

The Citation Maze: A Beginner's Guide

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The variety of ways in which citations can be used in libraries is broad, sometimes confusing, and often poorly understood. Citation studies can, however, be classified into four general types: (1) Bibliometric studies conducted to determine which journals in a given field are the most important to scholars in that field, (2) Citation counting in order to assess an author's eminence, scholarly or otherwise, (3) Studies designed to describe or map the literature of a particular subject, and (4) The use of citations as a direct means of collection evaluation.

When librarians talk among themselves about citation analysis, the conversation is likely to drift into confusion and incomprehension. This is, at least in part, because citation analysis assumes a wide, often bewildering, variety of forms, and is used for a broad range of purposes.

Citation analysis is distinguished by its extreme variability and flexibility: "There is no standard procedure for using citation analysis, and no standard protocol for interpreting the results" (Smith 1988, 220). Rather, since each study is carried out for a specific and often unique purpose, the basic methodology is subject to constant re-adaptation, depending on the project at hand.

FOUR TYPES OF CITATION STUDY

Nevertheless, it is possible to divide citation studies into four general types. They are:

1. *Bibliometric studies conducted to determine which journals in a given field are*

the most important to scholars in that field (Faigel 1985; Hall 1985).

This form of citation analysis may be useful in establishing which journals are the most reputable in their fields, and may therefore assist in collection development. Citation-counting exercises are carried out in order to produce ranked lists which can be useful in extending, reducing, or otherwise rationalizing a library's periodical subscription (Broadus 1985; Fitzgibbons 1980; Pan 1978; Swigger and Wilkes 1991; Voos 1981; Wiberley 1982).

The underlying principle is known as Bradford's law of scattering, which "postulates that a small core of journals will publish the great majority of articles in a discipline and the remainder will be scattered in a large number of journals" (Hall 1985, 55). Traditionally, "Monographs have received less attention than serials because of the low frequencies of citations in the sciences where most of the the studies were conducted" (Fitzgibbons 1980, 294).

Bibliometric studies have not met with

universal approval. Dissenters include Line (1978, 313), who argues that "no measure of journal use other than one derived from a local-use study is of significant practical value to libraries," and Scales (1976) who believes that, because of discrepancies between citation rankings and frequency of actual use, the method cannot be considered reliable. Smith (1988) argues that the method is intrinsically flawed, and too subject to error to be useful.

2. *Citation counting in order to assess an author's eminence, scholarly or otherwise.*

As institutions of higher learning strive to improve academic accountability, to balance budgets, and to allocate funds in often fiercely competitive environments, analyzing citations of publications by staff members is increasingly seen as a way to measure the value of staff research and hence of assessing the relative merit of individuals within the institution. Ban Seng and Willett (1995) report on a citation analysis project comparing citations per academic staff member with ratings received in an official research assessment exercise. They also found that citation-conscious researchers are likely to attract more citations in certain kinds of publications.

Assessments of the validity of this activity vary considerably. Garfield (1970) has suggested that citations can reliably be used in allocating "prizes, grants, fellowships and other forms of recognition," and even in predicting Nobel prize winners. Elsewhere, however, (1963) he acknowledges that overestimating their significance can lead to the undeserved prominence of individuals such as the discredited Russian biologist Lysenko. Comfort (1970) points out that reliance on citation counts could elevate the late Chairman Mao to the position of top scientist, while consigning Jesus Christ to obscurity.

Similarly, others discount the value of citation counting as a measure of the merit of institutions or groups of researchers (Carey, Solomon, and Wilson 1995). The method is suspect because original arti-

cles may be eclipsed by new articles, because even articles by eminent scholars may contain errors, because unimportant articles in currently fashionable research areas may be heavily cited, and because groundbreaking articles may not receive attention for several years. Kelland and Young (1994) point out that not all citations are of equal value, because of their wide variety of functions: citation may be done for purposes of criticism or refutation, and perfunctory or misleading citation, or excessive self-citation, may distort findings.

3. *Citation studies whose purpose is to describe the literature of a particular subject, usually to provide insights into the nature of scholarly communication.*

In such studies, variables such as format, age, language, and subject spread may be analyzed. Examples include: Attwood's (1991) study of citations in New Zealand Libraries, conducted in order to examine influences on New Zealand library researchers who publish; Heinzkill's (1980) examination of the characteristics of references in journals devoted to English literature; and Popovich's (1978) description of a business management collection.

