Responsible Authorship and Peer Review*

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In Honor Of

RICK ROSENTHAL
“I didn’t exactly write the article, but... well, I didn’t exactly do the research, either.”

OVERVIEW

I. INTRODUCTION

II. PRINCIPLES OF RESPONSIBLE AUTHORSHIP
   A. Principles of Authorship
   B. Principles of Primary Authorship
   C. Writing the Paper

III. ROLE OF THE PEER REVIEW SYSTEM

IV. PROBLEMS WITH THE PEER REVIEW SYSTEM
   A. Nonperformance of Editors and Reviewers
   B. Conflicts of Interest of Reviewers
   C. Suppression of Innovation
   D. Publication Bias
V. GUIDELINES FOR PEER REVIEW
   A. Archival Journal Articles
   B. Grant Proposals

VI. CARROTS AND STICKS IN THE PEER REVIEW SYSTEM
1. INTRODUCTION

If you’re doing an experiment, you should report everything that you think might make it invalid—not only what you think is right about it: other causes that could possibly explain your results; and things you thought of that you’ve eliminated by some other experiment, and how they worked—to make sure the other fellow can tell they have been eliminated.

... In summary, the idea is to try to give all of the information to help others to judge the value of your contribution; not just the information that leads to judgment in one particular direction or another.

—Richard P. Feynman, “Surely You’re Joking, Mr. Feynman!” (1985)
The University of Utah’s handling of cold fusion is a striking illustration of what happens when scientists circumvent the normal peer-review process . . . and when university administrators lobby for large federal funds before the science is confirmed. . . . It has taken upwards of some fifty to one hundred million dollars of research time and resources to show that there is no convincing evidence for room-temperature fusion. Much of this effort would not have been necessary had normal scientific procedures been followed.

II. PRINCIPLES OF RESPONSIBLE AUTHORSHIP

A. Principles of Authorship

An author should have made substantial contributions to all the following (International Committee of Medical Journal Editors 1997, 2001):

- conception and design of the project, or analysis and interpretation of data;
- writing the article or revising it critically for intellectual content; and
- final approval of the version to be published.

The following are not sufficient to justify authorship:

- participating solely in acquisition of funding;
- participating solely in collection of data; or
- supervising the overall activities of the research group.
Beyond these minimal requirements, Houck and Thacker (1990) elaborate the following principles of authorship:

- contribution of original ideas;
- design and writing of an approved protocol;
- responsibility for acquisition of data;
- responsibility for and leadership in the performance of the study;
- analysis and critical interpretation of data—including review and evaluation of previous studies;
- drafting, revising, and reviewing the manuscript;
- responsibility for the final manuscript; or
- willingness and ability to defend the publication.

Authorship should be jointly agreed by all collaborators as soon as the group has decided on the assignment of responsibilities and workload for all members of the group.
For the latest information on authorship and peer review from the International Committee of Medical Journal Editors, visit


For the latest information on authorship and peer review from the Council of Science Editors (formerly the Council of Biology Editors), visit

www.councilscienceeditors.org.
B. Principles of Primary Authorship

Houck and Thacker (1990) discuss the following possible criteria for primary authorship:

- Originality of contribution—an original theoretical or methodological contribution that was critical to the paper;
- Major intellectual input—ideas on study design and modifications, obtaining and using experimental subjects or material, conducting the study, solving measurement problems, analyzing and interpreting data, and preparing reports;
- Major feature of the manuscript—central theme or concept; or
- Greatest overall contribution—total effort, successful project coordination, intellectual leadership, and data analysis and interpretation.

Primary authorship should not be based solely on administrative position or technical expertise.
C. Writing the Paper

- The primary author coordinates the contributions of all coauthors, who are responsible for both the style and content of their respective sections of the paper.

- Keep in mind the checklist of key questions to be answered in a referee’s report as given on slides 22–25 below.

- Avoid selective underreporting of results that are “disappointing” or “uninteresting”—that is, results for which no significant effects could be detected.
• Avoid overselling research results.

