

## Reviewing Review Literature. Part 1. Definitions and Uses of Reviews

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Readers of this column know of my deep appreciation for the art of scientific reviewing. Indeed, I once proposed that reviewing be established as a scientific profession.<sup>1</sup> Just as peer review and refereeing are basic to the culture of science, so is the process of literature review. In this two-part essay I want not only to discuss and define review articles in general but also to highlight some of the better-known organizations that produce review serials.

While it may be unusual to say so at the start, after rereading this essay for the nth time I had to agree with a colleague's comment that somehow I had lost the sense of excitement that I want to convey. The "culture" of reviewing the literature is so fundamental to my own professional life that I too may forget that in comparison with research discoveries one reads about in the press, and for which Nobel Prizes are awarded, reviewing may seem to the uninitiated to be a relatively humdrum topic.

But it is precisely this mistaken notion that I want to dispel. It is not an accident that so many of our greatest scientists have used, created, and contributed to the review literature. Like an important opinion rendered by the chief justice of the Supreme Court, reviews can have great value and influence. Some of the most fascinating reading in history is to be found in such reviews, whether legal, scientific, or philosophical. Achieving the knowledge and skill necessary to write reviews, I believe, is a goal to which young scientists should aspire and ought to be part of their pre- and postgraduate training.

The notion persists, however, that a review article—even one that is highly cited—is a lesser achievement than a piece of original research. This is evident in the varied reactions we get from authors of reviews that are cited highly enough to be *Citation Classics*®. Many authors believe that review articles should not be automatically included in our *Citation Classics* feature. Some *Citation Classic* authors feel that their review articles should not be judged by the same criteria as their articles reporting original research. Indeed, the author of the commentary may point this out explicitly. However, it is undeniable that most highly cited review articles deserve *Citation Classic* status. Not all reviews are highly cited even though the relatively high impact of review journals is well known. And in our search for candidate papers we limit the number chosen for any field or journal.

In discussing the history of scientific and technical periodicals, David A. Kronick, professor of medical bibliography, University of Texas Health Science Center, San Antonio, points out that "review" journals were in circulation as far back as the eighteenth century. An example is the *Commentarii de Rebus in Scientia Naturali et Medicina Gestis*, which was published in Leipzig, Germany, between 1752 and 1798. This contained reviews of scientific books, dissertations, and journals.<sup>2</sup> However, it was not a review journal in the modern sense of that term.

In a 1961 paper, my late colleague and friend Scott Adams of the National Library of Medicine, Washington, DC, pointed out

**Table 1:** Types of reviews, as delineated by A.M. Woodward.

- Annual reviews**, containing state-of-the-art reviews and usually published annually in book format—*Annual Review of Biochemistry*, for example.
- Advances**, such as *Advances in Chemical Physics* or *Progress in Inorganic Chemistry*, generally containing both critical and state-of-the-art reviews and published somewhat less regularly in book format.
- Journals**, such as *Chemical Reviews*, usually containing critical reviews and often published as a monthly or quarterly journal by a society.
- Popular journals**, including *Scientific American*, providing articles in topical areas for the general reader.
- Yearbooks**, a form of state-of-the-art reviews usually dealing with individual papers. Example: *Year Book of Diagnostic Radiology*.
- Monograph series**, usually an irregular series of long treatises in a particular field. Woodward cites *Fortschritte der physikalischen Chemie* as an example.
- Essays**, such as *Essays in Biochemistry*, generally providing tutorial-type reviews aimed at a broader audience, particularly teachers and lecturers.
- Comments**, such as *Comments on Atomic and Molecular Physics*, usually containing brief reviews of a topic, taking one or a small number of recent papers as the nucleus.

two types of nineteenth-century German antecedents to today's review papers. One was the *Jahresbericht*, which was intended as a comprehensive descriptive record of annual contributions made to a field of study. Adams referred to the modern equivalent of this paper as a *discipline* review. The other German review was the *Ergebnis*, a form of publication in which the contributions from multiple scientific disciplines focused on a scientific problem and its solution. The descendant of this paper, noted Adams, is the *categorical* review, which is highly selective, critical in its approach, and heuristic in that it provides for speculation as well as for a record of research accomplishment.<sup>3</sup>

Adams's designation of two kinds of reviews—discipline and categorical—illustrates a significant problem in connection with review literature: the difficulty of defining the term "review." As I pointed out in an essay announcing ISI®'s *Index to Scientific Reviews*<sup>™</sup>, the word "review" is one of the more ambiguous terms in scholarship.<sup>4</sup> Even if one attempts to limit the discussion to scientific reviews (as distinct from, say, book reviews), one can still be dealing with several different approaches and treatments. For example, Anthony M. Woodward, Aslib Research and Development, London, notes that reviews can be critical, evaluative, interpretive, speculative, state of the art, tutorial, historical, and popular, among other classifications.<sup>5</sup> Woodward identifies eight main types of reviews, which appear in Table 1.

