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Context and Content of Citations between Communication and Library and Information Science Articles

Ronald E. Rice and Gregory A. Crawford

The present study considers the broad question, "Is there a convergence between information and communication?", by focusing narrowly on citation relations between the disciplines of communication and library & information science, but in depth by analyzing the articles' authors, dates, title words, nature, and citation context of the relations. The data consist of those articles in communication journals and library & information science journals that made citations to or received citations from the other discipline from 1977 through 1987.

Most frequent article title words varied between citing/cited communication or LIS articles, with the most frequent including "information", "communication", "system", "research", "telecommunication", "organization", "computer-mediated", "policy", "library", etc. LIS articles not only cite Communication articles more frequently, but also do so a bit more quickly. Authors of cited communication articles were more numerous, with many multiple frequencies, than of citing communication articles, and belonged to distinct network positions representing domestic and international telecommunications policy, academic and bibliometric evaluation, theory and research about computer-mediated communication, use of print media, and network information services. In general, possible areas of developing convergence between the two disciplines includes pragmatic issues of telecommunication policy, and social

(not technical) research on computer-mediated communication, along with some uses of documents and archives, written about by a variety of authors who do not yet constitute a cross-disciplinary invisible college.

Problem Statement

In the past decade, increasing attention has been paid to possible areas of commonality between the concepts, subdisciplines, research methodologies, and researchers concerned with "information" and "communication." This attention has focused on two primary issues: what conceptual commonalities and relationships exist between these two concepts, and what behavioral evidence is there that individuals, institutions, and research activities are beginning to become aware of each other across formal disciplinary and conceptual boundaries?

In their monumental work, *The Study of Information*, Machlup & Machlup (1983) sought to define the boundaries of the concept of information. They identified more than thirty fields that focus in some way upon information. Among these fields, the following were considered to be tied closely to the field of communication: linguistics, phonetics, semantics, semiotics, lexicology, communication science, communication theory, and telecommunications research. The authors claimed, however, that the terms information and communication possess various meanings, often involving "strange uses for common words" (p. 49). The various uses of these terms have led scholars from the separate disciplines to attempt to "erect fences around their fields," instead of finding ways to collaborate in order to promote mutual understanding (p. 7). Their study of information was an attempt to encourage this mutual understanding and to seek a convergence between the disciplines which study information.

Paisley (1986) considered mass communication, interpersonal communication, and information science to be three subfields of a common discipline, partially because they are all "variable fields," ones that focus on a theoretical variable—communication and information, respectively—rather than "level fields," ones that focus on a level of analysis—the individual or group, as in most behavioral and social sciences (Paisley, 1984). He noted evidence of internal convergences, such as the formation of the International Communication Association, and the American Association for Information Science, and argued that "adequate models of the processes and effects of the new system require concepts from all three subfields" (1986, 124). The subfields share three sets of concerns or

specialization: (1) social research approaches and methods; (2) issues of operations research, legal and regulatory issues, linguistics; and (3) training professionals. He analyzed various sources of data for evidence of convergence among the subdisciplines, and found that while several concepts have diffused among the disciplines (such as the knowledge gap, the information society, and the invisible college), there was little evidence of any convergence occurring among these subfields, or across communication and library and information science.

Beniger (1988) argued that there is, in general, an increasing convergence of the concepts of information and communication in social science and the humanities, if not across these two specific disciplines. Beniger claimed that

> the area of most general convergence involves theories of information, knowledge structures, communication, and the encoding and decoding of meaning, including broad topics in cognition, linguistics and language philosophy, hermeneutics and illocution, signs, subconscious and culture, and the social construction of knowledge. (P. 205)

However, Beniger argued that the field of communication, as represented by Berger & Chaffee's *Handbook of Communication Science* (1987), does not display this convergence of interest in theories of information and communication. Of the twenty-two authors who appeared on all three lists of the most cited authors in the disciplines of humanities, cognitive science, and semiotics, only ten were included among the 3,496 names indexed by the Handbook.

Crawford (1990) proposes that the concepts of information and communication are converging on the basis of three commonalities: (1) common language—"information" and "communication" are interrelated and frequently used terms in both science and everyday life, and communication and library and information science are concerned with how communicants and system users create meaning from information; (2) common technologies—both disciplines are, to some extent, interested in how media organize and provide access to information to allow communication over time, space, people and processes; and (3) common scholarly fields—both disciplines, to some extent, support research on processes involving information and communiucation as well as on the relationships of the terms themselves.

Others have analyzed such potential convergence between the specific disciplines of communication and library and information science (see editor's introduction and several chapters in Borgman 1990; Paisley, 1990; Pemberton & Prentice, 1990), considering, for example, concepts common

to communication and to library & information science, or cross-disciplinary citation patterns for a given year. Peritz (1981) found that 3 percent of the citations from a select sample of information science journals during the period 1950–1975 were made to psychology, sociology, or communication. So (1988) found that information science was not involved in enough cross-disciplinary citations to include it in his study of cross-disciplinary citing patterns among twelve disciplines from 1983–1985. Barnett & Fink (1989) also found that information science received essentially no citations from other social science disciplines. And Paisley (1984), found no cross-citation between communication and library and information science in 1980–1981, though he did find evidence that a few central communication concepts had diffused into the information science literature.

Analyses of citation patterns among journals from 1977 through 1987 have shown that the discipline of communication consists of the two subfields of mass communication and interpersonal communication (Reeves & Borgman, 1983; Rice, Borgman & Reeves, 1988). Rice's (1990) analysis of citations among journals of these two disciplines over the same eleven-year time period shows these same two communication subdisciplines, and three information science subdisciplines of information science, library science, and library practice. Over time, there was a general progression toward clearer differences among the subdisciplines as well as more internally structured citation relationships among journals in these five subdisciplines. Borgman & Rice (1992) found a small but growing trend toward cross-disciplinary citation, provided primarily by articles in library and information science journals citing articles in communication journals.

There is also anecdotal institutional evidence that these two disciplines have begun to explore issues of common interest. Several library and information science programs, such as Rutgers, Syracuse, and UCLA, have hired faculty with doctorates in communication in recent years.

Thus most prior relevant studies either consider the question of convergence of information and communication from descriptive or normative theoretical positions, or emphasize the citation relationships among subdisciplines without regard to the content of those relationships. The present study attempts to contribute to the question, "Is there a convergence between information and communication?" by focusing narrowly on citation relations between the disciplines of communication and library and information science, but focusing in greater depth on the context and content of those citation relations.

