Rules for Referees

The duties of the editorial referee are examined to establish efficient and uniform practices.

Bernard K. Forscher

In the past several years considerable concern has been expressed in many quarters regarding the expanding volume of the scientific literature. Perhaps because of the increased amount of "literature" and the concomitant increase in numbers of persons involved in handling manuscripts, our concepts of goals and purposes have become obscured. Therefore, it is appropriate to reexamine one aspect of the editorial process—the referee system.

Any attempt at developing a better way to accomplish a task should begin by defining the task and by making clear who is going to benefit by the better way. Regarding the latter, I think that "better" should be defined in relation to value or aid to the reader; and so the role of the editor and the referee are considered here from this standpoint. The task can be defined by establishing the nature and purpose of its end product, the scientific journal.

Purpose of a Scientific Journal

Although sometimes forgotten, the fact remains that the scientific journal is a medium of communication. A paper published in a journal is not to be considered analogous to a notch on a gun butt; the idea that one can evaluate a man's accomplishments by counting his publications instead of reading them has been a contributing factor in the literature explosion. Because journals are preserved in libraries, they constitute a depository of knowledge and a more or less official record of the transactions of the world of science. Thus, the act of communication is not restricted by the factor of time.

There is a danger that the archival aspects will come to overshadow the immediate communication aspect. With continued application of computer techniques to information retrieval, it may become possible to transmit directly from the computer in the laboratory to the memory banks in the library and thus do away with journals completely. This would be a great deterrent to progress in science.

When it is serving as a medium of communication, what, specifically, does the journal communicate? Three important types of message constitute its *raison d'être*: (i) new facts or data, (ii) new ideas, and (iii) intelligent reviews of old facts and ideas. The interaction between these and the reader's mind generates other new ideas and new accomplishments. For this to happen, the journal must be read; to be read it must be interesting, readable, and stimulating. The journal that attempts to avoid controversy, to publish only papers that are "right," or to limit discussion and speculation defeats its purpose.

Role of the Journal Editor

The editor or editorial board of a journal should have the authority to, and take the responsibility for, accepting and rejecting manuscripts on the basis of the policies established for the journal. No author has an absolute right to have his papers published, but the editor should not be arbitrary or selective in carrying out the policies of the journal. One set of rules should apply to all manuscripts. The decision to accept or reject is the duty of the editor, not of the referee. The editor, advised by the referee, weighs the referee's comments as representing one facet of the matter. In courts of law, both prosecuting and defending attorneys are bound by the rules of evidence; in editorial decisions, a referee should be expected to support his views with evidence, just as an author is expected to do.

When the editor informs the author of the decision, he may paraphrase or repeat those parts of the referee's comments that he thinks will help the author in making the requested revisions or in understanding the decision to accept or reject. On the other hand, the editor may transmit the referee's comments verbatim. In this case, the name of the referee should be included.

The standard expression "Please revise according to the enclosed suggestions" is not helpful when the comments include major and minor points, when (as often happens) two referees submit conflicting comments, or when two referees discuss entirely different aspects of the manuscript. In the last circumstance the editor can protect himself by preparing a summary of comments instead of merely forwarding the referees' reports, for the clever author can avoid making any revision at all by arguing that the first referee's points cannot really be important because the second referee didn't mention them, and vice versa. In any event, the author is entitled to a clear and specific exposition of what he is expected to do in the way of revision or rebuttal.

Rules for Referees

The editor solicits the opinion of a referee because of the specialized knowledge or experience the referee has in the subject matter of the paper being considered. Referees should recognize this and the limitations it implies. The efforts of the referee can be divided into two broad categories—specific questions and general questions. Aspects that are not at all the referee's concern make up a third category. The referee's task is to read the manuscript and answer the questions. He should neither look for something to criticize to prove his diligence and capability as a referee nor overlook or condone omissions or errors to prove his graciousness. He should bear in mind that he is rendering a service to the editor, in the manner of an expert witness, but that

The author, formerly a research chemist, is a member of the Section of Publications of the Mayo Clinic and Mayo Foundation, Rochester, Minnesota.

the actual decision is to be made by the editor.

The selection of appropriate referees is complicated by the possibility of "conflict of interest." In some instances the referee best suited to serve as expert witness for a manuscript also may be working on the same or a very similar investigation, and the information in the manuscript may give him an unfair advantage. There is no foolproof solution to this serious problem. It may be avoided to some degree if editors select referees who are experienced in the subject matter of the manuscript but who are not currently active in the field. This is not always possible. It is incumbent on those selected as referees to treat manuscripts under review as extremely private communications and, if they think they cannot immediately forget what they have read, to disqualify themselves and return the manuscript unread.

