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This study looks at other-field citation rates of library and information science (LIS) literature. It focuses on ten prolific library and information science researchers and the amount of other-field citations they each received in an effort to determine how applicable LIS literature is to other related fields. While other-field citations were found to be rising to LIS literature, LIS received other-field citation rates are still much lower when compared to other related fields' rates.

Headings:

Citation analysis

Library and information science research

OTHER-FIELD CITATION RATES OF LIBRARY AND INFORMATION SCIENCE LITERATURE

by
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INTRODUCTION

Library and Information Science literature[1] is often criticized for its shallow research focus, its resistance incorporating what research there is within a theoretical framework, the applied nature of what little theory is generated, its seeming refusal to use relevant theories from other fields, and the inability to come up with larger theories that can be applied across the field and other social sciences. A significant number of studies have been published that analyze library and information science (LIS) literature, many with a critical tone. Self-analysis of our literature is nothing new: according to William Fisher this trend shows itself as far back as 1937 with a letter to the *ALA Bulletin* (Fisher, 1999). A quick glance through the most reputable journals in our field shows this trend continuing. Criticism of LIS literature is flung far and wide and suggestions are made, but what is the current state of quality of this literature, and how do other fields view its quality and applicability?

There are many ways to look at the quality of a field's literature including looking at different citations rates, measuring the amount of theory used and developed, and examining the quality of publications and the reasons for publishing. This paper will examine each of these issues as addressed in previous studies, and will then take a much closer look at citation rates to LIS literature from inside and outside LIS.

Theory

Looking at the literature of library and information science reveals a discipline that could be characterized as unsophisticated and splintered. Theory, in general, seems to be lacking both in support of, and as a result of, the research being done. The amount of theory and level of research present in LIS papers has been explored in a number of studies.

Grover, Glazier, and Tsai (1991) published a particularly comprehensive study that looked at the amount of actual research being published in library and information science literature. They performed a content analysis of these articles looking at the level of theory and development found in each. Based on a random sample of LIS literature, they found that only 25% of the published articles qualified as "research" based (n=659). Of that 25% determined as actual research, 46% of the articles contained no statement of theory, which was defined as a generalization about the relationship or phenomena seen. This is an appalling statistic considering the reason for undertaking research, arguably, is to formulate a generalization that can then be either applied directly to the field, or serve as a theoretical base. Of the total sample of research articles, 13.3% were at the principle level of theory. Principles can be obtained experientially as opposed to experimentally, usually developed through practice, and are the lowest level of applied theory. Substantive theory was present in 29.1% of the research articles. This type of theory is grounded in research and is basically an applied research theory although it may have implications for the development of formal theory. And 11.5% of the research articles generated formal theory, which can be applied, but is stated at the discipline level. None of the articles gave grand theories, which are theories that cross disciplines and are the

highest level of applied theory. Looking at the overall content of the articles, they found 56.4% were descriptive, 23% were explanatory, and 20.6% were predictive. Descriptive research merely describes phenomena with no explanation or prediction involved and is the least sophisticated level of research. Explanatory research describes phenomena but also gives a reason behind it. And predictive research, the highest level of research, describes and explains research, but also predicts future behavior. The authors concluded that a more mature discipline would attempt to aim research articles at a higher level of theory (formal and above) as well as move towards a more predictive literature. (Grover, et. al., 1991).

More recently, Julien and Duggan looked at the presence of theory in information needs and uses literature (a sub-section of the LIS body of literature). Their general findings supported the conclusions of Grover et.al. on the lack of substance in LIS literature in that only 18.3% of their sample (n=300) had any grounding in theory (defined as "based on a coherent and explicit framework of assumptions, definitions, and propositions that, taken together, have some explanatory power"). This number is particularly troubling because 68.3% of the articles studied were research articles, which should have some mention of theory contained within. Not surprisingly, their study also found that researchers, as opposed to practitioners, were more likely to use theory in their articles, and that scholarly publications contained more articles based on theory than professional journals contained (Julien and Duggan, 2000).

In yet another article, Pettigrew undertook an analysis of the presence of theory involved in information science literature. Pettigrew points out in her literature review that the use of theory indicates a field's maturity, and that internally generated theories

gain recognition by other fields. This study found that 34.1% of the articles sampled (1,160=n) incorporated theory. And of those articles, theory papers and literature reviews cited theory most often, with empirical research papers having one of the lowest (7th out of 10) theory citation rates of types of those papers. This shows LIS research papers are not basing their research on theories, and other studies have found they are not generating new theories using this new data. Happily, 71 new IS theories were proposed in the body of literature examined, which supports the claim of a growing body of IS theory (Pettigrew, 2001).

These results again point to the immaturity of the LIS field when measured by theory use. Meyer and Spencer recommend building a more theoretical foundation: fields with a strong theory base are cited more by other fields and this theory building would thus attract the attention of other fields (Meyer and Spencer, 1996, p.32).

These results also point to what must be a lower standard for LIS articles and research. Grover et. al. observed that collected data was often not thoroughly analyzed, or even analyzed at all, and that the overall organization of research articles were poor with essential elements (like statement of purpose) often missing (Grover et. al., 1991). This is a sentiment voiced by others within the field: Floyd and Phillips surveyed library science editors and authors and found that the majority felt LIS literature was less rigorous then other fields (Floyd and Phillips, 1997).