The present study asks the following research questions:

1. Who are the authors involved in cross-disciplinary citing?
   A. Who are the most frequently involved?
   B. Do these authors represent distinct structural positions?
   C. What research content do these structural positions represent?
2. Do the two disciplines differ in the lag time between citing and cited article?
3. What are the articles about?
   A. Which words appear in the most article titles?
   B. Do distinct sets of words appear in these titles?
4. What is the content context of cross-disciplinary citations?
   A. What is the nature of the citing article?
   B. What is the context of a cross-disciplinary citation?

Method

Data

As part of our ongoing research project (Borgman & Rice, 1992; Rice, 1990; Rice, Borgman, Bednarski, & Hart, 1989; and Rice, Borgman, & Reeves, 1988), we began with the citation data among the seventy-seven journals in the core lists entitled "communication" and "information and library science" obtained from the *Journal Citation Reports (JCR)* of the *Social Sciences Citation Index* (SSCI) for each of the eleven years from 1977 through 1987. The 1985 *JCR* list of journals was the basis for identifying which journals to use in the longitudinal analyses as it was the latest list at the time of the initial data collection. The dataset was extended by picking up aberrant forms of abbreviation, title changes, and citations made to journals listed in the 1985 core list that were not in the core list of that year, thus ameliorating some of the problems created by the changing journal coverage (see Rice et al., 1989, for details). In addition we also included cross-disciplinary citations not listed by the *JCR* as occurring between two specific journals in the *JCR* (as explained in Rice et al., 1989) but found during our detailed inspection process. Table 9.1 lists the specific journal titles involved in cross-disciplinary citation between 1977 and 1987, along with the number of citations involved.

The JCR and table 9.1 indicate only the citing and cited journal. Each citing journal was then inspected to identify (1) the full bibliographic reference of the article making a cross-disciplinary citation; and (2) the full bibliographic reference of the cited article, as listed in the citing article.

TABLE 9.1
Journals Involved in Cross-Disciplinary Citing, with Citation Direction and Strength, 1977–1987 (Source: Borgman & Rice, 1992)

Year	Library & Information Science	Citation Direction	Communication	Number of Citations
1977	American Archivist	cited by	Journ. Quarterly	1
	Library Journal	cited by	Journ. Quarterly	1
1978	Info. Proc. Management	cites	Journ. Communication	6
	Lib. Quarterly	cites	Journ. Broadcasting	2
	Lib. Quarterly	cites	Journ. Communication	3
	RQ	cited by	Journ. Quarterly	1
	Special Lib.	cited by	Journ. Quarterly	1
1979	Govt. Pubs. Review	cites	Col. Journ. Review	1
	Journ. Lib. Studies	cites	Ed. Comm. Tech. Journ.	5
	Wilson Lib. Bulletin	cited by	Ed. Comm. Tech. Journ.	1
1980	ARIST	cites	Journ. Broadcasting	1
	ARIST	cites	Journ. Communication	9
	ARIST	cites	Telecomm. Policy	22
	Information Age	cites	Telecomm. Policy	3
1981	ARIST	cites	Journ. Broadcasting	1
	ARIST	cites	Telecomm. Policy	2
	InfTeL	cited by	Journ. Quarterly	1
	Lib. Journal	cites	Col. Journ. Review	2
	Lib. Quarterly	cites	Public Opin. Quart.	1
1982	ARIST	cites	Journ. Communication	12
	ARIST	cites	Journ. Quarterly	1
	ARIST	cites	Telecomm. Policy	2
	Behav. Soc. Sci. Lib.	cites	Human Comm. Research	1
	Behav. Soc. Sci. Lib	cites	Cent. St. Speech Journ.	1
	Information Age	cites	Telecomm. Policy	5
	Journ. Info. Science	cites	Telecomm. Policy	3
1983	Info. Proc. Management	cites	Ed. Comm. Tech. Journ.	1
	IFLA	cites	Journ. Communication	5
	JASIS	cites	Journ. Communication	1
	JASIS	cited by	Journ. Communication	2
	JASIS	cites	Telecomm. Policy	7
1984	American Archivist	cites	Comm. Education	1
	Information Age	cited by	Media Culture Society	1
	Scientometrics	cites	Human Comm. Research	1
	Social Science Info.	cites	Telecomm. Policy	2
1985	College Research Lib.	cites	Comm. Education	3
	College Research Lib.	cites	Journ. Communication	1
	College Research Lib.	cites	Journ. Quarterly	2
	Libri	cites	Comm. Research	1
	Libri	cites	Journ. Communication	4
	Libri	cites	Public Opin. Quart.	1
	Nachrichten fur Dok.	cited by	Media Culture Society	1
	Proceedings ASIS	cites	Journ. Communication	3
	Proceedings ASIS	cites	Telecomm. Policy	2
1986	ARIST	cites	Comm. Research	1
	ARIST	cites	Journ. Broadcasting	1
	ARIST	cites	Journ. Communication	1
	ARIST	cites	Public Opin. Quart.	1
	ARIST	cites	Public Relations Rev.	1
	ARIST	cites	Telecomm. Policy	7
	Database	cites	Journ. Communication	4
	Govt. Pubs. Review	cites	Journ. Communication	1
	Govt. Pubs. Review	cites	Public Relations Rev.	1
	Govt. Pubs. Review	cites	Quart. Journ. Speech	7
	Govt. Pubs. Review	cites	Telecomm. Policy	3
	Journ. Lib. History	cited by	Comm. Research	1
	Lib. Quarterly	cited by	Human Comm. Research	1
	Proceedings ASIS	cites	Journ. Communication	2
	Proceedings ASIS	cites	Telecomm. Policy	5
	RQ	cites	Comm. Education	2
1987	ARIST	cited by	Comm. Research	6
	Info. Proc. Management	cited by	Comm. Research	1
	Info. Proc. Management	cites	Journ. Communication	13
	Info. Proc. Management	cites	Telecomm. Policy	2
	JASIS	cited by	Comm. Research	4
	Lib. Quarterly	cites	Comm. Education	1
	Lib. Quarterly	cited by	Journ. Quarterly	3

Based on the bibliographic reference information, several subsets of the full data, aggregated over the eleven years, were prepared for further analysis:

1. The authors' names of the articles in each of the four possible citation categories—Communication citing LIS, Communication cited by LIS, LIS citing Communication, and LIS cited by Communication.