Specific questions. In his answering of specific questions the referee performs his greatest service because he is making available specialized knowledge that the editor may not have.

1) Newness. Are the facts and ideas given in the paper new, or is the paper a rehash of prior reports by the same or other authors? If the material is new, is there enough useful detail to warrant a full paper, or should the communication be condensed to a note? (If the latter, the referee should specify the parts that are new.) If the referee concludes that the matter is not new, he should cite the references in which it has already been reported. Newness is to be judged on what is known, not on what the referee may know personally.

2) Bibliography. Does the manuscript contain a complete or representative set of references? (If an important *relevant* report has been omitted, it should be cited in the comments. Authorship by the referee is not necessarily a valid criterion of relevancy.) In other words, has the author given a fair description of the knowledge available at the time the manuscript was written? Furthermore, does the manuscript accurately report the statements in the references cited?

3) Reliability of methods. Are the methods used in the work under consideration adequate to support the conclusions? Bitter differences of opinion can develop over this point. The referee is expected to support his opinion by evidence from the literature if he disagrees with the author.

4) Internal contradictions. On the basis of the data reported in the manuscript, are there any internal contradictions or computational errors?

5) Illustrations and tables. Do the illustrations actually show what the text or legends claim they show? Are the tables clear and informative, or are they unnecessarily confusing? Are there too many illustrations or tables? Is there material in the text that could be presented better in a table? Is there needless duplication between text and illustrations or tables?

General questions. General questions may or may not require answers, and the answers need not be as direct as those to the specific questions.

1) Clarity. Is the paper written in a style that is reasonably easy to follow and to understand? (This does not mean written in the literary style that is preferred by the referee.) If the referee finds that he must reread more than a few passages or that the meaning is not clear, he should point this out in his comments to the editor.

2) Validity of the logic. Is there a defect in the reasoning used for deriving the conclusions from the observations? If the referee believes there is, he should specify the step he thinks incorrect and say why he believes it is faulty. The referee should consider only the conclusions the author has presented; he should not extend or redirect them.

3) Alternate interpretations. Are there other valid interpretations of the observations, in addition to the interpretation offered by the author? The existence of such alternatives does not in itself invalidate the author's interpretation, but the editor should be aware of them and should consider the extent to which they should be recognized in the paper.

4) Loopholes. Are there loopholes in the array of observations, and, if there are, can the closing of them be considered (i) essential, (ii) desirable, or (iii) interesting? A loophole, in other words, may be classified in one of three categories, of different degrees of seriousness. The referee must specify the category whenever he directs attention to a loophole, so that the editor can assign the proper significance to it in reaching a decision on the manuscript.

Forbidden topics. The opinions a referee may express on "forbidden" topics have no relevance to the acceptance or rejection of the manuscript under consideration—that is, in voicing them the referee abandons his status as an expert witness and becomes an interested reader.

1) Experiment design. "I would have gone at the problem a different way" is one type of comment that has no place in refereeing. If the author has demonstrated in a valid way the point he set out to demonstrate, he has done his work. The choice of experiment design is the prerogative of the investigator, and, provided the design chosen does the job, is no ground for criticism or discussion. Any referee who sees another approach to a problem is free and welcome to roll up his sleeves and have a go at it.

2) Scope or goal. The investigator selects his objectives; if the finished manuscript reports on a project of a magnitude consistent with the policy of the journal, it should not be criticized on the basis of what could be done in addition to or instead of what was done. Except for the question of its newness, the referee judges the quality of the product, not its direction or the distance it covers. The suggestion that additional experiments be made is allowable only when it is essential that a loophole be closed, to make the author's interpretations or conclusions valid. Additional experiments to validate the conclusions of the referee are not in the "essential" category, perhaps not even in the "desirable" category.

Use of the Referee's Report

That the referee's report is specifically for the guidance of the editor is a major thesis of this article. If the editor transmits these comments verbatim to the author, then the name of the referee should also be transmitted.

On considering the referee's report, the editor may find criticisms on matters of fact, which he can refer to the author for correction or use as a basis for rejection if the referee's point is irrefutable and involves a fundamental aspect of the manuscript. The editor also may find comments that are controversial or are matters of opinion; in this case he must weigh fairly what the author has to say against what the referee has to say. The decision must be based on evidence

and logic; no special advantage can be given one side or the other.

