How Can We Investigate Citation Behavior? A Study of Reasons for Citing Literature in Communication

Donald O. Case* and Georgeann M. Higgins
School of Library and Information Science, College of Communications and Information Studies, 502 King Library South, University of Kentucky, Lexington, KY 40506-0039. E-mail: dcase@ukcc.uky.edu

Authors' motivations for citing documents are addressed through a literature review and an empirical study. Replicating an investigation in psychology, the works of two highly-cited authors in the discipline of communication were identified, and all of the authors who cited them during the period 1995–1997 were surveyed. The instrument posed 32 questions about why a certain document was cited, plus questions about the citer's relationship to the cited author and document. Most findings were similar to the psychology study, including a tendency to cite "concept markers" representing a genre of work. Authors in communication were more likely to have an interpersonal connection to cited authors, and to cite literature reviews—their most common reason for citation. Three types of judgments about cited works were found to best predict citation: (1) that the work was novel, well-known, and a concept-marker; (2) that citing it might promote the authority of one's own work; and (3) that the work deserved criticism. Suggestions are made for further research, especially regarding the anomalous role of creativity in cited works.

Introduction

Why do authors cite one another? Although various forms of citation analysis have been employed to study scholarly productivity (e.g., Garfield, 1979), communication in science (e.g., Gilbert, 1977), the history of ideas (e.g., Zuckerman, 1987), and the structure of a discipline's literature (e.g., Small & Griffith, 1974), until recently, there were few empirical studies that investigated authors' motivations for citing the works of other authors.

The issue of why one author cites another has been widely discussed among sociologists of science for at least four decades. Merton (1957), for example, wrote about citation as driven by hypothesized "norms of science"; acknowledgment of credit for new ideas, via citations to earlier works, advances the norm that Merton called "communism." Under the communal system of science, investigators credit the original work of others, even though this creates some tension for individual scientists by working against their self-interest in achieving recognition themselves, and thus can lead to social conflict. Merton's (1968) later observations on citations as a part of the reward system of science certainly apply; citations are a form of social recognition, even when critical in nature.

Some scholars argue that the decision to cite another document is guided more by self-interest (Leopold, 1973) or idiosyncrasies (Kaplan, 1965) than norms to which authors adhere. The *persuasive* nature of citations has been discussed by several scientists, who point out that citers are, in effect, appealing both to supportive evidence and to recognized authorities in order to convince the reader of his or her claim to knowledge. Gilbert, a British sociologist, has been particularly associated with this point of view, writing that the discovery of important results is only part of the battle; to defend a new claim to knowledge, one must also convince one's audience of its importance.

Merton also acknowledged the persuasional nature of citations; in particular, he suggested that scientists were more likely to cite the work of already-famous authors than they were to cite the equivalent writings of less-known investigators. The physicist Ziman (1968), as well, claimed that citations are sometimes self-consciously used to support a scientist's research agenda and/or findings.[1]

Yet how can we study such an internal phenomenon as an author's decision to cite another document? Cronin (1984) points out that we lack both adequate theories and evidence of citing behavior. After reviewing accumulated

* To whom all correspondence should be addressed.

Received August 16, 1999; revised October 12, 1999; accepted October 12, 1999.

[1] These and other writers on the persuasional nature of citation are reviewed by McInnis and Symes (1988).

findings regarding citation, Cronin (1984, p. 22) concludes that:

> "In the absence of explicit and universally recognised consistencies in individuals' citation practices, it is difficult to see how citation can be defined as a norm-regulated activity."

Zuckerman (1987) agrees with Cronin that a theory of citation is badly needed. More recently, Leydesdorff (1998) has advanced the notion that any such theory must be different at the micro-level (i.e., for the individual author and text) than at the aggregate level (i.e., applying to social networks of authors and their systems of concept symbols).

Investigating the motivations for citations does indeed pose epistemological and methodological problems. What can we assume about the nature of bibliographic citations? Do they express simply a relationship between two documents and the ideas they contain? Or might authors have other, perhaps more personal, motivations for citing the work of another author? Are all citations of equal value? Martyn (1964) and Voos and Dagaev (1976) point out that citing a seminal discovery or a methodological breakthrough certainly is more important than citing other investigators who have pursued the same topic. And yet, most citation analyses do not recognize the varied purposes of citations, treating them all as functionally equivalent.

Cronin (1984, p. 57) argues that "the process is not amenable to scrutiny . . . attempts to expose personal motivations are likely to founder, for the simple reason that it is the results, not the process leading up to citation selection, which authors are likely to recall if questioned directly on their practices." Chubin and Moitra (1975, p. 426) voice concerns similar to Cronin's regarding an appropriate methodological approach to the study of citation behavior, even while advocating interviews with authors:

> A phenomenological approach would focus on the *private* process by which authors choose references. . . . Is there a design for learning about such a process? Direct questioning of authors about why they referenced who they did, and in what fashion, may be a beginning. Both the candour and recall of authors may be lacking, however, rendering such data impressionistic, selective and self-serving.

While asking the authors introduces problems of both *recall* (will they remember their reasons, fully and accurately?) and the *social desirability* of answers (will they answer honestly, without regard for the feelings of their colleagues and their own self-interest?), one must start *somewhere* if we are to achieve a better understanding of citation behavior; to simply say that "it cannot be studied" would be to abandon the topic to mystification. If the motivations of authors are to be understood, then asking authors directly about their motivations—despite the methodological pitfalls of self-reporting—is a logical place to approach the issue of citer motivation.

Following a review of research about why one author cites another, this paper reports on recent studies of motivations for citation through the use of self-administered survey instruments. Results of a landmark study of psychologists' citing behavior are compared to a similar study of authors in the discipline of communication. The Discussion section highlights the strengths and weaknesses of this approach and other approaches to studying citer motivations, and explores complementary strategies for research on the topic.

Reasons for Citation: Commentaries and Investigations

It is obvious that writers cite documents that are "relevant" to their topic, which provide useful background for their research, and which may acknowledge intellectual debts—what we might call a *normative* style of citation. It also seems apparent that authors prefer to cite documents that are supportive of what they write, preferably by noted experts—a *persuasional* citation strategy. However, within these general strategies or styles of citation, *specific* reasons for citing a particular document at a particular time seem to vary widely, according to both anecdotal and systematic evidence.