A.A. Manten, Elsevier Science Publishers, Amsterdam, The Netherlands, offers a system of classification for reviews based on length, subject matter, content, period covered, degree of coverage of sources, and expected readership. For example, classifying by content permits one to identify various types of reviews. One of these, which Manten refers to as the literature review, includes among its subtypes the annotated bibliography, in which a brief description and sometimes a brief evaluation accompany each reference.<sup>6</sup>

Another type of literature review is the research review, which, according to Manten, is concerned directly with facts and findings and seldom with the opinions of authors of papers from which the information is taken. Manten offers further subdivisions, mentioning subtypes of the research review that include, for example, the interpretive review. This kind of review attempts to assemble, analyze, and interpret material, with the primary aim of showing mutual relationships that are generally the elements of a reevaluated or original theory. Another kind of research review is the critical review, which, as the name implies, emphasizes critical evaluation of published data or concepts.<sup>6</sup>

This sampling of classifications and nomenclature conveys some idea of the wide variety to be found in review literature. As can be seen from Manten's classifications, reviews can run from little more than bibliographies to highly subjective evaluations of material within a field.

**Table 2:** Winners of the National Academy of Sciences Award for Excellence in Scientific Reviewing, 1979-1987.

1979	G. Alan Robison, School of Medicine, University of Texas, Houston, TX
1980	Conyers Herring, Department of Applied Physics, Stanford University, CA
1981	John S. Chipman, Department of Economics, University of Minnesota, Minneapolis, MN
1982	Victor McKusick, School of Medicine, Johns Hopkins University, Baltimore, MD
1983	Michael Ellis Fisher, Baker Laboratory, Cornell University, Ithaca, NY
1984	Ernest R. Hilgard, Department of Psychology, Stanford University, CA
1985	Ira Herskowitz, Department of Biochemistry and Biophysics, University of California, Los Angeles, CA
1986	Virginia L. Trimble, Department of Physics, University of California, Irvine, CA
1987	Gardner Lindzey, Center for Advanced Study in the Behavioral Sciences, Stanford, CA

The difficulty of defining reviews does not end there. Some reviews take the form of book chapters or conference proceedings. As such, these reviews might escape the attention of scholars and researchers (although ISI's *Index to Scientific Book Contents*<sup>7</sup> and *Index to Scientific & Technical Proceedings*<sup>8</sup> are designed to prevent this). And, of course, it is commonplace for journal articles containing original research to also feature sections discussing and summarizing previous research, with explicit citations to key papers. Despite these sections, such papers are not generally considered reviews.

As we've seen, it is difficult to arrive at a single definition or description of a review, so varied are the forms that reviews may take. Equally varied are the critical and integrative functions and benefits that reviews offer. Woodward points out that reviews provide scientists and scholars with informed notification of the published literature, help them maintain current awareness of related fields, and provide a backup to other methods of literature searching. Reviews are also valuable as a means of becoming oriented in a new field and as an aid in teaching.<sup>8</sup>

In a 1981 study, Susan E. Cozzens, then a research projects manager at ISI, surveyed over 500 scientists on their uses of review literature. Cozzens found that research scientists use the review literature primarily as a device to help orient themselves to new areas. Another finding was that scientists involved in basic research reported heavier use of review literature than did those involved in applied research. Scientists who were part of collaborative groups relied less on reviews than non-group members. Cozzens

notes that members of groups, and particularly the leaders, may pass information along to their colleagues, lessening the need for all members to read reviews. The survey showed that group leaders made heavy use of review literature.<sup>9</sup>

Another study on review literature was written in 1976 by Angela Mazella and Morton Malin, also of ISI. They examined "certain important functions that [reviews] are purported to serve" in scientific literature. One of these functions is the role that reviews play in identifying emerging specialties. The authors examined 32 clusters of co-cited papers. Each of these clusters constituted a discrete specialty area that continued over a four-year span. Mazella and Malin identified all the review articles in each of the clusters and analyzed their position and movement over the four-year interval.<sup>10</sup>

The authors had expected that a new review would appear in a growing cluster whenever the cluster reached a certain size or age, at which point the review would identify, describe, and thus integrate the emerging specialty into the scientific mainstream. Although results in this study did not support the authors' expectations, subsequent studies have suggested that this is the case.<sup>11</sup> Earlier, Derek Price had estimated that after 30 or 40 papers in a subject field there is a need for a review.<sup>12</sup>

In another study, Henry Small, ISI's director of research, discusses a method of using citation analysis to generate reviews. In this method, co-citation clusters are used to develop synopses of scientific fields. Small refers to these reviews as "specialty narratives." Developing these narratives involves

statistical analyses of documents within the cluster to identify passages that cite the cluster's core publications. Using computer analysis, these passages can be assembled, combined with transitional material, and sequenced to form the specialty narrative, which becomes, as Small states, "a combination of statements by several individuals from several sources, melded together by common usage, and selected to typify that usage." Small points out this method could in principle be extended to any of the several thousand co-citation clusters currently generated in the *Science Citation Index*<sup>®</sup> or the *Social Sciences Citation Index*<sup>®</sup>, and also to higher-level clusters.<sup>13</sup>

It was in recognition of the crucial importance of reviews that ISI and Annual Reviews Inc., Palo Alto, California, joined in 1979 in sponsoring the National Academy of Sciences Award for Excellence in Scien-

tific Reviewing. The award honors Professor James Murray Luck, the founder of Annual Reviews Inc. Past recipients, selected on a rotating basis from the life, physical, and social and behavioral sciences, are listed in Table 2. In a forthcoming essay I'll be discussing the 1987 winner, Gardner Lindzey, who has been selected for his reviews in the social and behavioral sciences. In Part 2 of this essay I'll discuss further aspects of review literature, including the place of reviews in the spectrum of literature coverage.

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