2. The year of the citing article and the year of the article(s) in the other discipline that it cited.

3. The words in the titles of articles in each of the four possible citation categories.

4. Finally, each citing article was coded for the nature of the article and the context in which each citation was made.

Procedures Corresponding to Research Questions

Authors

A. Article authorship in each of the four categories of references was simply noted, and ordered by frequency.

B. Then network analysis was used to detect patterns of relationships among the authors based on their cross-disciplinary citations. First, to simplify the list of authors, all articles with the same first author were aggregated, and only the first author's name was used. Second, to remove the least involved authors in the data set, the authors making or receiving two or more cross-disciplinary citations, as well as other authors involved in cross-disciplinary citations with those authors, were identified and only their citation relations were represented in a asymmetric matrix. These authors represented 80 of the 153 unique first authors involved.

Third, a network analysis technique called CONCOR was used to identify authors' positions in the cross-disciplinary citing network (Breiger, Boorman & Arabie, 1975). A "position" is a set of nodes that has similar relations to all other nodes. That is, the authors in a position do not necessarily make citations to or receive citations from each other, but they do have similar patterns of making and receiving citations with the other authors. The concept of a "position" is grounded in sociological and anthropological theories that are concerned with one's role or position in a given social structure.

CONCOR converts the matrix of citation relations into a correlation matrix, which measures the similarity of citation activity between any two authors. In order to capture the influence of both making and receiving citations, both rows and columns of the initial raw matrix were used to create the first correlation matrix. The correlation procedure is repeated until the correlations converge toward 1.0 or 0.0. CONCOR then permutes the matrix to place together authors who are highly similar, and hierarchically separates them into various "positions" that are subsets of the initial positions.

C. The titles of the articles by each of the authors in each position were inspected to provide an informal content-based label for each of the positions.

Lag in Citation Years

The difference between the year of each cross-disciplinary citing article and the year of each of its respective cited articles was summarized and then tested for statistical significance.

Words in Articles Involved in Cross-Disciplinary Citation

Several standard text-management procedures were used to improve the consistency of the words in the article titles. First, the words were spell checked. Second, symbols such as quote marks or unnecessary apostrophes were removed. Third, variants such as US or U.S. were standardized. Fourth, plural forms for words were changed to singular forms (for example, "technologies" to "technology"). Finally, common stop words were removed (for example, "a" or "their").

A. After this preparation, each separate article title within each of the four citation categories was used as the basis for creating a word-frequency and wood-cooccurrence matrix (Woelfel, 1990). The word-frequency listing simply identifies the frequency with which each word was used in the entire set of article titles in each of the four categories. The word-cooccurrence matrix is created by keeping track of the number of times any two of these words appear in the same article title. That is, the article title is considered the unit of meaning, and the frequency of cooccurrence between any two words is an indicator of how related they are in meaning. There is considerable precedent for analyzing relations among words from reference structures such as article titles, reference descriptors, computer-monitored messages, responses to open-ended questions, focus group discussions, etc. (Braam, Moed, & van Raan, 1991; Callon, Courtial, Turner, & Bauin, 1983; Danowski, 1987).

B. Various outputs from this step were then transformed for input into the NEGOPY network analysis program (Richards & Rice, 1981; Rice & Richards, 1985). NEGOPY takes a list of "sending" nodes, "receiving" nodes, and the strength of their relationships as its input, and, based on a set of graph-theoretic criteria, identifies various network roles. Briefly, a *group* consists of (1) at least three nodes that (2) are more strongly related with each other than with other nodes; (3) have over 50% of their linkage within the group; and (4) no one of which can be removed without breaking apart the rest of the group. A *liaison* is a node that belongs to no particular group, but which is linked to two or more groups. A *dyad* is a pair of nodes linked only to each other. An *isolate* is unconnected, while a *type 2 isolate* is connected to just one other node which in turn may be connected to other nodes. A *tree node* is connected to isolates as well as to a group. For the present purposes, NEGOPY is useful in identifying how words in article titles in each of the four citation categories (citing or cited, for the two disciplines) are related, to get an indication of the kinds of topics emphasized by articles that make or receive citations across the two disciplines.

For the NEGOPY runs, the cooccurrence strength cutoff was set at two.

That is, the program ignored words that only cooccurred in one article. However, because there are so many LIS articles citing Communication articles, there were considerable linkages even with a cutoff of two. Therefore, we also used a cooccurrence cutoff of three, to identify greater distinctions among word goups and roles.

What is the content context of cross-disciplinary citations?

A. We content-coded and analyzed the general type of each article that made citations to an article in the other discipline to identify the general nature of the articles. The coding scheme was developed and tested on a small set of sample articles, revised, and then used separately by the two present authors. We simply coded for the categories shown in table 9.2, based on, in order, the abstract, the introduction, or the text of the article, until the article was categorized. The primary area of disagreement was whether certain social science reviews and studies should be categorized as theory/model/concepts. Intermediate percentage of agreement on all categories except these was 93 percent. We discussed the remaining citations, referring to the content codes, until agreement was reached.

B. The specific context of each cross-disciplinary citation was coded, as shown in table 9.2. As with the prior coding scheme, this was developed iteratively, and used on all citations separately by both authors. The context component concerns the process aspects and not about the content; the coding is within the context of the citation location within the citing article. Specific words used in the citing location were used to resolve ambiguity. For example, if a citation might seem to be both a results as well as a methodology context, but used the word "evidence", it was coded as a results context. The primary areas of disagreement centered around what constituted "prior results" as opposed to theory, methodology, problem, or review citations. Intermediate percentage of agreement on all categories except those involving the disputed "prior results" category was 88 percent. As above, we discussed these until agreement was reached.

Results

A Frequency of Authors

Table 9.3 (A-D) lists the authors of articles in both disciplines that cited, or were cited by, articles in the other discipline.