Garfield (1965), founder of the Institute for Scientific Information (ISI), which produces the citation indices used in this study, provided one of the earliest and most-referenced commentary on the motivation of citers. Garfield identified, apparently through observation and anecdote, 15 reasons why authors cite another document. These reasons are: paying homage to pioneers; giving credit for related work; identifying methods, equipment, etc.; providing background reading; correcting one's own work; correcting the work of others; criticizing previous work; substantiating claims; alerting researchers to forthcoming work; providing leads to poorly disseminated or uncited work; authenticating data and classes of fact (e.g., constants); identifying original publications in which an idea was discussed; identifying the original publication describing an eponymic concept or term, such as "Pareto's Law"; disclaiming the work or ideas of others (negative claims); or disputing priority claims of others (negative homage).

At about the same time Lipetz (1965), while attempting to develop relational indicators to be used in indexing documents, characterized what might be considered 28 different reasons for citing another document. A later, but highly similar, project by Duncan et al. (1981) came up with 26 relations between cited and citing documents: paying homage; background reading; historical; bibliographical leads; narrative; definition; clarification; illustration; example; experimental detail; theory; data; methodology; description; current concerns; development of ideas; disputing; criticism; corroboration; disclaiming; substantiation;

similar research; contradictory research; further detail; same paper; statistics.

Cronin (1984), describes other classifications of citation types, based on both empirical investigation and conjecture. These include Hodges (1978; ten types), Frost (1979; eight classes) and Finnery (1979; seven types). By and large these typologies duplicate the reasons listed, although Frost's, which dealt with humanists rather than scientists, is somewhat distinctive.

Several investigations have analyzed the *content* or *context* of citations to identify as few as two, or as many as eight, broad categories of citation. Moravcsik and Murugesan (1975) developed a four-part classification of both quality and context of citations, incorporating a contrast between essential ("organic") and nonessential ("perfunctory") citations. Moravcsik and Murugesan suspected that the indifferent nature of many citations had been underestimated in most typologies of citation meanings. Analyzing the content of a large sample of citing documents in physics, they found that 41% of the citations fell into the "perfunctory" category and that 14% were "negational" (i.e., containing negative claims or negative homage) in character. A corresponding content analysis by Chubin and Moitra (1975) examining citing documents physics and using a modified typology found a 20% incidence of perfunctory citations in the physics literature, and only a 5% incidence of negative claims/homage (these findings and their methodological problems are discussed further below).

Oppenheim and Renn (1978) examined a sample of documents citing older works in physics. Starting with the classification scheme of Chubin and Moitra (1975), they elaborated the following seven reasons for citations: to provide historical background; to describe other relevant work; to supply information or data (other than for purposes of comparison); to supply information or data for comparison; to identify theoretical equations used; to identify methodologies used; and, to point out a theory or methodology that is either not applicable or not the best choice. Oppenheim and Renn documented that only 40% of these citations to very old documents were for the purpose of providing historical background, and therefore 60% were for more substantive reasons; they found that less than 2% were "partially negational" citations to these highly-cited documents.

More recently, Cano (1989) adapted the Moravcik and Murugesan model to examine eight types of citations by their location within 42 articles, having the authors judge the type of citation. Among other findings, the authors indicated that the most numerous type of citations (26%) were perfunctory whereas only 2% were negational; over a third of citations in the introductory sections were perfunctory.

As Shadish et al. (1995) point out, typologies such as the above tend to impose reasons for citation that may not have been in the author's mind at the time of citation. Some studies have consulted the citers themselves regarding specific citations. These survey approaches are reviewed below.

Surveys of Citers Regarding their Motivations

Only a few investigators have attempted to survey authors on this question, and most investigations have used small samples. In a 1983 survey of 19 authors in business administration, Prabha (1983) asked whether their citations in specific articles were "essential" or not; she found that authors considered less than a third of their citations to be "essential."

Prabha's sample also sheds light on a side issue regarding citation. On average, authors claimed to have read 96% of the material they cited, in contrast to the results of an unobtrusive study by Broadus (1983) of 180 papers, in which he found that 23% of citations to a particular work copied an erroneous title from another document that cited it; this finding suggests that the citing authors did not consult the original work but relied on a flawed source to obtain the citation. Broadus concludes that even if only a small percentage of authors lift citations from other works without examining the original work, such a practice nevertheless constitutes a general problem for citation analysis.

Brooks (1985) was apparently the first to conduct a systematic study asking authors directly to state their particular motivations for specific citations. Brooks reviewed various models of citation behavior and extracted from them seven common reasons for citing another author. He then surveyed 26 authors and asked their motivations for citing particular items in articles they had recently published. Brooks found "persuasiveness"—the use of a citation to establish a knowledge claim (following Gilbert, 1977)—to be the most frequently-referenced motivation. The use of citations to correct or dispute another author's claim ("negative credit") or to refer to a "social consensus" of opinion on an issue, were used rarely among his sample of authors. However, he also noted that motivations are varied, and seem to differ among disciplines.

A more recent empirical study, intended to explore reasons for self-citation, was conducted by Snyder and Bonzi (1989). They surveyed 13 faculty and staff in environmental science and forestry with a checklist of 12 possible reasons for citation, two of which ("political pressure" and "raise citation count") found no support at all among respondents. In order of frequency, the remaining ten reasons given for specific citations were to: identify related work; earlier work on which this builds; substantiate claims; establish writer's authority; demonstrate knowledge of important work; best work on the subject; no other sources of data; critically analyze earlier work; choice among equally valid sources; and ease of access. The study concluded that there were few differences in reasons given for citing oneself vs. citing another author.

Only recently has a large-scale survey of motives for citation appeared. A group of psychologists, Shadish et al. (1995) conducted two surveys, which serially sampled several hundred citations from psychology journals and surveyed authors about their reasons for citing. Shadish et al.

preferred not to use Brooks' approach as it imposed "externally constructed measures of various meanings" (p. 497); instead, they used sessions with authors, in addition to reasons culled from earlier studies of citation practices and the commentaries of sociologists of science, to develop an initial roster of 28 items reflecting motivations for citation. They conducted two studies of the type reported by this author, the first with 192 responses and the second (with additional roster items) receiving 118 responses.

