

The Role of the Manuscript Reviewer in the Peer Review Process

Joseph F. Polak¹

Peer review of submitted manuscripts is recognized as a critical component of the publication process in all major medical journals. It lends respectability and scientific credibility to those journals that have adopted the process [1]. This function is delegated to a group of persons who perform the task selflessly and without compensation. Of the many facets of the peer review process, the selection of manuscript reviewers and their subsequent interaction with both editors and authors may be so poorly understood by aspiring authors that certain misconceptions ensue. Authors of rejected manuscripts may fear that reviewers have acted in an arbitrary and possibly censorial fashion [2, 3]. Conversely, authors of accepted manuscripts who face a mountain of revisions may wonder if such an effort is likely to improve their manuscript [4, 5].

The following questions come to mind: Where do the reviewers come from? What do they do, and what constitutes a good reviewer? What power do they have? How is reviewer performance measured? Can the editor recognize publicly the good reviewer? Are reviewers really blinded? How does one become a good reviewer? Who will be the reviewers of the future? While looking at these questions, we should consider objective approaches of assessing reviewer quality and wonder whether they would improve the quality of the published manuscript.

Where Do Reviewers Come From?

The process that leads to the selection of a reviewer is not mystical. Like most things, it makes sense. The editors of most journals identify certain persons who publish, present papers, or give courses in a specific field. Invitations to review articles in their area of expertise are then sent out

and, in most instances, accepted. The other pathway is that of verbal or, sometimes, written recommendations. Finally, a reviewer may volunteer by sending a letter of query to the editor of a journal.

No data are available to suggest that the method by which a reviewer is chosen has bearing on performance. In general, reviewers are recruited from the ranks of academics. Younger reviewers tend to give better and more timely reviews than older reviewers [6]. At the very least, the quality of the review does not appear to increase with academic seniority [7]. The sex of the reviewer appears not to have an effect on the nature of reviewers' recommendations or on final acceptance of a manuscript [8]. A survey of 90 reviewers for the *AJR* [9] shows no statistical difference between men and women with respect to the average quality of their reviews (Table 1).

The editor might select an individual to be a reviewer on the basis of an elaborate curriculum vitae and a reputable institution [6]. These do not guarantee good performance as a reviewer. The strength of the selection can be verified by monitoring the content and tenor of the submitted reviews [10].

What Do Reviewers Do?

Reviewing is ultimately time-consuming and a great deal of hard work. The role played by the reviewer is complex. A careful evaluation of the submitted manuscript includes determining its scientific merit and ranking it against what is already in the current literature. This evaluation requires that

Received March 21, 1995; accepted after revision April 10, 1995.

Supported by the ARRS Melvin M. Figley fellowship award, 1994.

¹Department of Radiology, Harvard Medical School, Brigham and Women's Hospital, 75 Francis St., Boston, MA 02115. Address correspondence to J. F. Polak.

TABLE 1: Relationship Between Reviewer Performance and Sex^a, Obtained from the AJR Database of Active Reviewers up to January 1994

Sex	Number of Reviews (Mean \pm SD)	Days for Review (Mean \pm SD)	Quality of Review ^b (Mean \pm SD)
Male	13 \pm 8	20 \pm 10	3.2 \pm 0.6
Female	14 \pm 8	19 \pm 6	3.2 \pm 0.5

^aBased on a random sample of 45 male and female reviewers used by the AJR.

^bAverage of a subjective score from 1 to 4 assigned by the editor, with 4 being the best.

reviewers be well versed in the scientific method. They are also likely to review articles within their area of subspecialization and to have a pertinent knowledge of recently published papers. Reviewers also verify the suitability of illustrations and references. The reviewer not only helps the editor select the manuscript but also suggests changes in the manuscript that will help authors transmit their message to the readers more clearly and succinctly.

The reviewer does not select the manuscript for publication but renders an opinion. This opinion is weighed against the opinion of one or more additional reviewers. With both the *AJR* and *Radiology*, the reviewer assigns a numerical score to the manuscript to quantify the estimation of the merit of the manuscript for publication. The final decision remains the prerogative of the editor. Although the score given to the manuscript is important, the criticisms the reviewer makes also provide insight into the quality of the review. The critique also helps the editor weed out the extremes such as the assassins [10] who seek only to negate other authors' efforts or the zealots who are not critical enough. The editor's task is facilitated when the reviewer has carefully evaluated the manuscript and rendered an opinion based on facts. The reviewer should not simply judge a manuscript but give recommendations that will help the authors better present their data. Because readers are not expected to have every element of specialized knowledge at their fingertips when reading the final manuscript, a reviewer can help bridge this information gap by making specific recommendations on the content of the manuscript. To do this function well requires some understanding of the publication process. The editorial office may not have time to access critical references and compare a newly submitted manuscript with other publications.