Only McKerns and Delahaye published more than one article that made citations from Communication to LIS, a 1977 original and a 1981 update

TABLE 9.2
Coding Scheme for Citing Article Type

1. Social Science: Review
   (of prior results in particular area, or of particular methods issues)
2. Social Science: Theory/Model/Concepts
   (code REVIEW here if the primary purpose of the review is as the basis for a theory or model or a meta-theoretical framework, as opposed to "what do we know so far")
3. Social Science or Policy: Study(s)
   (not including history, biography; include here what may have lengthy reviews if that is a background for a study(s); policy studies would include economic or market analyses that used financial or industry data, etc.)
4. Policy: Review
5. Policy: Theory/Model/Problem
6. Bibliography
   (essentially listing of references; however, if it is annotated and on a particular topic, then code as REVIEW)
7. History or biography

Coding Scheme for Context of Cited Article

1. Theory
   (including concepts, models, principles)
2. Results
   (including sources of facts or archival data)
3. Methodology
   (or operationalization/definition; this also includes simple descriptions of new media, such as videotex or computer-mediated communication, when that's not referenced as a conceptual or theoretical issue; also includes studies about particular data-collection or analysis method)
4. Problem claim
   (may be salient social issue, or non-social science theoretic position, such as a policy problem)
5. Review or Bibliographic list
   (for example, when one or several citations are lumped together as sources for review of or background on the topic, whether they include results or not; but code as RESULTS if specific results are referred to)
6. Not listed in text of citing article; only in reference section

about mass communication articles in U.S. and foreign journals, a sort of bibliometric study. Of the LIS authors making cross-disciplinary citations, Cawkell (information technology and communication, and privacy in the information society), Ford (library learning), Rice (communication technology studies and reviews, computer-monitored data collection), and Suprenant (information crisis in the library, international information and communication policies) provided at least two articles apiece that cite articles in communication journals.

There were numerous authors who had more than one Communication

TABLE 9.3
Authors of Articles in Communication Journals Citing Articles in Library & Information Science Journals

Baker, I.		Nitecki, D.	
Becker, J.		Nord, D.	
Fulk, J., Steinfield, C., Schmitz, J. & Power, J.		Rice, R. & Love, G.	
Markus, M. L.		Rosengren, K.	
McKerns, J. & Delahaye, A.	(2)	Showalter, S.	
Myatt, B. & Carter, J.		Steinfield, C. & Fulk, J.	
Nass, C.			

Authors of Articles in Library & Information Science Journals Citing Articles in Communication Journals

Adoni, H.		McClure, C.	
Benadom, G. & Goehlert, R.		Milevski, S.	
Bochnig, P.		Rice, R.	
Bookstein, A. & Biggs, M.		Rice, R. & Borgman, C.	
Brimmer, K.		Rice, R. & Torobin, J.	
Cawkell, A.	(2)	Rice, R. & Shook, D.	
Charlton, T.		Robinson, P.	
Culnan, M. J. & Bair, J.		Rosenberg, V.	
Dolansky, T.		Schement, J., Curtis, T. & Lievrouw, L.	
Ford, N.	(2)	Schubert, A.	
Furuta, R.		Springer, M.	
Gavryck, J.		Steinfield, C.	
Griffiths, J.		Stevenson, G.	
Hart, P. & Rice, R.		Surprenant, T.	
Hattendorf, L.		Surprenant, T. & Zande, J.	
Heim, K.		Watson, P.	
Kling, R.		Weiner, J.	
Love, G. & Rice, R.		White, H.	
MacAdam, B.		Zimmerman, E. & Brimmer, K.	

Authors of Articles in Communication Journals Cited by Articles in Library & Information Science Journals

de Sola Pool, I.	(3)	Katzman, N.	
de Sola Pool, I. & Solomon, R.		Kernan, J. & Mojena, R.	
Adoni, H.		Kiesler, S. & Sproull, L.	
Anawalt, H.		King, J. & Kraemer, K.	(2)
Bamford, H.	(2)	Klemmer, E. & Synder, F.	
Becker, A.	(2)	Kling, R.	(5)
Beinstein, J.		Lamond, F.	
Berger, C. & Calabrese, R.		Langdale, J.	
Brezin, M.		Leduc, N.	(3)
Bryant, J., Comisky, P. & Zillman, D.		Levin, H.	
		Loory, S.	

Carey, J.		Marchand, D.	(3)
Clark, E.		Marvin, C.	
Clark, R. & Snow, R.	(2)	Masmoudi, M.	(2)
Clippinger, J.		McCombs, E. & Eyal, H.	
Codding, G.		McEvoy, F. & Vincent, C.	
Cole, R. & Bowers, T.	(2)	McPherson, E.	
Cronholm, M. & Sandell, R.		Mendelsohn, H.	
Dance, F.	(2)	Meyer, N.	
Danowski, J. & Edison-Swift, P.		Morris, J.	
Della Bitta, A., Johnson, E. & Loudon, D.		Mosco, V.	
		Noll, A. M.	
Dervin, B.		Owen, B.	
Dordick, H.		Panko, R.	(3)
Dordick, H. & Goldman, R.		Parker, E.	(2)
Dordick, H., Bradley, H., Nanus, B. & Martin, T.		Pfund, N. & Hofstadter, L.	
		Pipe, G.	
Dunn, D.	(2)	Pye, R.	(3)
Edwards, G.	(3)	Raskin, A.	
Edwards, J. & Baker, L.	(2)	Read, W.	
Eisenstein, E.		Reeves, B. & Borgman, C.	
Ellinghaus, W. & Forrester, L.		Rice, R. & Parker, E.	
Garay, R.	(2)	Rice, R. & Paisley, W.	(2)
Gardner, M.		Rice, R. E. & Case, D.	(4)
Garramone, G., Harris, Allen C. & Anderson, R.		Roach, D. & Barker, L.	
		Robinson, P.	(2)
Gibb, J.		Saur, R.	
Glassman, M.		Schement, J. & Lievrouw, L.	
Gold, E.		Segal, B.	
Greenberg, A.		Seitz, N.	
Greene, M.		Singh, K. & Gross, B.	(2)
Hamelink, C.	(3)	Solely, L. & Reid, L.	
Hamlin, D. & Harkins, C.		Sreberny-Mohammad, A.	
Harkness, R.	(2)	Starck, K.	
Harris, A., Garramone, G., Pizante, G. & Komiya, M.		Stevenson, R.	
		Thayer, L.	
Hays, E. & Mandel, J.		Trauth, E.	
Helmreich, R. & Wimmer, K.		Tyler, M.	(2)
Hiebert, R. & Devine, C.		United States Library Congress	
Hiltz, S.	(4)	Vincent, R.	
Hiltz, S. & Turoff, M.	(2)	Weaver, D. & Wilhoit, G.	
Hoban, C.		Wigand, R.	
Holland, W.		Williams, E.	(2)
Homet, R.		Williams, F., Dordick, H. & Horstmann, F.	
Honig, D.	(2)		
Jacobson, R.	(2)	Wright, C.	
Johansen, R.	(2)	Zeidner, M.	