Shadish et al. found many variations on citer motivation, with the general conclusion that highly-cited articles are more likely to be thought of as exemplars: the "author was a recognized authority; and that the work was thought to be a classic, early reference that represented a genre of studies, that generated novel research and that resisted falsification" (p. 492). Specific findings are reported below, along with corresponding results from the present investigation.

Shadish et al. also found several limitations to their work, some of which cannot be fully addressed by a change in methodology, and some that could. In particular, they identify a topic for further research when they say (1995, p. 495):

> the analysis in this study may misleadingly suggest that all authors cite the same study for the same reasons. This could be examined by locating a highly-cited work and then asking different authors about why they have cited it.

A Study of Reasons for Citation

The present investigation partially replicates, in the discipline of communication, the Shadish et al. measures with the intention of answering both the question they pose above (for what specific reasons was a particular highly-cited work cited?) and a corresponding question (do highly-cited authors differ from Shadish's sample of authors in the specific reasons given for citing their works?). Unlike Shadish et al., who employed a random sample of citations from a purposive sample of journals, this investigation identified two "highly-cited" authors and surveyed the researchers who cited their publications about why they did so. This design allowed for the comparison of reasons for citations across the following pairings:

- Cites to the most highly-cited documents by the two authors, vs. cites to their less-cited works; while restricted to a sample of two authors, this approach *does* have the advantage of holding authorship constant—lest perception of the *authors'* personal traits color the respondents' judgments of their *works.*
- Cites to two highly-cited authors, vs. cites to all authors in the Shadish study; this constitutes a comparison of the two different disciplines, although with a bias toward highly-cited authors in the communication sample.
- Cites to one author, vs. the other author, to see if differences exist in the evaluations of their works by citers.

Methodology

Highly-cited authors were first identified, based on two recent studies of such authors in communication. So (1995, 1997) analyzed 1319 papers presented at the Annual Conference of the International Communication Association (ICA) over a 3-year period (1985–1987). Those papers contained 44,877 citations among which So created ranked lists of the most highly-cited papers among ICA presenters as a whole, and among its 13 divisions and special interest groups. So also conducted a survey of 234 scholars and administrators in the discipline asking them to identify the top scholars in each of the 13 specialities; the results of those rankings closely parallel the citation rankings.

Funkhouser (1996) used the more common method of studying citations in journal articles. He chose 27 journals in communication, based on the advice of a panel of communication researchers; data for 13 of the journals came from the *Citation Index for the Social Sciences* (*SSCI*) and the *Arts and Humanities Citation Index* (*AHCI*), whereas the rest were coded manually. A total of 7640 citations were examined to produce a ranked list of the 50 most-cited authors in communication.

There is substantial agreement between the So and Funkhouser lists regarding the top 14 authors: seven of these are the same individuals, and both lists rank the same author as the top, most-cited individual.[2]

The So and Funkhouser rankings were compared and the two most highly-ranked authors common to both lists were chosen for the present study: Dr. A, a female, ranked seventh on the Funkhouser list and eleventh among the So rankings, while Dr. B, an older male, ranked first on both lists. In terms of ICA divisions, both authors were cited most often by scholars of instructional/developmental communication, followed by interpersonal communication (the ninth- and third-largest divisions, respectively); Dr. B's work also ranked highly in the organizational and health

[2] Why don't the two lists agree exactly? There are three obvious methodological differences. First, So deals with conference papers whereas Funkhouser considers journal publications. Although these are complementary approaches to identifying highly-cited documents, they lead to different results; conference papers are typically refereed less strenuously, and therefore may include a broader (and probably younger) base of authors, who in turn may cite somewhat different literatures than the more "exclusive" authors in refereed journals. A second, corollary, issue is the conference chosen by So for sampling papers, ICA; with over 3400 members in 13 divisions, ICA is the most comprehensive of several scholarly associations in communication, but it emphasizes somewhat different research than the National (formerly Speech) Communication Association, which is over twice as large; therefore, which authors are cited in ICA papers may be skewed by their chosen research orientation. A third, but less significant, difference is that the two studies were conducted using different years of presentation or publication. Although the difference in coverage between these two studies is 3–6 years (1985–87 vs. 1990), there is ample reason to consider them comparable; the productivity and fame of academic authors do not rise and fall so quickly. In addition, the usual tendency for conference papers to precede articles by a year or more lessens the gap in time coverage.

communication divisions (the second- and eighth-largest divisions).

Whereas Dr. B could have been the sole focus of the study, the addition of Dr. A (the author with the next-highest level of agreement between the two lists) created the potential for comparison by gender—although no statistically significant differences were found among either the citation patterns or return rates of those surveyed: both A and B were cited by male and female authors in similar proportions, and males and females who cited them returned the survey at comparable rates, whatever the gender of the author they cited.

The publications of these authors were identified via searches of the *Social Science Citation Index* and the *Arts and Humanities Citation Index.* The samples used were all citations (excluding self-citations) made to the work of A and B during the years of 1995 and 1996; however, authors who cited the work of either scholar more than once received only one questionnaire, sampling their citation to the most recent work published. A total of 133 unique citers were thus identified.

A survey instrument was prepared, using a comprehensive list of 32 items taken from the Shadish et al. studies of citation practices; the survey also included their 11 "proximity" questions about the relationship between the citer and the author and document they cite (e.g., "would you consider the author a personal friend?" and "have you read this reference?"). The main 32 items consist of a series of Likert scales, such as the example below, reflecting reasons for citing another author's work:

This is a classic reference in the field.

Agree 1 2 3 4 5 Disagree

Mail questionnaires were sent out in February 1998, with a second (reminder) copy mailed 7 weeks later. Of the 133 surveys mailed, 20 were returned with an indication of a wrong address, or that the author's location was no longer known. Of the remaining 113 questionnaires, 56 were eventually returned in a complete form, for a response rate of 50%; in two cases, responses to particular questions are missing, resulting in some analyses with a reduced N of 54.