Reviewers need not correct grammatical and spelling errors, because the editor and the editorial staff can work miracles converting into lucid prose manuscripts that make English sound like a foreign language. To copy-edit when asked to evaluate the scientific merit of a manuscript is generous indeed. However, it is an unnecessary burden that may waste the reviewer's time.

In addition to looking for reviewers who are insightful and knowledgeable, editors look for reviewers who write clearly and succinctly. Whereas the author can have the benefit of the doubt when writing a manuscript, the reviewer has no excuse. What the reviewer has written must be clear and organized. It is frustrating when the authors, revising their

manuscripts, must jump back and forth from one comment to the next. Adopting a systematic way of conducting and organizing a review makes common sense even when no guidelines have been published on how the review should be done. In truth, our reviewers must often discover for themselves how to conduct a fair and comprehensive review. Is there a template that reviewers new to the field can look to? Unfortunately not. Every reviewer is different, and editors are reluctant to force them all into the same mold. The best reviewers adopt a systematic approach that enables effective communication with the editor and also helps the authors.

A clear review, organized to parallel the organization of the manuscript, is easily done: At the beginning can be a summary statement describing what the reviewer sees in the manuscript. The review can then follow the flow of the manuscript and focus on each section: Abstract, Introduction, Materials and Methods, Results, Discussion, References, Tables, and Figures (and their legends). The final conclusion for the editor gives an overall opinion on the value of the manuscript and normally remains confidential.

The reviewer should take care in organizing these sections. If, for example, a statement in the Results section warrants a change in the Materials and Methods section, then the change should be indicated at both locations in the review. This rule is particularly important when drastic changes are recommended. Changes in figures also warrant mention in more than one location.

This approach is well suited to the review of major papers. A similar approach can be adapted for reviewing case reports, review articles, and pictorial essays. In general, a review that parallels the organization of the manuscript is easier to read than one that jumps back and forth.

It also seems obvious that more time should be given to the review of complex manuscripts. According to the data available for 1993, *AJR* reviewers show surprising consistency in the way they review manuscripts. The time taken for the review increases with the complexity of the manuscript (Table 2).

How Powerful Is the Reviewer?

Being invited to become a reviewer carries the implication that the person is being recognized as an expert in the field—a definite ego boost. Can the reviewer make a mark on all future manuscripts to be published in the field? This achievement would be difficult, because editors have

TABLE 2: Relationship Between Time Needed for a Review and Complexity of the Manuscript for Manuscripts Submitted to the AJR in 1993

Type of Manuscript	Time Taken for Review (Accepted Manuscripts) ^a	Time Taken for Review (Rejected Manuscripts)
Major papers	32 \pm 10 days (n = 223)	32 \pm 10 days (n = 542)
Pictorial essays	27 \pm 6 days (n = 48)	29 \pm 9 days (n = 65)
Case reports	23 \pm 8 days (n = 70)	19 \pm 9 days (n = 417)

^aManuscripts accepted with revisions.

recourse to more than one reviewer and the review process is, in most cases, blinded.

Often, much care goes into concealing the identity of authors from the reviewers and vice versa, but the editor remains all-knowing. As mentioned by a previous editor of the *New England Journal of Medicine*, the editor exercises the option of accepting the submitted review [11]. The reviewer is not the arbiter: the editor has this role and must weigh the different opinions, estimate their importance, and consider the possibility of referee bias. This bias, if present, is difficult to find. For example, a superficial review or one requiring less effort would be expected to take less of the reviewer's time. A look at the *AJR* database [9] reveals that manuscript rejection does not necessarily imply that the reviewer spent less time reviewing the manuscript (Table 2). For example, in 1993, the average time for initial decision in 542 rejected major papers was 32 ± 11 days, whereas it was 32 ± 10 days for 223 accepted papers. This table also shows that less time is spent reviewing less complex manuscripts such as pictorial essays or case reports. This measurement is not perfect, because the time given to the review cannot be distinguished from the time it took the reviewer to start the review. In summary, an individual reviewer is one of the editor's consultants—no more, no less.