Authors of Articles in Library & Information Science Journals Cited by Articles in Communication Journals

Culnan, M. J.		Rice, R. & Borgman, C.	(2)
Culnan, M. J. & Bair, J.		Richard, O.	
Edelglass, E.		Robinson, S.	
Friedman, W.		Rubin, M. & Sapp, M.	
Harris, M.		Schmitz-Esser, W.	
Marshall, J.		Small, H.	
Nitecki, D.		Steinfield, C.	(3)
Rice, R.	(3)	Thomison, D.	
		White, H. & Griffith, B.	

Note: Figure in parentheses represents total number of *articles*, not total number of *citations*.

article cited by a LIS article. Those with at least three include de Sola Pool (international telecommunications policy, international computer communications and data flow), Edwards (all to the same article on impacts of office automation), Hamelink (all to the same article on the New World Information Order), Hiltz (computer conferencing, electronic funds transfer), Kling (social aspects of computing, electronic funds transfer), Leduc (all to the same article on a study of organizational computer communications), Marchand (all to the same article on privacy and computing), Panko (outlook, and standards for, electronic mail), Pye (monopoly or free market telecommunications services, information retrieval services), and Rice (electronic mail, videotex, communication satellites).

Selected article topics of those communication authors with two articles cited include computer conferencing, instructional media research, productivity of journalism faculty, the concept of communication, computer communication services and information policy, evaluation of doctoral programs in speech communication, telecommunications policy, office system policy, electronic funds transfer, the New World Information Order, implications of computers and telecommunication systems, teleconferencing research, reading habits, transborder data flow, and videotex.

Finally, the authors of LIS articles most frequently cited by Communication articles included Rice (review of impacts of computer-mediated communication, and, with Borgman, computer-monitored data), and Steinfield (review of impacts of computer-mediated communication).

Considering all four categories of citations, and using first author only, those authors either cited or being cited across the two disciplines more than once include: Rice (17 times), Hiltz (6), Kling (6), Steinfield (5), de Sola Pool (4), Culnan, Dordick, and Robinson (3 times each), and Adoni, Nitecki, Schement, Surprenant, White (2 times each). The articles by the four most frequently involved first authors were all concerned with research on and social aspects of computer-mediated communication or organizational computing.

B & C. Positions of Authors and Their Article Content

Table 9.4 provides the six authors' positions resulting from the CONCOR analyses. Along with the authors, it provides a summary of the major themes in the position's article titles. Most of the positions have quite consistent and clear "identities" based upon the article titles. The positions and their summary identities are: (1) domestic telecommunications policy; (2) international telecommunication policy; (3) diverse topics including academic evaluation (such as publication productivity and Ph.D. programs), educational media, privacy and censorship, archives and library learning; (4) research and theory on computer-mediated communication and information systems (especially reviews) and broad telecommunication policy issues; (5) use of print mass media; and (6) telecommunication, network, and computer communication services, especially computer conferencing and electronic funds transfer. Several more detailed hierarchical positions were possible, but these six were the most parsimonious and clear.

(2) Years Between Citing and Cited Articles

Communication articles making cross-discplinary citations were significantly older ($M = 1982.4$, $s.d. = 3.6$ versus $M = 1983.2$, $s.d. = 2.8$ for LIS articles making citations, $p < .05$), communication articles cited by LIS were significantly older ($M = 1977.5$, $s.d. = 9.6$ versus $M = 1979$, $s.d. = 5.3$ for LIS articles being cited, $p < .001$), and the lag time between citing and cited cross-disciplinary relation was significantly greater for communication articles ($M = -4.89$, $s.d. = 8.25$ versus $M = -4.18$, $s.d. = 4.96$ for LIS articles, $p < .001$). While the first two results are simply descriptive and may be attributed to a variety of causes, such as late updating for communication citations in the *JCR*, the last result, because it is based solely on the citation relation, seems more indicative. In general, communication authors seem to take a bit longer to become aware of and cite relevant LIS articles, or perhaps the review and publication cycle for communication journals takes longer. Thus LIS articles not only cite communication articles more frequently (absolutely and proportionally), but also do so a bit more quickly (about seven months faster).

TABLE 9.4
Structural Positions Among Authors Involved in Cross-Disciplinary Citations

Position 1 (Domestic Telecomm Policy)	Position 3 (Inst. Tech, Acad. Eval, Privacy, Archives, Comm. Theory & History)	Position 5 (Use of Print Mass Media, Subject Headings)
de Sola Pool, I.	Adoni, H.	Eisenstein, E.
Garay, R.	Becker, A.	McCombs, E.
Gold, E.	Bookstein, A.	McEvoy, F.
Greene, M.	Clark, R.	Robinson, P.
Harkness, R.	Cole, R.	Wright, C.
Noll, A. M.	Dolansky, T.	
Parker, E.	Edelglass, E.	Position 6 (Computer Conferencing, Network Services, EFT)
Pye, R.	Edwards, J.	Bamford, H.
Tyler, M.	Ford, N.	Dordick, H.
	Glassman, M.	Dunn, D.
Position 2 (International Telecomm Policy & NWIO)	Hoban, C.	Edwards, G.
Anawalt, H.	Marchand, D.	Hiltz, S.
Clippinger, J.	McKerns	Johansen, R.
Codding, G.	Meyer, N.	King, J.
Danowski, J.	Morris, J.	Kling, R.
Ellinghaus, W.	Rosengren, K.	Leduc, N.
Gardner, M.	Thomison, D.	Panko, R.
Garramone, G.	White, H.	Williams, E.
Greenberg, A.		
Hamelink, C.	Position 4 (Information Tech., Computer Communication, New Media Theories, Telecomm. Policy)	
Honig, D.	Brimmer, K.	
Jacobson, R.	Cawkell, A.	
Kiesler, S.	Culnan, M. J.	
Masmoudi, M.	Dance, F.	
Raskin, A.	Fulk, J.	
Segal, B.	Furuta, R.	
Singh, K.	Harris, M.	
Stevenson, R.	Hart, P.	
Surprenant, T.	Heim, K.	
U. S. Lib. Cong.	Helmreich, R.	
Wigand, R.	Love, G.	
	Markus, M. L.	
	Marvin, C.	
	Rice, R. E.	
	Rosenberg, V.	
	Steinfield, C.	
	Zimmerman, E.	