The response rate in the present investigation is considerably lower than that garnered in the Shadish et al. studies (64% and 68%), raising the issue of unknown nonresponse biases. The most likely explanation for the low response rate is the lengthy and redundant nature of the questionnaire; it is also likely that there were additional faulty addresses among the initial mailings that were not returned. Other problems and solutions to the response rate problem are discussed below under "Methodological Limitations."

Of the 56 returns, 31 cited the work of Dr. A, whereas 25 cited documents by Dr. B. Tests of equality for means and variances of responses to the 32 reasons for citation showed that works of the two authors did not differ significantly (at $p = 0.01$) on any of these. Overall, then, it appears that the two authors were regarded as very similar in terms of the quality and characteristics of their publications.

Results

Insofar as the results of this study can be compared with those of Shadish et al. (who conducted two studies with different instruments and samples), they are expressed in Tables 1, 2, and 3.

Reasons for Citation

Table 1 reflects the presence of several "other" responses (i.e., reasons given in the respondent's own words) listed as "most important" in the citation decisions. In nearly all cases, these were more specific examples of one of the questionnaire items. The most common examples were "it included an instrument I used," and "it provided the dependent variable measures"; in such cases, the answer was recoded to the more general "source of a method or design feature." Other than an increase in the relative importance of methodology in making citations, the ranking of most important items did not change due to the recoding. As in the Shadish et al. second study, no other distinctive reasons for citing a document were uncovered in the open-ended responses, suggesting that the Shadish et al. instrument was fairly exhaustive of major reasons for citation.

As indicated in Table 1, the highest-ranked item in this study was "this reference reviews prior work in this area," with 24% of all respondents choosing this item as being "most important" in their decision to cite another document; it accounted for a third of the "most important" rankings among those respondents who made reference to the most highly-cited works. Close behind it in popularity (and the third-highest factor in the Shadish study) was "this reference is a 'concept marker' "; 20% of all respondents found that item to be most important, somewhat more so than in the Shadish study. It was also slightly more important to those who had cited the highly-cited documents.[3] "This reference documents the source of a method or design feature" was chosen by 11% of all respondents (and 16% in the earlier study).

After those three items, responses drop sharply: "this reference helps establish the legitimacy of the topic of your article" was chosen by 18% of those referencing the highly-cited documents and 4% of those who cited the less-cited documents (the latter just the same as in the Shadish et al. study). "This reference is authored by a recognized authority in the field," was a choice of none of those who cited the less popular documents (similar to the 1% who chose this

[3] This finding is notable because it supports the hypothesis of Small (1978) that a study may stand for an important concept, and thus represent a genre of studies.

TABLE 1. Most highly-ranked reasons for citing another document.*

Item reflecting the reason for the citation	The present investigation			
	Less cited documents (N = 28)	Highly cited documents (N = 27)	All documents (N = 56)	First Shadish study (N = 192)
This reference reviews prior work in this area.	14	33	24	3
This reference is a "concept marker"—it represents a genre of studies, or a particular concept in the field.	18	22	20	16
This reference documents the source of a method or design feature.	11	11	11	16
This reference helps establish the legitimacy of the topic of your article.	18	4	11	4
This reference is authored by a recognized authority in the field.	0	11	5	1
This reference supports an assertion in the sentence in which it occurred (not used in present study).	—	—	—	18

* Percentage of respondents listing item as "most important."

item in the Shadish et al. study), but was chosen by 11% of those who referenced the highly-cited documents.

Twelve items were chosen by only one or two respondents each, and indeed 13 items were not considered to be "most important" by any respondent (Shadish et al. had only four items judged to be unimportant in their first study, probably due to a larger—and more variable—sample). The mean of the Likert scale rating for each item also indicates which items were most extreme in their response patterns, suggesting that respondents found them meaningful in making judgments about documents. On average, respondents were most likely to *agree* with the statement "This reference is authored by a recognized authority in the field." The three items that respondents were (equally) likely to *disagree* with were "this reference has deficiencies that contrast to the strengths of your article," "this reference illustrates a perspective or finding that contradicts a perspective or finding in your article," and "this reference is now methodologically outmoded."

As in the Shadish et al. study, this investigation found very few "negational" types of citation: only 5% of the "most important" reasons for citations in this sample, and 9% in the Shadish et al. investigation, were at least partially negative; at least five of the survey items in the current study indicated criticism of the document cited. These results are not far off from the 4% "partially negational" rate documented by Chubin and Moitra (1975) among physics articles, and Oppenheim and Renn's (1978) 2% "partially negational" rate among older physics literature; however,

TABLE 2. Relationship of citing author to cited author and document (N = 56).

Questions about relationship to cited author and document	Percentage of respondents answering "yes" to each item	
	This study	Shadish study
Have you ever spoken directly or by phone (or e-mail) with the author?	46	45
Would you consider the author a personal friend?	23	18
Is the author a colleague at your institution?	2	9
Did the author work at an institution where you were trained?	20	10
Did a journal referee/reviewer ask you to include this particular reference . . . ?	5	3
Have you ever coauthored a document with this author?	16	—
Have you ever read this reference?	98	95
If so, how many months ago? (mean)	44	29
Did this reference appear in the journal in which your article appeared?	13	17
Do you subscribe to the journal in which this reference appeared?	38	28
Do you currently possess a copy of this reference?	85	85

TABLE 3. Citation factors, highest loading items, and item loadings (items ≥ 0.5).

