research of others.

I will conduct, discuss, manage, judge and report science honestly, thoroughly, and without conflict of interest.

I will encourage constructive critique of my personal science and that of my colleagues, in a manner that fosters harmony and quality amid scientific debate.

I recognize past and present contributors to my science and will not accept unwarranted credit for the accomplishments of others.

I will maintain and improve my professional skills and be a mentor to others.

I will ensure safety and humane treatment of human and animal subjects and will prevent abuse of research resources entrusted to me.

We have also promoted a fuller enfranchisement of scientists within their scientific societies and within the journals in which they publish.

Of course, enfranchisement in the peer reviewing and editing process demands a balancing of rights and responsibilities, but neither of these can be dictated. They must be arrived at through a process of consensus determination among participating scientists and the institutions which support them. And this is best done within the framework of individual scientific professional societies, especially those that manage the journals in which we publish. That is not to say, however, that a broader consensus should not in fact be achieved through coalitions of societies and broad-based philosophically disposed societies such as Sigma Xi.

In this case, enfranchisement means having a measure of say-so regarding how the vehicle of scientific publication is driven. Our administrators, professional society officers, and editors are entrusted to place their hands on the wheel, feet on the pedals, and eyes forward on the road ahead; but hopefully they also cast an occasional prudent glance in the rear view mirror, not just to see where we have been, but also to see what 18-wheeler may be

gaining on us; and hopefully they cast another occasional glance at their passengers and ask how they are doing. For although every passenger in that vehicle cannot steer and brake to their personal satisfaction, neither should obdurate drivers have the power or freedom to take the passengers where they do not want to go, nor should they be allowed to take them there in unnecessary discomfort.

Abstract

Research reports are generally critiqued by fellow scientists. The action, otherwise known as the peer-review process, is subject to various abuses. This paper draws on the authors' experience with the peer-review process, on information presented at a 1991 symposium on the topic, and on a survey of perceptions by members of the American Society of Agronomy (ASA). The paper lists 11 recommendations made to the ASA board of directors. These include selection of competent reviewers and allowing authors fair opportunity for critique and rebuttal of reviewer remarks. Also included was a recommended promotion of institutional and professional codes of scientific ethics. The code for the Agricultural Research Service, which one of us helped develop, is provided as an example.