Note: Based on those authors making or receiving two or more citations, as well as other authors involved in citations with those authors; thus 80 of the possible 153 authors were analyzed here.

(3) Words in Cross-Disciplinary Articles

A. Frequency of Words Occurring in Citing and Cited Article Titles

Simple frequency counts of words in article titles can provide some sense of the nature of citing and cited articles. Table 9.5 provides ordered word frequencies for each of the four categories of article citations.

For Communication articles citing LIS articles, the most frequent words are communication (4 times) and information (3), mass and foreign (3 times, relating to the bibliometric study of foreign published articles, and to transnational corporations), and a set of words relating to publications and to technology research and theory.

For LIS articles citing Communication articles, the most frequent word by far was information (14 articles), followed by communication (9), library, policy, and words relating to impacts of computer-mediated communication. Clearly the central concepts appear predominant in these articles' titles. Words occurring only twice included general terms about research, problems, science and trends.

For communication articles cited by LIS articles, the most frequent words were again information (25 times) and communication (23), followed by policy (18), and a set or words relating to computers/systems/telecommunications/technology/electronic, research, social/public/implication, and use/evaluation. These article titles also included a wide variety of words occurring 3 or 4 times, relating to international telecommunications policy, computer privacy, and the New World Information Order.

For titles of LIS articles cited by Communication articles, the most frequent word was communication (9 times), information or computer-mediated (6), and impact/organization/system (4 times). Bibliometric words such as book, co-citation, literature also occurred more than once. Several words about documents occurred once apiece, indicating a slight concern by communication researchers with traditional library topics.

It is clear that the hypothesized most central concerns between the two disciplines—information and communication—appear most frequently in cross-disciplinary citing or cited articles. Note also the rather clear affiliation of these two words with their disciplines; for the most part LIS articles that were either cited or citing had information as the most frequent word, while communication was the most frequent for communication articles that were either cited or citing.

B. Word Groups and Roles in Citing and Cited Articles

Although the word-frequencies provide a good sense of the nature of concerns of cross-disciplinary citations, they are in essence removed from

TABLE 9.5

(A) Words in Article Titles of Communication Journals Citing Articles in Library & Information Science Journals

4 Times: Communication
3 Times: Mass Foreign Information
2 Times: Article Journals Readers Research Technology Theory Organization Media
1 Time: Elizabeth Timothy America's First Woman Editor Sponsorship Nonmonetary Incentive Response Rate Sampling Picture Preferences Children Young Adults Four Activities Country New Effects Transnational Corporation Example Bertelsmann Working-class Family Community Reading Late Nineteenth-century America Electronic Emotion Guide Paradigm Socioemotional Content Role Toward Critical Universal Access Interdependence Diffusion Computer-mediated Network Interactive Social Processing Model Use Following Money Trail Years Measuring Economy

(B) Words in Article Titles of Library & Information Science Journals Citing Articles in Communication Journals

14 Times: Information
9 Times: Communication
5 Times: Library
4 Times: Policy
3 Times: Technology Impact System Analysis Computer-mediated Organization Electronic
2 Times: Review Public Learning Data Research Perspective National Computing Current Science Problems Production Media Social Trends

(C) Words in Article Titles of Communication Journals Cited by Articles in Library & Information Science Journals

25 Times: Information
23 Times: Communication
18 Times: Policy
17 Times: Computer
14 Times: System Research
12 Times: Telecommunication
11 Times: Electronic
10 Times: Social
9 Times: Technology
8 Times: EFT Service
7 Times: Media Office Public Implication Order World
6 Times: Use Evaluation Message
5 Times: Exchange Organization Data New University Alternative Instructional Productivity Description International
4 Times: WARC Agenda Teleconferencing Report Study Communicating Third Programs Article Computer-based Videotex Utility
3 Times: Concept Some Human Educational Findings Teletext Conference Automation Making Through Developing Privacy Confidentiality Analysis Emergence Standards Informatics Development Who National Foreign News Call Community Macbride Response Hidden Mass Speech

(D) Words in Article Titles of Library & Information Science Journals Cited by Articles in Communication Journals

9 Times: Communication
6 Times: Information Computer-mediated
4 Times: Impact Organization System
3 Times: Service Use Book Interpersonal
2 Times: Co-citation Literature Computer-monitored Science Research
1 Time: Writings Archives Historical Manuscripts Current First Librarian America Attitudes Toward Retrieval

their linguistic context. We are not conducting linguistic or structural analyses of the meaning of article titles, but analyzing the cooccurrences of words within each article title does retain some of the relationships and the meaning among the words. Here, word groups consist of words that appear in at least two articles (with the exception of the additional analysis with a cutoff of three articles). Table 9.6 portrays the network analysis results.

For communication articles citing LIS articles (9.6A), one word group resulted, derived from the bibliometric article on U.S. and foreign mass communication journals. Note that this group is a very specialized topic in just one article, indicating that the numerous frequent words noted in the prior section must occur throughout a variety of article titles. The only other set of frequently cooccurring words is information and organization, generally concerning impacts of information systems in organizational settings.

The word-network analysis of LIS articles citing communication articles (9.6B) shows a concern with impacts of computer-mediated communication systems. Other words that tend to cooccur as isolated links to this group involve policy, trends, review, technology, and electronic.