1. Classic citation (alpha reliability = 0.76; scale mean = 12.4, SD = 3.9). The cited work is widely regarded as a classic study that has generated much novel research. It is a "concept marker" that represents a genre of studies or a particular concept of study and strongly influenced the citer's thinking:	
a classic reference in the field.	0.80
strongly influenced your thinking on the topic of your article.	0.65
is a "concept marker"—it represents a genre of studies, or a particular concept in the field.	0.50
has generated much novel and successful research or scholarship.	0.80
2. Social reasons for citing (alpha reliability = 0.71; scale mean = 14.1, SD = 3.6). The citation shows the reader that the author is familiar with the important literature in this field, and reflects an orientation that is congruent with that of the expected audience. The cited item appeared in a prestigious publication and thus helps to establish the legitimacy of the citing author's work:	
was published in a prestigious journal or handbook in the field.	0.70
shows the reader that you are familiar with the important literature in this field.	0.85
presents an orientation that is congruent with that of the readers or reviewers for the journal in which your article appeared.	0.63
helps establish the legitimacy of the topic of your article.	0.52
3. Negative citation (alpha reliability = 0.76; scale mean = 5.4, SD = 2.3). The cited work discusses outmoded theories and methods. It is deficient in some respect(s). The cited work is not of high quality:	
is now methodologically outmoded.	0.81
is now theoretically outmoded.	0.81
has deficiencies that contrast to the strengths of your article.	0.57
4. Creative citation (alpha reliability = 0.71; scale mean = 7.9, SD = 3.0). The cited work is highly innovative and bridged a gap in the literature. It may serve as the basis for future research:	
used a method or a theoretical perspective that is currently unusual or especially innovative.	0.80
illustrates possible avenues for future research.	0.74
bridges a gap between two subfields.	0.64
5. Contrasting citation (alpha reliability = 0.46; scale mean = 4.0, SD = 2.0). The work was cited to contrast with a statement or finding in the citing work. The cited work might have been that of an editor or reviewer of the citing work (implying also that it may have been suggested for inclusion by the cited author):	
illustrates a perspective or finding that contradicts a perspective or finding in your article.	0.75
was authored by someone who might have been influential in the review process.	0.55
6. Similarity citation (alpha reliability = 0.54; scale mean = 6.9, SD = 2.8). The cited work was the source of the idea, design and/or method of the citing work and is thus similar to it:	
reports an article this is similar to your own article.	0.75
was a major source of the idea for your article.	0.66
documents the source of a method or design feature used in your study.	0.56
7. Citation to a review (alpha reliability = 0.51; scale mean = 6.2, SD = 2.0). The work is a review of the literature and restates much older views of the topic:	
is a reiteration of a position formulated many years before this reference was published.	0.82
reviews prior work in this area.	0.58

the incidence of negative citation is much lower than the 14% found by Moravcsik and Murugesan (1975).

In sum, such results suggest that "negative citation" is fairly rare. In contrast, anecdotal classification schemes of citer motives imply that criticizing a study is a fairly common reason for citation; for example, 20% of Garfield's (1965) 15 reasons for citation are negative in nature. Despite the fact that respondents in the present study did not rate negative questionnaire items as important, a strong "negative citation" factor emerged in multivariate analyses, which will be discussed later.

The present investigation did not include the most popular item in the Shadish et al. study, "This reference supports an assertion in the sentence in which it occurred," which garnered 18% of the "most important" votes in their first study. Because that item is so general and "mundane," it does not indicate exactly *how* the target document "supports an assertion"; it was among those items dropped by Shadish et al. in their second study and therefore from this study as well.[4]

The inclusion (or absence) of the item undoubtedly shifts responses to the others—a common problem in surveys (Schuman & Scott, 1987). Whether it accounts for *all* of the differences between the two studies is hard to say, but seems unlikely. One can see how "supports an assertion" would take away responses from "helps establish . . . legitimacy" (a highly intercorrelated item) as well as "reviews prior work" but it is difficult to reconcile the results for "this is a classic reference" on the same basis.

It could also be that some responses are unreliable. Given a long checklist to complete, authors were undoubtedly tempted simply to go down the list and check the central columns. This tendency was tested by duplicating one item in the roster, with a very slight change in wording (the addition of the words "I think" to the earlier item). As we would expect, the duplicate items achieved by far the highest correlation among any two items (0.77) yet were not perfectly correlated. Hence, there is some lack of consistency or care in the responses to at least some items—one of the problems noted in Cronin's discussion of methods for studying citer motivation.

Are Highly-Cited Articles Different?

Up to this point, the study has compared highly-cited authors in one discipline with a random sample of authors from another discipline. To address a central question posed in this investigation, "are highly-cited articles different from less-cited articles?," the distribution of the data was considered, the most-highly cited articles were selected for further

[4] Comparisons of the present investigation with the Shadish et al. study must be considered cautiously, as they used slightly different instruments. The instrument used in this study was an expanded version of Shadish et al.'s "Study Two"; however, the authors did not publish discrete results of that study, so the responses to "Study One" are used in Table 1.

analysis, and the means on the 32 items were compared statistically.

The time lag between the publication date of the original item and the citing item ranged from 1 to 30 years, with a mean of 12.3 years, a median of 12, and a standard deviation of 6.1 years. Given the delays in publication, in the preparation of the *Citation Index*, and in the diffusion of published articles (that must be read and "digested" before they are cited), it is not surprising that relatively few cited articles (13%) were 6 years old or less. Highly-cited articles tend to be older, as is true in this case: the eight most highly cited items were between 7 and 22 years old, with the two most-cited items being 9 and 19 years old, respectively. However, it is also true that many of the highly-cited items in this study were fairly close to the median in age. Given the mixed ages and citation rates, and the fact that we examined citations during a 3-year period (rather than cumulative citations), age of the cited item did not turn out to be a significant predictor of citation when examined in the multivariate analyses reported below.

As is common with scholarly work, some documents were cited only once (7%), twice (7%), or three times (14%); the remaining 71% of the articles, books, and book chapters were cited five times or more over the 2-year period, with a high of 29 citations. Half (50%) of the articles by these noted authors were cited 11 times or more within 2 years—a fairly high citation rate in the relatively small discipline of communication.

The mean ratings on the 32 items were compared using two different divisions. First, the 11 most highly-cited documents (the top 20%) were compared to the remaining ones; no significant differences were found among the 32 items. Second, the sample of articles was divided in half at the median number of cites received. Comparing those items which received 11 or more cites with those that received ten or fewer cites showed significant statistical differences ($t = 2.773$; $df = 54$, $p = 0.008$) on only one item: "this reference reviews prior work in this area." Thus, more highly-cited items tended to feature literature reviews, which were judged to be among the "most important" reasons by respondents in this study; this item was not specifically chosen by the respondents of Shadish et al. (see Table 1), yet it might contribute to the "exemplar" factor found by those authors.[5]

Given the anomalous findings, the small sample and the methodological problems reported above, we cannot reach definitive conclusions about the nature of highly-cited items vs. others. However, it can be said that citations to such "famous" works are:

- very likely to emphasize reviews of the literature on their topic.
- cited as "concept markers."
- authored by widely-recognized authorities in a field of research.