Some people think that publicizing the limitations of the work may be left to rival researchers who have competing techniques to promote.

In *Advice to a Young Scientist*, Medawar (1979) made the following statement.

*I cannot give any scientist of any age better advice than this: the intensity of the conviction that a hypothesis is true has no bearing on whether it is true or not.* The importance of the strength of our conviction is only to provide a proportionately strong incentive to find out if the hypothesis will stand up to critical evaluation.

(The emphasis in the quoted statement is Medawar’s.)
III. ROLE OF THE PEER REVIEW SYSTEM

• The main purpose of the peer review system is to serve the community of researchers—and ultimately to benefit society—by providing expert advice to

  – editors of archival journals who must make decisions on acceptance, rejection, or revision of papers submitted to their journals; and

  – program managers of funding agencies who must make funding decisions on the research proposals submitted to their programs.

• The peer review system performs an essential quality-control function in maintaining the self-correcting character of the research enterprise.
Another major function is improvement of the manuscript with respect to
- readability,
- completeness,
- conciseness, and
- rigor.

“Peer review” by software users and developers is claimed to be the principal advantage of open software standards; see Eric Raymond’s seminal essay “The Cathedral and the Bazaar,” which is available online via

IV. PROBLEMS WITH THE PEER REVIEW SYSTEM

A. Nonperformance of Editors and Reviewers

- The main problem with the peer review system for archival journal articles is simple dereliction of duty—
  - by editors who refuse to take responsibility for “hard” editorial decisions, preferring to operate by majority vote of the referees; and
  - by referees who cannot be bothered to read and evaluate carefully the work of other researchers, leaving editors as referees of last resort.

- Nonperformance of editors and referees has reached epidemic proportions in some branches of science and engineering.
• Notorious initial paper on cold fusion by Fleischmann and Pons (1989a) was
  – published in *Journal of Electroanalytical Chemistry* in four weeks, and
  – soon followed by long list of errata (Fleischmann and Pons 1989b).
B. Conflicts of Interest of Reviewers

- Referees may be tempted to engage in the following types of misconduct:
  - misappropriation of ideas—that is, stealing ideas from the papers and grant proposals that a referee is asked to evaluate; and
  - misappropriation of priority—that is, delaying or obstructing the publication or funding of a referee’s rivals so that the referee can be the first to publish a result or to receive funding for work in a particular area.

- If the solution to the referee’s own research problem is found in a paper or grant proposal sent to the referee for confidential review, then permission to use those ideas must be sought from the author and acknowledged in papers exploiting those ideas.
C. Suppression of Innovation

- See McCutchen (1997) and Horrobin (1991) for examples of groundbreaking ideas that were rejected for publication or not funded because of the inherent conservatism of reviewers.

- Yalow (1982) summarized the gist of the problem:

  There are many problems with the peer review system. Perhaps the most significant is that the truly imaginative are not being judged by their peers. They have none!
D. Publication Bias

- In education, medicine, and psychology, there is clear evidence of publication bias reflecting the direction and strength of study results (Dickersin 1991).

- Other causes of bias in referees’ reports include: jealousy; revenge; and prejudice against certain topics, individuals, or institutions (McCutchen 1997).
V. GUIDELINES FOR PEER REVIEW

A. Archival Journal Articles

• Two main reasons for breakdowns in refereeing are
  
  – misconceptions by referees about the job they are supposed to do;
  and

  – misperceptions by referees about the incentives (respectively, consequences) for doing a good (respectively, bad) job of refereeing.

• Referee’s main responsibilities are to

  – serve the editor as an “expert witness,” and

  – answer certain key questions about the paper.

• Most of these questions can be answered assuming the paper is error-free.
• G. H. Hardy said a referee must answer three questions about a piece of research offered for publication:

3. Is it true?
2. Is it new?
1. Is it interesting?

• A cogent example of such a review—

   This paper, whose intent is stated in its title, gives wrong solutions to trivial problems. The basic error, however, is not new...