The much more frequent communication articles cited by LIS articles (9.6C) provide a rich word-network structure. The first group is quite large, involving a wide variety of topics such as communication, information, technology impacts, international communication, office automation, telecommunications policy, and bibliometric evaluations of publication productivity. The second group concerns standards about and evaluation of electronic mail. The third and fourth groups concern the New World Information Order. Related frequently cooccurring issues involve teleconferencing, development, and data. Teletext and videotex appear in article titles together more often than with other words. If we increase the cutoff threshold to 3 for these article titles (9.6D), the word groups become a bit more distinctive (these results are not portrayed in table 9.5). Group 1

TABLE 9.6

(A) Network Structure of Words in Titles of Communication Articles Citing Library & Information Science Articles, Cutoff Strength = 2

Group 1	Dyad Members
Article	Information
Mass	Organization
Communication	
Foreign	
Journals	

(B) Network Structure of Words in Titles of Articles in Library & Information Science Journals Citing Articles in Communication Journals, Cutoff Strength = 2

Group 1	
Communication	
Organization	
Impact	
Computer-mediated	
Analysis	
Isolate (T2)s	**Dyad Members**
Review	Library
Technology	Learning
Data	
Policy	
Research	**Tree Nodes**
Production	Information
Trends	Media
Electronic	

(C) Network Structure of Words in Titles of Communication Articles Cited by Library & Information Science Articles, Cutoff Strength = 2

Group 1	Group 2
Communicating	Use
Concept	Electronic
Communication	Standards
Information	Description
Research	Message
Human	University
Impact	Utility
Technology	
Media	**Group 3**
Alternative	Informatics
Instructional	Third
International	World
Computer	Call
EFT	New
Office	Order
System	

Agenda	**Group 4**
Public	Report
Policy	Macbride
Service	Response
Implication	
Social	**Isolate (T2)s**
Telecommunication	Some
Organization	Development
Automation	Teleconferencing
Making	Developing
Through	Data
Privacy	Who
Confidentiality	Foreign
Study	Mass
Emergence	Computer-based
Community	
National	**Dyads**
Evaluation	Teletext
Article	Videotex
Productivity	
Programs	**Liaisons**
Speech	Exchange
	Findings
	Hidden

(D) Network Structure of Words in Titles of Communication Articles Cited by Library & Information Science Articles, Cutoff Strength = 3

Group 1	Group 4
Communicating	Impact
Information	Office
Research	Organization
Technology	Automation
Computer	
EFT	**Group 5**
Public	Communication
Policy	Programs
Exchange	Speech
Findings	
Implication	**Isolate (T2)s**
Through	Instructional
Privacy	Service
Confidentiality	Teleconferencing
	Making
Group 2	Study
Use	Article
System	
Electronic	**Dyad Members**
Description	Teletext

Message	Videotex
University	
Utility	**Tree Nodes**
	Social
Group 3	Telecommunication
Informatics	Productivity
Third	
World	
Call	
New	
Order	

(E) Network Structure of Words in Titles of Library & Information Science Articles Cited by Communication Articles, Cutoff Strength = 2

Group 1	**Isolate (T2)s**
Information	Service
Use	Frontier
Impact	Extent
Organization	Nature
Interpersonal	Ownership
Computer-mediated	Southern
Communication	Indiana
Computer-monitored	1800–1850
Data	Dimensions
Science	Perceived
Research	Accessibility
System	Implication
	Delivery
Group 2	
Co-citation	**Tree Nodes**
Literature	Book
Measure	

concerns telecommunications and information policy; Group 2 is the set of words from an empirical study of a university electronic mail system; Group 3 is about the New World Information Order; Group 4 is clearly about the impacts of office automation; and Group 5 is about the evaluation of speech communication programs. Linking words include social, telecommunication, productivity, and teleconferencing.

The final word-network analysis concerns LIS articles cited by communication articles (9.6E). Two groups emerge: one concerning evaluation of computer-mediated communication systems, as well as use of computer monitored data for such studies, and one concerning bibliometric co-citation.

(4) Content Context of Cross-disciplinary Citations.

Table 9.7 (A) shows that, overall, the three most frequent types of articles that made cross-disciplinary citations were social reviews, social science theory/method, and empirical studies, with about one/fifth of all citations made apiece. Policy reviews are next, with 15 percent, followed by policy theory/problems, bibliographies, and history/biographies. Communication articles making cross-disciplinary citations were primarily concerned with theory or empirical studies (approximately 29 percent each) and history/biography (21 percent), while LIS articles were primarily reviews (25 percent), followed by studies (23 percent) and policy reviews (15 percent).

Overall, the most frequent context for making a cross-disciplinary citation was as a reference to prior results (nearly 50 percent), as shown in table 9.7 (B). The next most frequent citation context was to a social or policy problem (17 percent). Approximately 7 percent of all cited cross-disciplinary articles were not in fact mentioned in the text of the citing articles! The primary context for cited communication articles was also for prior results, but the next most frequent context was as a problem (20 percent) or reviews (often a string of citations) (10 percent). The primary context for cited LIS articles was again for prior results (43 percent), followed by reviews (30 percent) and methodological issues (including descriptions or definitions) (17 percent).

Finally, what is the relationship between the nature of the citing article and the context of the citation made? Table 9.8 shows that the most frequent relationships all involved citations to prior results (including empirical studies, results, and archival sources of facts), from social reviews (17 percent), empirical studies (9.6 percent), policy reviews (8.5 percent), and social science theory/concept articles (7.3 percent). The only other frequent citation relationship was from policy reviews to articles concerned with social issues or some policy problem (9 percent).

Discussion

The variety of analytical methods used in this study provides a multidimensional perspective into the general question motivating this study: Are concepts, disciplines, and research involving information and communication converging? In spite of taking a narrow focus on this broad question by (1) considering only the content and context of the actual citations between the disciplines of communication and library and information science; (2) analyzing citations only during the period of 1977–1987; and (3) using one particular source for identifying the journals and citations to

TABLE 9.7
Cross-Tabulation of Disciplines of Citing Article and Context Category of Citing and Cited Articles

Discipline of Citing Articles	Categories of Citing Articles							
Frequency / Percent / Row Pct / Col Pct	Social Science		Either	Policy		Either		
	Review	Theory	Study	Review	Theory	Bibli.	History Biogr.	Total
Comm	1 1.85 7.14 9.09	4 7.41 28.57 40.	4 7.41 28.57 30.77	0 0. 0. 0.	0 0. 0. 0.	2 3.70 14.29 66.67	3 5.56 21.43 60.	14 25.93
LIS	10 18.52 25.00 90.91	6 11.11 15.00 60.	9 16.67 22.50 69.23	8 14.81 20. 100.	4 7.41 10. 100.	1 1.85 2.50 33.33	2 3.70 5.00 40.	40 74.07
Total Percent	11 20.37	10 18.52	13 24.07	8 14.81	4 7.41	3 5.56	5 9.26	54 100.