Relationship Between Citer and Cited Author

Overall, the results for proximity items are similar between the two studies, except for those that might be explained by the size of the discipline. Communication scholars are more likely than psychologists to have trained and/or be friends with the author they cited; they are also more likely to subscribe to the journal they cited. All of these are reflective of the smaller size of the communication discipline, with a smaller number of journals and a smaller number of universities offering doctorates in that subject, when compared with the discipline of psychology investigated by Shadish et al.

The anomalous finding that psychologists are more likely to cite colleagues at their own institution might be explained by the structures of the two disciplines. Communication departments are more likely to have small faculties with diverse specialties. In such situations, a scholar may have few colleagues to cite (i.e., few faculty working on the same research problems) at their own institution. Psychology departments, on the other hand, are more likely to have large, specialized faculties with groups of faculty working in closely related areas. However, this is merely a speculation since this study did not collect data on faculty size, research problems, and the like.

The item regarding co-authorship represents a possible bias in the sample: about one in every seven respondents had, at some point, co-authored an article with one of these two, prolific authors. (Shadish et al. do not report asking this question in their first study, only in the second.) Presumably, co-authors would be positively biased toward the document and author they were asked about. Although a future investigation could attempt to eliminate all co-authors from among the sampled citers, this would be difficult to do systematically; perhaps in a sample from a larger discipline, this would be less of a problem.

These results answer two questions posed at the beginning of this article: (1) are there differences between highly-cited papers and less-cited papers, in terms of motives for citing those papers?, and (2) are there differences between the disciplines of psychology and communication, in terms of motivations for citing documents?

The answer to the first question is "Yes": highly-cited documents *are* different, and that difference is worth studying further. To the second question, the answer is "Maybe." These two, somewhat related, social science disciplines are different in both size and apparent social structure, and yet exhibit only mildly different patterns of motivations for citing other scholars. The latter finding could be considered as problematic, as it suggests that results from one discipline may not be easily generalized to other disciplines.

[5] Garfield (1996, p. 456) makes special mention of this "very normal practice of citing review articles that serve as surrogates for long lists of relevant works"; therefore, it is surprising that citing reviews was not more prominent among the respondents in the Shadish et al. studies. Apparently, documents in communication are more likely to be syntheses of earlier literature than is the case in psychology.

Multivariate Analyses

In an attempt to reach a more basic understanding of citer motivation, we conducted a factor analysis of the reasons for citation to look for an underlying structure to the Likert responses. First, we eliminated seven items that had one or more of the following characteristics: were not chosen as "most important" factors; received consistently neutral ratings on the Likert scales; were highly correlated with potentially overlapping items. The seven items included one deliberately redundant item, two highly neutral items, and four others that were statistically redundant, and were excluded from further analyses.

The remaining 25 responses to the "reasons for citation" items were factor-analyzed using principal components analysis, with the intention of producing uncorrelated factors. Seven factors with eigenvalues greater than 1.0 were obtained following orthogonal rotation of the initial nine factors. Together, the seven factors explain 69% of the total variance. The results are shown in Table 3.

The factors tend to reinforce some of the more common speculations regarding the reasons authors choose to cite another author's work, as reflected in the label chosen to represent that factor. The items loading most heavily on each factor are listed under each factor label in order of their statistical strength.

Four of the 25 items did not achieve factor loadings high enough to be included in Table 3 (which lists only those items with loadings of 0.5 and above), yet might have been significant with different samples of citations. "This reference concerns a currently 'hot' topic," for example, would likely rise in influence with a sample of more recent (cited) documents, and ". . . one of the earliest works in the field" might have been more influential in citation decisions regarding older documents. The mixed ages of the current sample of cited documents effectively washed out the importance of such age-related judgments. "This . . . is authored by a recognized authority . . ." did not load highly quite enough (0.48) on the Classic factor, whereas ". . . an exceptionally high quality piece of science" achieved only a −0.49 load on the Negative factor; retaining the two items (the latter with a reversed scale) in their respective factors made only minor differences in reliability, so they were dropped in the interests of parsimony.

Four of the seven factors are very similar to the six factors identified by Shadish et al. in their first study. Among their three others, the "Supportive Citation" scale (a factor of weak reliability, composed mainly of an item not used in this study) is necessarily absent here, whereas their "Personally Influential Citation" factor appears to combine the Similar, Contrasting, and Review factors of the present findings.

A multiple regression of the seven factor scores was used to predict citation counts. The adjusted R^2 (0.59) was significant ($F = 3.27$, $df = 7, 51$, $p = .007$). *Highly cited* works were rated as Classic ($\beta = 0.36$; $p < 0.05$), as cited for Social Reasons ($\beta = 0.24$; $p = 0.05$), and as Reviews ($\beta = 0.13$; $p < 0.05$). Highly cited works were judged somewhat less likely to be Negative ($\beta = -0.26$) or Creative ($\beta = -0.14$), or to be Contrasting ($\beta = -0.36$) or Similar ($\beta = -0.10$) to the citer's own work, but none of the latter four factors were significant at $p = 0.05$.

The odd conclusion that highly-cited works are rated as less creative was also found by Shadish et al. in a variety of analyses. Those investigators decided that creativity is unrelated to citation count but functions as a suppressor variable. In a multivariate analysis, the positive contributions of creativity associated with being a classic or exemplar are partialled out, with the remainder of the variance being negatively related to citation counts. Thus, there may be a component of creativity that does not lead to higher citation. Shadish et al. suggest that there are

> articles that are creative in a way that does not fit into existing conceptual frameworks or into accepted social norms for scholarship in an area. Such works might not be cited much even though they are acknowledged to be creative.

An implication of this finding, they add, is that

> if we judge the quality of a work solely by its citation count, we probably undervalue some very creative work that peers judge to be of high quality.