   —Clifford Truesdell, *Mathematical Reviews*
   12 (January 1951): 561.
Key Questions to be Answered in a Referee’s Report

1. Are the problems discussed in the paper of substantial interest? Would solutions of these problems materially advance knowledge of theory, methods, or applications?

2. Does the author either solve these problems or else make a contribution toward a solution that improves substantially upon previous work?

3. Are the methods of solution new? Can the proposed solution methods be used to solve other problems of interest?
4. Does the exposition of the paper help to clarify our understanding of this area of research or application? Does the paper hold our interest and make us want to give the paper the careful reading that we give to important papers in our area of specialization?

5. Are the topic and nature of this paper appropriate for this journal? Are the abstract and introduction accessible to a general reader of this journal? Is the rest of the paper accessible to a readily identified group of readers of this journal?

6. Are the clarity and readability of the manuscript acceptable? Is the writing grammatically correct?
7. Does the manuscript contain an adequate set of references? Is adequate credit given to prior work in the field upon which the present paper is built?

8. Is the material appropriately organized into an effective mix of text, figures and tables? Are data given in tables better presented in figures or in the text?

9. Is the work technically correct? Are the main conclusions justified by the experimental data and by logically valid arguments? Are the theorems stated and proved correctly given the assumptions? In practical applications of the theoretical results, do the authors check the validity of the underlying assumptions?
10. Are there gaps in the discussion of the experimental methods or results? If there are such gaps, can the closing of these gaps be considered (i) essential, (ii) desirable, or (iii) interesting? Are the experimental methods described in sufficient detail so that other investigators can reproduce the experiments?

11. Have the authors explicitly addressed the limitations of their study—that is, have they adhered to Feynman’s ideal of “utter honesty” and “leaning over backwards” in reporting their results?
• See also

  – “A Guide for New Referees in Theoretical Computer Science” by Ian Parberry, which is available online via
    www.eng.unt.edu/ian/guides/referee.html;
  
  – “Rules for Referees” (Forscher, Science, 1965);
  
  – “Some Notes on Refereeing” (Gleser, The American Statistician, 1986);
  
  – “Writing an Effective Manuscript Review” (Waser, Price, and Grosberg, BioScience, 1992); and
  
  – Chapter 4 of Scientific Integrity: Text and Cases in Responsible Conduct of Research (Macrina 2005).
B. Grant Proposals

• To deserve funding, a proposal should be daring, novel, or interesting (Rozenweig, Davis, and Brown, 1988).

• A positive review of such a proposal should provide detailed answers to the following questions:

1. Why is the proposed research important?

2. What contribution will the proposed research make?

3. Why are the investigators qualified to do the work?

• Reviewers should guard against the tendency to give much more detailed comments on the weaknesses of a proposal than on its strengths.
VI. CARROTS AND STICKS IN THE PEER REVIEW SYSTEM

• Rewards for good reviewing

  – Reviewing manuscripts and grant proposals is one of the most important ways in which individual researchers can contribute to the development of their discipline.

  – McCutchen (1997) observed that reviewing of journal articles and grant applications gives reviewers the intellectual pleasure of interacting with authors and proposers, as well as education that, I suspect, has led to more advances than generally realized. These rewards are legitimate.
– Since the best referees generally receive the best papers and proposals to review, those individuals enjoy the benefits of continual professional enrichment and renewal.

– High-visibility editorial positions are usually filled from the ranks of prompt and insightful reviewers; and most universities and many other research organizations regard appointment to such positions as grounds for promotion and other forms of professional advancement.
• Consequences of Bad Reviewing

– Bad refereeing can cause long-lasting damage to an individual’s reputation in the eyes of editors and program managers, who increasingly maintain computerized records on the performance of reviewers (Abelson 1992).

– Some editors maintain an “A” list of good referees and a “B” list of bad referees; and when authors from either list submit a paper for review, the editor selects referees for that paper from the author’s list.