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Citation Indexes for Science

Eugene Garfield's article, "Citation indexes for science" [*Science* **122**, 108 (1955)], is interesting beyond doubt. If we had in our library a citation index such as he proposes, I should use it to advantage.

Amid today's overwhelming difficulties in scientific communication, however, this index would solve too few problems to justify its surely great cost at this time.

Even though all the cited references in a given article were indexed, those ideas and key words not covered by the cited references would remain excluded, according to Garfield's system. The most valuable parts of a research paper, the author's own contributions, would thus fare no better than they do today.

In our present indexing journals, many key words are not indexed at all; a paper's title—and even its summary—often can display only a few of the author's ideas. Excellent thoughts, particularly concerning technique, may lie buried deep within an article, lost to the index-reading "public." It is precisely the inventive, busy author who will neglect to publish a significant idea in the form of a separate paper. A citation index, much as it may be worthwhile, would fail to catch and broadcast such an idea.

My suggestion in regard to literature indexing would be to continue and greatly expand the sort of skilled, discriminating indexing that is found in the Armed Forces Medical Library's *Current List of Medical Literature* and in *Chemical Abstracts,* publications that are excellent despite their limited budgets.

The status of the Armed Forces Medical Library should be changed to that of an independent Federal Medical Information Bureau. *Chemical Abstracts* and similar publications should be supported *in part* by the government. Congress should appropriate a truly adequate sum of money to provide these organizations with highly trained indexing personnel (minimal education: M.S. degree).

An impractical dream? All right; but this sort of action, which would conform to the Hoover Commission's recommendation for greater support of basic medical research (*Philadelphia Inquirer,* 1 July 1955) is just what is needed to begin the attack on our massive problem of scientific communication.

Other subsequent efforts in this direction would include the formation of an International Scientific Journal Union (to supervise prompt publication) and the development of departmentalized scientific newspapers as reported by J. A. Behnke [*Science* **120**, 1055 (1954)].

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If the cost of preparing a citation index were comparable to the cost of conventional indexes, this cost would be justified by virtue of the time and money it could save in research. Fortunately, the cost of citation indexes per entry is extremely low because the bulk of the work can be performed by clerks and machines. *Shepard's Citations* adds more than 1 million citations to its cumulations each year. Even though Shepard's Citations, Inc., has a large staff of qualified attorneys, their published volumes are not exorbitantly priced. As Schoenbach surely knows, the subscription rates for such indexes as the *Bibliography of Agriculture* and the *Current List of Medical Literature* do not reflect their true publication costs. And the government does, in fact, do what Schoenbach wishes it did—support such activities *in part*. If any additional support is forthcoming, it should be from industry and other nongovernmental index users.

Schoenbach implies that a citation index for science is meant as a substitute for the conventional subject indexes rather than an adjunct. This is by no means true. The lawyer may use a digest—that is, a conventional index—as his starting point. Having located an array of references pertinent to his search, he then goes to *Shepard's Citations* for all subsequent citations to the cases in point.

Schoenbach also implies that the *Current List* and *Chemical Abstracts* do keyword indexing—that is, indexing based on titles. This is also incorrect. Each of these publications indexes articles in great depth. However, the number of indexing entries applied has an economic as well as an *intellectual limit*. In a paper I recently presented before the American Chemical Society, "Breaking the subject-index barrier—A citation index for chemical patents," I discussed this all-important "barrier"—the inability of the indexer, no matter how conscientious, to catch the total import of an author's remarks. Furthermore, the author himself is not always aware of the implications of his own discoveries. It is precisely because, as Schoenbach states, "Excellent thoughts, particularly concerning technique, may lie buried deep within an article, lost to the index-reading 'public' " that a citation index is needed. When the use and construction of the citation index is properly understood, then it will become apparent that it can help to "broadcast" these otherwise buried ideas.

When Schoenbach criticizes the limitations of the proposed citation index, he really criticizes present citation practices. There are numerous instances when an author could provide a citation that would establish the necessary association between his new contribution and what has gone before. If it is completely new and unrelated to anything previously published, then the idea will in most cases be caught by the indexer. If neither the author nor the indexer is aware of its significance, some other author will bring it out through a subsequent citation. Through the citation index, one could then use the antecedent article as a new starting point.

I would wholeheartedly support any move to expand the services of the *Current List* through increased financial support from the government or any other interested parties. Hopefully, its expanded services could include a citation index. Since the conventional subject index and the citation index complement each other in a synergistic fashion, this would, I think, be a great stride forward for science. However, this important problem is in no way related to the merits of the citation index and should receive a more thorough treatment in the pages of *Science* and elsewhere.

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