To summarize the results of the multivariate analyses, the three most significant factors in predicting citation to a document are the following: first, the perception that the cited work is novel, well known, and represents a genre of studies; second, the citing author's judgment that citing a prestigious work will promote the cognitive authority of his or her own work; and third, the perception that a cited item deserves criticism—which can also serve to establish the citer as an authoritative, critical thinker.

Together, the strong influence of these three factors suggest that works may be either praised or attacked—or both—and in all cases promote some degree of legitimacy and authority to the citing author through association with the cited work, whether pro or con. The conclusions of Gilbert (1977), Brooks (1985), and others—that citations are largely used to persuade—seem warranted.

The other four factors in this analysis were not found to be statistically significant in a regression to predict citation counts. Further work is needed to address the respective roles of creativity, contrasts, and similarities among works, and works that are cited mainly because they review other literature. In particular, the conclusion of Shadish et al., that highly creative works may *not* attract citations, is worthy of investigation on its own. If creative works indeed have such a dual nature, the use of citation counts in university promotion decisions (and in other contexts) is further complicated.

Methodological Limitations to This Study

This investigation encountered several methodological challenges. In particular, solutions to three intermingled problems—the sampling frame, the sample size, and the response rate—are suggested.

First, there is the issue of the frame used for the sample. Although sampling *authors* provides for a comparison between their higher- and lower-cited works, sampling highly-cited *works* is a more direct way of studying differences in citer motivations. The issue of a comparison group in the latter type of study might be addressed by sampling highly-cited works from psychology, and using the Shadish et al. results as a comparison group. Another approach would be to draw a separate sample of citers of infrequently-cited works for comparison with a sample of those who cited very popular works.

The *SSCI* and *AHCI* are problematic as sampling frames, as they do not index citations to some journals in a discipline, and provide old or incomplete addresses for many of the citers. Even using association membership directories to confirm respondent addresses in the discipline of communication did not prevent 14% of the initial mailing from coming back as "undeliverable"; the percentage of wrong addresses could easily have been much higher than one in seven, deteriorating the estimated response rate.

Whatever the sampling frame, there is an obvious need for a *larger sample* in order to generate meaningful statistical comparisons. The sample could be made larger in terms of numbers of documents, numbers of years, or numbers of cited authors. For the current investigation to have received 200 returned surveys, it would probably have been necessary to sample at least 5 years of citations to the work of at least four different authors (assuming that any one citer was to be burdened with no more than one questionnaire).

The *response rate* might be improved by shortening the lengthy survey instrument. Shadish et al. used 28 in their first study; this study used 32 questions gleaned from both of the Shadish et al. surveys, resulting in a long instrument with some items that proved to be redundant. The questionnaire could be made less intimidating and time-consuming by eliminating some weak and/or redundant items. As mentioned above, there were at least seven items that could have been eliminated from this roster without severely reducing the range of potential choices open to the respondents.

Discussion

Complementary Research Strategies and Measures

Many commentaries have appeared offering reasons for, or typologies of, citations. Those explanations based on empirical evidence have tended to use one of three methods: content/context analysis, self-administered questionnaires, or interviewing.

Many investigations of citation behavior have made use of *content* or *context analysis* of citing papers to suggest reasons for citation. The distinction between content and context is partly one of depth of inquiry (Rice & Crawford, 1993). Both approaches call for a examination of the place in a document at which a citation is made. However, content analysis usually implies a close examination of the words surrounding a citation, whereas context analysis may be as simple as identifying the section of the paper in which the citation appears (e.g., the literature review, methodology, results, or discussion section).

Although some content analyses have aimed at identifying a variety of types of citation, most (along with all of the context analyses) have been tightly defined to look at a small number of citation types, such as *perfunctory* vs. *meaningful.* Hence, they are limited in what they can tell us about an author's motivations.

In addition, any method that relies upon judgments from persons other than the authors may suffer from reliability problems. Judging whether or not a citation falls into the methodology section of an article is easy; deciding whether it is "essential" vs. "nonessential" is not. Some published content analyses provide no operational definition for the judgment tasks and report no reliability coefficient for the decisions made by judges (e.g., Maričić et al., 1998); this is assuming, of course, that more than one judge was used, as we would normally expect in a rigorous content analysis. Thus, content and context analyses have particular weaknesses when it comes to understanding motivations for citation.

Given the popularity (and some would say, overuse) of survey methodology, it is odd that there have not been more surveys conducted on this topic. Brooks (1985), Snyder and Bonzi (1989), Shadish et al. (1995), and the present study employed *self-administered questionnaires.* Survey techniques have well-known strengths and weaknesses, some of which are discussed below.

A third research strategy to studying citation behavior, suggested by Chubin and Moitra (1975), Cronin (1984), and Shadish et al. (1995), is to conduct in-depth interviews with authors who are actively engaged in writing a research document to ask them what they are citing and why. Shadish et al. advocated a "discourse analysis" that would examine authors' accounts of their citations through combination of observation, interviews, and questionnaires. Cronin referred to this as the phenomenological approach to studying citation.

There has been at least one such study. White and Wang (1997) conducted a long-term study of document usage among 12 agricultural economists. They identify 27 criteria used by their respondents for when to cite a document—many of which parallel stated reasons given by the respondents in this study. Of particular interested are the reasons implied for *not* citing a document. For example, relevant documents may be judged to be "too old" or "too specific" or require too much of the author's time to obtain and

read—reasons that have not been solicited directly in surveys like the present one. As White and Wang point out, intensive interviews can uncover motivations that surveys, content analysis, and context analysis do not address. Their qualitative approach requires a great deal of time and effort, but shows great promise in understanding citing behavior.

All of these approaches have their limits. Both self-administered questionnaires and face-to-face interviews may suffer from problems of retrospective reasoning, recall, and lack of honesty by respondents. Interviewing authors at the time of composition lessens problems of recall but increases the likelihood of socially desirable responses on the part of the respondent, given the face-to-face interaction with an interviewer. Questionnaires tend to prompt more honest responses than answers obtained through face-to-face interviews; however, they suffer from lack of reliability as respondents attempt to reconstruct their past behavior.