Nisonger (1983) enhanced the usefulness of this kind of study by further analyzing his samples in terms of language, format, date, and subject area. Although this technique has implications for collection development, it is less likely to be useful in evaluating or comparing library collections.

4. *The use of citations as a direct means of collection evaluation.*

Citations are gathered, and checked against library holdings to determine the extent to which "the work could have been written with the resources available at that library" (Hall 1985, 56). Studies of this kind, sometimes referred to as citation-reference studies (Mosher 1984) fall into two main sub-groups:

1. Citations are gathered from works produced outside the institution conducting the study. Bland (1980) suggests compiling lists from the cita-

tions of standard college textbooks. The method was tested by Stelk and Lancaster (1990, 193), who found that "sources cited in texts required in undergraduate courses can indeed be a useful component in the valuation of the holdings of an undergraduate library." Gallagher (1981, 37) used the citations in a classic ophthalmology textbook to determine the extent to which it "could have been written using the library's collection as the primary literature source," and expressed satisfaction with the validity of the results. Nisonger (1983) tested two specific techniques—which differed in the ways the citations were selected from source journals—in evaluating a political science collection, and concluded (p. 174) that both techniques employed "reliable and valid evaluation methods." Since postgraduate materials were involved, he doubted the effectiveness of this particular approach "for evaluating a collection's ability to support teaching at the undergraduate level."

In a further development of this method, Lopez (1983), using titles from *Choice* as a starting point, developed a five-level process in which cited items were themselves used as sources of citations, and a complex scoring system was employed. This refinement fosters the inclusion of older and newer library materials, and to some extent replicates the experience of actual researchers.

This method amounts to a sophisticated version of the time-honored list-checking method of library evaluation. In this case the citation gathering becomes an alternative method for constructing the list (Bonn 1974; Gleason and Deffenbaugh 1994; Hall 1985). Unlike evaluation from standard lists, however, it is "based on the principle that the actual use of the material is indicative of its relevance to current research." (Nisonger 1983, 164). Another likely important difference between this refined method and a method using standard lists is

that materials from subject fields other than the one under direct investigation have a greater chance of being represented. Where cross-disciplinary holdings are considered relevant, this may prove an effective means of list compilation (Nisonger 1983). Gleason and Deffenbaugh (1994) found that only 52.2% of the titles they investigated were classified at the relevant Library of Congress classifications.

2. In a further refinement of this method, the citations are taken from published or unpublished works produced within the institution, thereby providing a more accurate reflection of the library's ability to meet local need.

As Line (1978, 313) points out, "What is core to one library is marginal to another." Buzzard and New (1983) took their citations from local dissertations. As source material, Lewis (1988) used books, chapters in books, papers in conference proceedings, and journal articles written by academic staff at his university, as well as Ph.D. theses produced there. Dykeman (1994) investigated the ability of the Georgia Institute of Technology to meet the information needs of its scientists by extracting faculty citations from the INSPEC database.

A particular advantage of this method is that it is both collection centered and client centered, since local needs are accounted for as fully as possible. Also, locally published items are represented; this is important in smaller countries such as New Zealand where libraries must offer the best international materials but also must not neglect the publications of their own country. The method also enables monograph and periodical titles to be surveyed in the proportions in which they are actually used.

The method's main disadvantage is that its results may be skewed by the understandable human preference for the locally available item over the possibly more desirable but less ac-

cessible one: Buzzard and New (1983, 470) noted the possibility "that there may have been a tendency to cite works that were accessible and to omit those that were not." It seems likely that this factor influenced, to some extent, Okomo's (1991) finding that 73% of journal citations from published work generated by science researchers at the University of Benin were available at the University of Benin Library.

CONCLUSION

Citation analysis is a valuable and adaptable tool which can be used, either alone or in conjunction with other tools, to produce answers to a wide variety of library questions. Citations can provide a measuring-stick for elements otherwise very difficult to measure or describe. Citation analysis does not consist of a single method or formula, and whenever it is applied care must be exercised both in understanding the nature of the problem at hand, and in devising methods specifically tailored to its solution.

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