In some cases it may not be possible to reach a truly reasonable decision. I suggest a solution for these cases. The author is informed of the referee's view and is offered publication provided a statement from the referee is appended to the paper; this statement is identified as a referee's appendix, is signed by the referee, and is submitted to the author when the offer of publication is made. The same information is transmitted to the referee. If both agree, paper and appendix are published. If the referee demurs, the paper is published without the appendix. If the author demurs, nothing is published.

In view of the high degree of specialization that characterizes much current research, one cannot expect the editor of a journal to have knowledge of the background and methods pertinent to every paper submitted to, or published by, his journal. For this reason the referee system has great merit and usefulness if the editor makes the system work properly for him, and if the referees understand what they are supposed to do. One does expect the editor to have a sense of fairness and an ability to apply general principles of logic. One hopes he will be an active participant in the decision-making process. But, most of all, one wishes that editors and referees would realize that readers have a little sense too and do not have to be protected so assiduously.

Earthquake Prediction: OST Panel Recommends 10-Year Program

A panel of experts, formed in response to the political and scientific aftershocks of the Good Friday earthquake in Alaska in 1964, has recommended a 10-year program of research on earthquake prediction and earthquake engineering. The program would cost an estimated $137 million over the 10 years.

Soon after the big quake in Alaska, the director of the Office of Science and Technology, Donald F. Hornig, asked geophysicist Frank Press, now a departmental chairman at M.I.T. to assemble an "ad hoc committee on earthquake prediction." Last week saw the release of the committee's report, which said, in essence, that carrying out of the proposal (i) would offer a fair chance to develop a method of giving warnings "hours to days" in advance of major earthquakes, and (ii) would, through engineering research, provide means of minimizing loss of life and property damage, even if a warning system were not achieved.

At a meeting with reporters last week Press said that 10 years ago the possibility of predicting earthquakes was considered remote. A more sanguine view among scientists today has been encouraged primarily by rapid advances in instrumentation and techniques, and also by hints—still not in the category of evidence—that "premonitory events" may be detectable.

The International Geophysical Year yielded improved geophysical instrumentation. And the International Upper Mantle Project, which ends in 1967, and space-agency-sponsored work toward developing seismological instruments for study of the moon's surface have also contributed to advances. But the big impetus toward improved instrumentation has come from the Department of Defense's project to develop methods for detecting and identifying underground tests of nuclear weapons.

This project can be traced to the so-called conference of experts held in Geneva in the summer of 1958, an East-West meeting convened for the purpose of assessing technical capabilities for detecting nuclear explosions. The conclusions were that these capabilities were insufficient. Subsequently, in the United States, acceptance of recommendations by a panel headed by Lloyd V. Berkner led to the establishment of the three-part Project Vela. Vela Uniform deals with problems of underground and undersea detonation; Vela Hotel is concerned with ground-based detection; and Vela Sierra, with a satellite-based detection system for high-altitude explosions.

Vela was administered by the Department of Defense's Advanced Research Projects Agency, a contracting and management organization which deals with universities, industry, and other government agencies. Under the Vela Uniform program rapid advances were made in the development of instruments and techniques; perhaps the most notable of these was the placement of highly sensitive seismometers in holes some 10,000 feet deep. But perhaps the most important effect of Vela has been the adoption of a "systems approach." A flow of funds into a field that had been undermanned and underfinanced made it possible to employ "arrays" of improved instruments and to tie these into computerized systems.

A culmination of this new approach is to be found in the Large Aperture Seismic Array (the acronym LASA, rhymes with NASA), dedicated this week in Montana. LASA boasts some 525 instruments arranged in 21 clusters buried 200 feet in the ground and distributed over an area 150 miles square. Despite its dedication date, LASA was in working order in time to record the results of the subsurface detonation, last month, of 200 tons of chemical explosives in an old ship 70 miles off the Virginia coast. Other tests are scheduled, including an undersea blast in the Pacific and detonation of an atomic device deep underground in the Aleutians.

LASA is reportedly a vast improvement on earlier models effective in detecting earthquakes, but the question of whether it is possible to distinguish an earthquake from an underground nuclear explosion apparently is still an open one. And it seems still to be the official United States view that scientific means of making the distinction are still lacking, the Soviets to the contrary notwithstanding.

While the program recommended by the Press committee would profit from the momentum of the Vela program, its breadth and the difference in its