In spite of methodological weaknesses, the present study suggests that surveys *can* provide some insight into the reasons that authors cite one another. Although Chubin and Moitra's (1975) and Cronin's (1984) methodological concerns are noted, self-reports *do* bring us closer to an understanding of citation behavior. Particularly when coupled with qualitative interviews, such as used by White and Wang (1997), author surveys offer a valid source of evidence on citation behavior.

References

Broadus, R. (1983). An investigation of the validity of bibliographic citations. Journal of the American Society for Information Science, 34, 132–135.

Brooks, T. (1985). Private acts and public objects: An investigation of citer motivations. Journal of the American Society for Information Science, 36, 223–229.

Cano, V. (1989). Citation behavior: Classification, utility, and location. Journal of the American Society for Information Science, 40, 284–290.

Chubin, D., & Moitra, S. (1975). Content analysis of references: Adjunct or alternative to citation counting? Social Studies of Science, 5, 423–441.

Cronin, B. (1984). The citation process. London: Taylor Graham.

Duncan, E., et al. (1981). Qualified citation indexing: Its relevance to educational technology. In E. Duncan & R. McAleese (Eds.), Information retrieval in educational technology. Proceedings of the First Symposium on Information Retrieval in Educational Technology, April 1, 1981, Aberdeen (pp. 70–79). Aberdeen, Scotland: University of Aberdeen.

Frost, C. (1979). The use of citations in literary research: Preliminary classification of citation functions. Library Quarterly, 49, 399–414.

Funkhouser, E. (1996). The evaluative use of citation analysis for communication journals. Human Communication Research, 22, 563–574.

Garfield, E. (1965). Can citation indexing be automated? In M. Stevens, V. Guiliano, & L. Heilprin (Eds.), Statistical association methods for mechanized documentation: Symposium proceedings (pp. 189–192). Washington, DC: National Bureau of Standards; also reprinted in Garfield, E. (1977). Essays of an information scientist (vol. 1, pp. 84–90). Philadelphia: ISI Press.

Garfield, E. (1979). Is citation analysis a legitimate evaluation tool? Scientometrics, 1, 359–375.

Garfield, E. (1996). When to cite. Library Quarterly, 66, 449–458.

Gilbert, G. (1977). Referencing as persuasion. Social Studies of Science, 7, 113–122.

Hodges, T. (1978). Citation Indexing: Its Potential for Bibliographic Control. Unpublished PhD thesis, University of California, Berkeley, CA.

Kaplan, N. (1965). The norms of citation behavior: Prolegomena to the footnote. American Documentation, 16, 179–184.

Leopold, A. (1973). Games scientists play. Bioscience, October 23, 590.

Leydesdorff, L. (1998). Theories of citation? Scientometrics, 43, 5–25.

Lipetz, B. (1965). Improvement of the selectivity of citation indexes to science literature through the inclusion of citation relationship indicators. American Documentation, 16, 81–90.

Martyn, J. (1964). Bibliographic coupling. Journal of Documentation, 20, 236.

Maričić, S., Spakventi, J., Pavičić, L., & Pifat-Mrzljak, G. (1998). Citation context versus the frequency counts of citation histories. Journal of the American Society for Information Science, 49, 530–540.

McInnis, R., & Symes, D. (1988). David Riesman and the concept of bibliographic citation. College and Research Libraries, 49, 387–399.

Merton, R. (1957). Priorities in scientific discovery: A chapter in the sociology of science. American Sociological Review, 22, 635–659.

Merton, R.K. (1968). The Matthew effect in science. Science, 159, 56–63.

Mitroff, I.I. (1974). The subjective side of science: A philosophical inquiry into the psychology of the Apollo moon scientists. Amsterdam: Elsevier.

Moravcsik, M., & Murugesan, P. (1975). Some results on the function and quality of citations. Social Studies of Science, 5, 86–92.

Oppenheim, C., & Renn, S.P. (1978). Highly cited old papers and the reasons why they continue to be cited. Journal of the American Society for Information Science, 29, 225–231.

Prabha, C. (1983). Some aspects of citation behavior: A pilot study in business administration. Journal of the American Society for Information Science, 34, 202–206.

Rice, R., & Crawford, G. (1993). Context and content of citations between communication and library and information science articles. In J. Schement & B. Ruben (Eds.), Information and behavior (vol. 4, pp. 189–218). New Brunswick, NJ: Transaction Publishers.

Shadish, W., Tolliver, D., Gray, M., & Gupta, S. (1995). Author judgments about works they cite: Three studies from psychology journals. Social Studies of Science, 25, 477–497.

Schuman, H., & Scott, J. (1987). Problems in the use of survey questions to measure public opinion. Science, 236, 957–959.

Small, H. (1978). Cited documents as concept symbols. Social Studies of Science, 8, 327–340.

Small, H., & Griffith, B. (1974). The structure of scientific literatures. I: Identifying and graphing specialties. Science Studies, 4, 17–40.

Snyder, H., & Bonzi, S. (1989). An enquiry into the behavior of author self-citation. In J. Katzer & G. Newby (Eds.), Proceedings of the 52nd Annual Meeting of the American Society for Information Science (vol. 26, pp. 147–151). Medford, NJ: Learned Information.

So, C. (1995). Mapping the Intellectual Landscape of Communication Studies: An Evaluation of Its Disciplinary Status. Unpublished doctoral dissertation, University of Pennsylvania, Philadelphia.

So, C. (1997). Citation Ranking Versus Expert Judgment in Evaluating Communication Scholars: Effects of Research Specialty Size and Individual Prominence. Paper presented at the 47th Annual Conference of the International Communication Association, May 22–26, Montreal, Quebec.

Voos, H., & Dagaev, K. (1976). Are all citations equal? Or did we op.cit. your idem? Journal of Academic Librarianship, 1, 19–20.

White, M., & Wang, P. (1997). A qualitative study of citing behavior: Contributions, criteria, and metalevel documentation concerns. Library Quarterly, 67, 122–154.

Ziman, J. (1968). Public knowledge. Cambridge, England: Cambridge University Press.

Zuckerman, H. (1987). Citation analysis and the complex problem of intellectual influence. Scientometrics, 12, 329–338.