Articles	Context Categories of Cited References						
Frequency / Percent / Row Pct / Col Pct	Theory	Results	Method	Problem	Review	Unlisted	Total
Comm	11 6.21 7.14 91.67	76 42.94 49.35 88.37	10 5.65 6.49 71.43	30 16.95 19.48 100.	16 9.04 10.39 69.57	11 6.21 7.14 91.67	154 87.01
LIS	1 .56 4.35 8.33	10 5.65 43.48 11.63	4 2.26 17.39 28.57	0 0. 0. 0.	7 3.95 30.43 30.43	1 .56 4.35 8.33	23 12.99
Total Percent	12 6.78	86 48.59	14 7.91	30 16.95	23 12.99	12 6.78	177 100.

Note: For Citing cross-tabulation, Chi-Square = 12.6, $p<.05$—however, 71% of cells have expected counts less than 5.
For Cited cross-tabulation, Chi-Square = 14.2, $p<.01$—however, 42% of cells have expected counts less than 5.

TABLE 9.8
Cross-Tabulation of Content Category of Citing Article and Context Category of Cited Article

Categories of Citing Articles	Context Categories of Cited References						
Frequency / Percent / Row Pct / Col Pct	Theory	Results	Method	Problem	Review	Unlisted	Total
Social Science: Review	3 1.69 5.66 25.00	30 16.95 56.60 34.88	6 3.39 11.32 42.86	6 3.39 11.32 20.	4 2.26 7.55 17.39	4 2.26 7.55 33.33	53 29.94
Social Science: Theory Concept	8 4.52 25.00 66.67	13 7.34 40.63 15.12	3 1.69 9.38 21.43	2 1.13 6.25 6.67	6 3.39 18.75 26.09	0 0. 0. 0.	32 18.08
Social Science or Policy Study	1 .56 3.33 8.33	17 9.60 56.67 19.77	3 1.69 10. 21.43	1 .56 3.33 3.33	8 4.52 26.67 34.78	0 0. 0. 0.	30 16.95
Policy: Review	0 0. 0. 0.	15 8.47 37.50 17.44	2 1.13 5.00 14.29	16 9.04 40. 53.33	0 0. 0. 0.	7 3.95 17.50 58.33	40 22.60
Policy: Theory/ Model/ Problem	0 0. 0. 0.	6 3.39 54.55 6.98	0 0. 0. 0.	5 2.82 45.45 16.67	0 0. 0. 0.	0 0. 0. 0.	11 6.21
Biblio-graphy	0 0. 0. 0.	0 0. 0. 0.	0 0. 0. 0.	0 0. 0. 0.	5 2.82 100. 21.74	0 0. 0. 0.	5 2.82
History or Biography	0 0. 0. 0.	5 2.82 83.33 5.81	0 0. 0. 0.	0 0. 0. 0.	0 0. 0. 0.	1 .56 16.67 8.33	6 3.39
Total Percent	12 6.78	86 48.59	14 7.91	30 16.95	23 12.99	12 6.78	177 100.

Note: Chi-Square = 112.2, $p<.001$ however, 74% of cells have expected counts less than 5.

be analyzed (ISI's Journal citation Report), we can nevertheless begin to get an in-depth, empirical picture of one particular arena for possible convergence between information and communication.

What is the direction and pace of cross-disciplinary convergence in the form of citations? The bulk of the citations are from LIS articles to communication articles, and *to* a broader range of communication articles than *from* communication articles. Further, many communication authors are cited by two or more LIS articles. LIS articles also seem to cite Communication articles a bit more quickly.

Who are the authors involved in cross-disciplinary citations?Based upon the author analyses, the bases for convergence in communication and LIS include six distinct sets of authors concerned with domestic telecommunications policy, international telecommunication policy, privacy and academic evaluation, research and theory on computer-mediated communication and information systems, use of print mass media, and computer communication and information services.

What are the cross-disciplinary articles about, based on article titles? Overall, the most frequent words occurring in the titles of cross-disciplinary articles include (or are related to) information, communication, policy, and computer-mediated communication research and impacts, with a number of less frequent words such as co-citation. Word-network analyses identified meaning-units of the most frequently cooccurring words in article titles, such as telecommunications policy, international information policy issues, information and organization, and impacts and research on computer-mediated communication.

What are the cross-disciplinary articles about, based on the nature of the article? They are mostly concerned with empirical studies and reviews and theoretical discussions of social science topics. Communication articles are more concerned with theoretical issues and empirical studies, while LIS articles are more concerned with reviews and empirical studies.

What are the contexts of the cross-disciplinary citations? Articles are cited by the other discipline primary because of results that seem relevant to the purposes of the citing article. Other than this context, communication articles tend to cite LIS articles that provide reviews and methodological discussions (mostly about computer-monitored data), while LIS articles tend to cite communication articles that discuss social and policy problems and review topics of interest.

In summary, we can conclude that while there may be growing convergence between concepts, institutions, and disciplines interested in general and theoretical aspects of information and communication, there is a small amount of exchange of research on specific topics between the disciplines of communication and library and information science. The particular

form of this exchange does not concern issues of linguistics, semiotics, social construction of knowledge, or language philosophy. Rather, the authors and articles that cross the formal boundaries of these two disciplines are concerned primarily (though not exclusively) with more pragmatic issues centered around telecommunication policy, research and theory on computer-mediated communication systems, and general bibliometric analyses of program and disciplinary evaluation. In most ways, the exchange is asymmetric, with LIS citing far more communication articles than vice versa, with citing communication articles being more theoretical in nature while citing LIS articles oriented more toward reviews, and, although both have equal frequent interest in prior studies, with citations to communication articles being in the context of social issues or problems and citations to LIS articles being in the context of reviews.

The data and analyses presented here seem to indicate that there is a need, and opportunity, for sharing and overlap between these two disciplines in these areas. As Crawford (1990) and Paisley (1984, 1986) proposed, both disciplines have interest in social aspects of communication and information systems, both are concerned with information policy issues, and both have some interest in ways of evaluating scientific communication. The initial forms of convergence between these fields are primarily social and behavioral, not cognitive or philosophical, and centered around the uses and implications (both organizational and social, for management and policy concerns) of new information/communication systems, rather than their design, performance, or technical characteristics. Institutions, curriculum developers, textbook authors, library collection decision-makers, Ph.D. admission committees, faculty search committees, and book editors, as well as others, may use such preliminary evidence to help guide them in fostering further convergence between the two disciplines perhaps most obviously interested in communication and information—communication science and library and information science.

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