How Is Reviewer Performance Measured?

What are the attributes of a good reviewer? From the editors' complaints, timeliness might seem foremost. The editorial office works against the clock. Each month it must accumulate material of sufficient quality to fill the issue and maintain a regular publication schedule. This task is difficult. No wonder that modern editors track the time taken for their reviewers to return their opinions. Time, however, is but one aspect of reviewer performance.

The approach adopted by the editors of the *AJR* and *Radiology* is to monitor reviewer performance by tracking certain variables [10]. At the *AJR*, these include the number of manuscripts reviewed, the time since the last manuscript was sent for review, the editor's subjective score on the quality of the review, and the time taken for the review. Using such a database, it is possible to evaluate certain relationships. At the *AJR*, for example, the number of manuscripts sent to a reviewer depends on the average score the editor has assigned to previous reviews. In essence, the better the reviewer, the better the likelihood of the reviewer's receiving another manuscript. Can an optimal reviewer be identified? Probably not. But those reviewers who receive the greatest number of manuscripts are, again by default, those whom the editor consistently rates well.

Is there an objective and democratic way to evaluate reviewer performance? Authors' performance and the quality of their publications are often judged by the number of citations made to that article in the literature. This figure is recorded in the Science Citation Index (Institute for Scientific Information, Philadelphia, PA). The number of citations in the citation index can indicate the importance of scientific publications and, although such an approach is not perfect, could be used as a rough index of the quality of a reviewer's work.

Unfortunately, this tool might work when judging groups of reviewers [4] but might not be suited for individual reviewers.

In summary, even easy accessibility of objective information on the quality of published articles would likely not improve the tried method of having the editor subjectively grade reviewers' performance.

How Can the Editor Reward the Reviewer?

Editors feel the need to publicly recognize reviewers who perform well. They will likely list their reviewers in one issue of their journal. The very best reviewers may be rewarded by membership on the editorial board or the granting of an award. Dedicated service as a reviewer is usually not known to the public and represents an unselfish donation of time and energy.

Are there alternative ways of rewarding reviewers? One possibility is to have promotion committees take this important role into consideration when a reviewer is being considered for academic promotion. The editor could then prepare a letter describing the reviewer's performance. Another possibility is to grant reviewers a salary. Unfortunately, the only reasonable source of funds would be the authors themselves, possibly leading to a publication process biased in favor of authors with more funds and likely discouraging junior members of our specialty from sending in some of their manuscripts.

Should Reviewers Be Blinded?

The *AJR* and *Radiology* have a policy of blinded reviews. Blinding improves the quality and consistency of reviews [12] as well as the quality of the final manuscripts [4]. Blinding also alleviates uncomfortable situations in cases of manuscript rejection. For example, blinding prevents a senior author from discussing a junior faculty member—in this case a reviewer—with his friend, the chairman of the department in which the reviewer works. Conversely, it prevents the frustrated junior author from keeping a chip on his shoulder about a certain senior reviewer. It also keeps the author from arguing and debating with the reviewer after rejection. Because, on average, more manuscripts are rejected than accepted, enforcing reviewer anonymity makes sense.

How Can Reviewer Performance Be Improved?

As we become linked by a digital communication network, we will most likely see images and text transmitted directly to the reviewer [13]. This method may further decrease reviewer's response time, improving the current turnaround time of 25.6 ± 11.7 days made possible with the aid of second-day mail [9].

Can reviewer performance be evaluated scientifically [14]? Instruments that might give an unbiased way of evaluating reviewer performance are now being tested [15, 16]. This issue is complicated by the spectrum of radiological manuscripts. Reviewing a pictorial essay requires a different mindset and a different knowledge base than those needed for evaluating a manuscript that consists of a metaanalysis. At

the *AJR*, pictorial essays take less time to review than do major papers (28 ± 7 days versus 32 ± 10 days; $p < .001$). The editors of *Radiology* and the *AJR* keep track of the type of manuscript being evaluated as they grade reviewer performance. Editors believe that reviewers should be good clinical radiologists who are able to write clearly.

Editors may further improve the average quality of their published manuscripts by selecting reviewers well grounded in the scientific method and with a knowledge of some statistical techniques. Reviewers' qualifications in these areas may be determined by the content of the reviews that are sent back and by a record of the reviewers' academic performance, that is, relevant publications. The editors of the *AJR* and *Radiology* now check this informally.

What Will Our Future Generation of Reviewers Look Like?

