""""""current comments"

Is Citation Frequency a Valid Criterion for Selecting Journals?

April 5, 1972

Since 1964, journal coverage for the Science Citation Index® has grown from about 600 journals to about 2400 journals. The SCI® unquestionably now includes the world's most important scientific and technical journals. The SCI is published quarterly and cumulated annually and quinquennially. However, the data base from which SCI is derived is maintained in its entirety on magnetic tape, and updated weekly. At the end of 1971, this data base contained more than 27 million citations to about 10 million different published items. These reference citations appeared over the past decade in in the footnotes and bibliographies of more than 2 million source journal articles.

The SCI data base is the source of ISI®'s Journal Citation Index (JCI), to which I have alluded previously. 1.2.3.4 The JCI has many important potential uses including the difficult problem of selecting journals.

Before we developed the JCI, journal selection was of necessity highly subjective for most disciplines. The JCI has given us some quite objective criteria to use in journal evaluation and selection. One of them is absolute citation frequency—the number of times a particular journal candidate has been cited by all the other journals already covered by our SCI system.

So far, we have ranked by absolute citation frequency about 12,000 "journals" and other publications. As these analyses proceed we are convinced that Current Contents services, as well as SCI itself, do indeed cover the most "important" and "significant" scientific and technical journals. For example, of the 1000 or so journals found to be most heavily cited in 1969 only about 40 had not been covered, and those 40 were added early in 1972.

However, absolute citation frequency is not sufficient for the task of journal selection except perhaps to establish "core" journal collections. One must consider other important factors, particularly in the case of newer journals. To be ranked among the 1000 most-cited journals, a journal must be cited about 350 times a year. A monthly journal that publishes about 10 articles per issue would produce 120 articles a year. We also know that an almost immutable "constant" citation rate will obtain and that the average article in SCI is cited about 1.67 times a year.5 A monthly journal of this size should have had its 1967 and 1968 output cited about 400 times in 1969, if all of its articles were cited, or about 300 times if some articles were not cited. But, as frequently happens with new journals in newly burgeoning fields, many citations

are "self-citations". If the self-citation rate, with some justification, exceeds a typical 20%, citations in our data base will fail to reach a figure within the 1000 most-highly cited group. Putting aside self-citation a journal may simply publish too few articles to reach the "critical mass" necessary to get it on the 1000 most-cited list.

No journal, however infrequently cited, is likely to escape the SCI citation network for long, but as we've seen, absolute citation frequency doesn't tell the whole story. That's why we've developed the "impact factor", that is, the number of times cited in relation to the number of articles published. This "impact factor" discounts the advantage that larger, established journals have in absolute citation counts. For example, Accounts of Chemical Research published less than 1% of the articles published by Journal of the American Chemical Society, but those few review articles were cited 5 times as often as the average IACS article. That tells us that the journal may be quite important, even though it isn't on the most-cited

Unfortunately, gathering and unifying the citation data for smaller journals becomes an increasingly more expensive and tedious process because there are so many to consider. As each new cited journal is identified we must count the number of articles it has published in 1967 and 1968 if we are to use 1969 as a basis for computing its impact factor in comparison with other journals. Obviously the base time-period will change in the future. While there are occasionally some major surprises in this game, most of the journals we don't cover fall into the average or low-impact group. It then becomes a very subjective matter as to which journals should be given priority. What is one to do about such journals? By contrast, what is one to do about journals already covered that have no better and perhaps worse ratings than the new candidates? Users are distressed by discontinuities in coverage. But such "sentimentalities" tend to prevent the process of "natural selection". Carried to absurdity one would find that preference is being given to uncited material that is in the system while the new but more heavily cited material remains outside the system. For the time being the only choice is growth in coverage, unless economic decisions require the inevitable and probably wiser decision to let the chips fall where they may.

- 1. Garfield, E. A basic journal collection; ISI & lists the fifty most-cited scientific and technical journals. Current Contents, No. 2, p. 3-5, January 12, 1972.
- 3. Current Contents, No. 6, p. 5-6, February 9, 1972.
- 4. Citations-to divided by items-published gives journal impact factor; ISI lists the top fifty high-impact journals in science. Current Contents, No. 8, p. 6-9, February 23, 1972.
- 5. Institute for Scientific Information, Inc. Science Citation Index ® 1970 Guide and Journal Lists. (Philadelphia: ISI, 1971), p. 13-14.