The reviewers, more than any individual radiologist, are a mirror into the soul of our specialty. Their opinions mold the publication process. How are they equipped to cope with the changes in health care that are likely to affect radiology? Third parties looking at the specialty increasingly scrutinize radiology journals for data that can be used to determine the efficacy of different imaging or interventional procedures. Can our reviewers make certain these data are available, and can they evaluate these data fairly? Do they know enough to do so consistently? These questions can, in part, be answered by requiring that more of our reviewers be familiar with the field of technologic evaluation and cost-effectiveness research. With the knowledge that subject-competent reviewers will be reviewing their manuscript, authors conducting this type of research and publishing their results will not feel that their work is being judged unfairly. Reviewers who are familiar with these techniques should, in turn, look at the peer review process as an opportunity to share their expertise and help authors present their data. Although all papers are possible candidates, it is often difficult to identify papers containing data that will play a role in future technologic evaluation. Historically, we have lacked the foresight to do so. For example, despite the number of early publications in the field of MR imaging, nonradiologists were quick to point out that few, if any, gave information of sufficient quality to justify adopting this new technology [17, 18]. A third party evaluating the role of radiology publications in the development of future health care policy might have wondered whether radiologists were aware of the critical issues [19].

As always, the responsibility for identifying the new generation of reviewers will likely belong to the editors. Whereas an informal approach seems to have worked well until now, it may become necessary to more systematically recruit our reviewers. Strict criteria, such as primary authorship in at least five articles, for example, may qualify a reviewer for this task. A working knowledge of statistics and of experimental design may be required. The quality of the journals is to a large measure in the hands of the reviewer. An ample supply of insightful, knowledgeable, and dedicated reviewers must be ensured if the caliber of radiology journals is to be maintained and improved.

REFERENCES

1. Relman AS, Angell M. How good is peer review? *N Engl J Med* **1989**; 321:827-829
2. Peters DP, Ceci SJ. Peer-review practices of psychological journals: The fate of submitted articles, submitted again. *Behav Brain Sci* **1982**;5:187-195
3. Horrobin DF. The philosophical basis of peer review and the suppression of innovation. *JAMA* **1990**;263:1438-1441
4. Laband DN, Piette MJ. A citation analysis of the impact of blinded peer review. *JAMA* **1994**;272:147-149
5. Justice AC, Berlin JA, Fletcher SW, et al. Do readers and peer reviewers agree on manuscript quality? *JAMA* **1994**;272:117-119
6. Evans AT, McNutt RA, Fletcher SW, et al. The characteristics of peer reviewers who produce good-quality results. *J Gen Int Med* **1993**;8:422-428
7. Stossel TP. Reviewer status and review quality. Experience of the Journal of Clinical Investigation. *N Engl J Med* **1985**;312:658-659
8. Gilbert JR, Williams ES, Lundberg GD. Is there gender bias in JAMA's peer review process? *JAMA* **1994**;272:139-142
9. Berk RN. Personal communication, **1994**
10. Siegelman S. Assassins and zealots: variations in peer review. *Radiology* **1991**;178:637-642
11. Relman AS. Peer review in scientific journals: what good is it? *West J Med* **1990**;153:520-522
12. Fisher M, Friedman SB, Strauss B. The effects of blinding on acceptance of research papers by peer review. *JAMA* **1994**;272:143-146
13. Fishman EK, Ney DR, Brody WR. The *AJR* of the future: electronic publication and distribution. *AJR* **1993**;160:413-415
14. Rennie D. Guarding the guardians: a conference on editorial peer review. *JAMA* **1986**;256:2391-2392
15. Goodman SN, Berlin J, Fletcher SW, et al. Manuscript quality before and after peer review and editing at *Annals of Internal Medicine*. *Ann Intern Med* **1994**;121:11-21
16. Feurer ID, Becker GJ, Picus D, et al. Evaluating peer reviews. Pilot testing of a grading instrument. *JAMA* **1994**;272:98-100
17. Cooper LS, Chalmers TC, McNally M, et al. The poor quality of early evaluations of magnetic resonance imaging. *JAMA* **1988**;259:3277-3280
18. Kent DL, Larson EB. Magnetic resonance of the brain and spine. Is clinical efficacy established in the first decade? *Ann Intern Med* **1988**;104:402-424
19. Hillman BJ. Government health policy and the diffusion of new medical devices. *Health Serv Res* **1986**;21:681-711