Insularity

When LIS literature does use other research as a framework for its articles, it apparently does so in an insular way, rarely venturing out of the comfortable confines of

its own discipline. A particularly vivid place to see this is in LIS citation rates to other fields. Bracken and Tucker found that in bibliographic instruction literature, authors cite literature within the library science field three times as often as literature outside of the field. This represents an increase in same-field citation rate from previous studies. Gatten supported this conclusion when he looked at the intersection of library science and sociology in terms of the sociological aspects of libraries. He found that library science cited far less sociology research then sociology cited library science literature when dealing with this topic. Julien and Duggan also found a mean of only 25% of the total citations, in their examined information needs and use articles, were to fields outside LIS, the highest proportion, 42.9%, going to the social sciences (Julien and Duggan, 2000). Interestingly, however, in Pettigrew's study of theory presence, only 29.9% of the theories cited originated in the IS literature, whereas 45.4% came from the social sciences, 19.3% from the sciences, and 5.4% from the humanities (Pettigrew, 2001, p.67). This probably stems from the fact that the field of LIS itself contains very few theories to draw on, requiring other field theory citation and use. Looking at a broader study Grover et. Al. found a 33.6% citation rate to fields outside LIS, leaving almost two-thirds of the citations in LIS literature to itself (Grover et. al., 1991).

Gatten hypothesized that an applied science such as library science cites within its own field in a topical approach, whereas a research science such as sociology takes a theoretical and methodological approach which would lead it to relevant other-field documents (Gatten, 1991). From these studies, and others like them, it can be shown that LIS is not utilizing relevant theory and research from other fields to frame our findings. Meyers points out that by using other fields' theories we are more likely to share

commonalities with them. Extrapolating from this sentiment we can suppose that LIS would then be more useful to them and it would strengthen our research base as well (Meyer and Spencer, 1996).

Other-Field Citations

Another way to gauge the development of a field is to look at its impact on other fields. Using citation analysis can be a concise way to measure how relevant Library and information science literature is to other fields. Clement So looked at the impact of LIS on other fields, and found it had a low "other field affinity" value. An other-field affinity value (OFV) looks at all of the citations to a field's literature, and what percentage comes from outside the discipline. LIS came in the lowest with an 8% OFV, while more developed fields generally have an OFV of 25% or higher. He concluded that this was due to the applied nature of the LIS field, a comment that fits in with Grover et. al's conclusions. Cronin and Pearson's study of six top authors in Information Science found an OFV[2] of 9.5% (Cronin and Pearson, 1990). More recently, Meyer and Spencer found that the OFV for library and information science had risen to 13%. This is still well below the aforementioned 25% goal, but this issue may indicate a maturation of the field since So's study. In a more focused study, Pettigrew found that IS theory is not heavily cited outside the field, except by IS authors publishing in other literatures. In fact, most of the IS theory cited outside the field stems from two principal authors (Dervin and Salton), and when these outliers are taken out of the sample, IS theory other field citation rates fall to 8.9%. More tellingly, these two authors are not primarily affiliated with IS and publish broadly outside the IS literature (Pettigrew, 2001).

Meyer and Spencer also looked more closely at which fields, in particular, are citing LIS literature. They found that outside citations are coming from a wide range of disciplines, although the majority fall within five subject areas. Computer applications and cybernetics cited LIS the most frequently (15.5%), followed by the social sciences (11.6%), medicine (10.2%), psychology (9.9%), and education (6.5%). Two LIS journals, *Scientometrics* and the *Journal of the American Society for Information Scientists*, received the majority of the citations with a combined score of 44.9% (Meyer and Spencer, 1996).

There are several possible reasons other fields are not citing LIS literature. The lack of real research, or a theoretical base, may translate into a lack of relevance in other disciplines' research. This lack of real research within the LIS discipline also means less theories from outside the field are being used as a conceptual framework for our research, thus other fields have less in common with us. This lack of true, quality research might be traceable to publishing trends and reasons, and there may be some changes Library and Information Science programs need to make before an improvement is seen.

Publishing Trends

The lack of other field citations, and the poor quality of research as indicated by a faulty research process, lack of relevant theory citation, and lack of theoretical basis, might be traced to several factors. Fisher's results, which validated many earlier studies, showed that librarians in academic arenas publish to attain promotion or tenure (Fisher, 1999). This conclusion supports Floyd and Phillips' earlier findings that most

authors' reasons for publishing focus on personal reasons (promotion, tenure, raises, etc.) rather than professional reasons (dissemination of knowledge, contribution to theory base, etc.) (Floyd and Phillips, 1997). With authors publishing for personal reasons, rather than for professional, a lack of commitment to true research is not surprising.

The journals themselves may also be contributing to the problem. Fisher points out in his conclusion, that journals are trying to deal simultaneously with research and best practice articles, so those readers looking for one will always be disappointed with a chunk of the journal as a whole, and he recommends clearer objective statements from journal publishers (Fisher, 1999). Might this also be confusing those researchers in other fields? If a journal that appears at first to have "true" research articles in it (that is one deemed a scholarly publication with a peer review process) ultimately contains several best practice articles completely irrelevant to that researchers' purpose they may stop reading the journal, or worse write the LIS field off as a waste of precious time. The separation of the article type within a journal might also spur more serious research, as a scholarly journal would contain only research-based articles. Therefore those librarians aiming for tenure or promotion would need to publish high quality research in these journals, hopefully raising the level of theory and quality of research.

The purpose of this study is to look at other-field citations of LIS literature. Has the OFV of LIS increased? Are other fields finding applicability in LIS literature? While the critics are correct in their critique of LIS research, is the research as bad as these studies have shown?

METHODOLOGY

This investigation uses citation analysis to trace other-field citations to library and information science literature. Budd created a list of the most heavily cited LIS authors, from which the top ten authors were used for this study (Table 1) (Budd, 2000). In using the most heavily cited authors in the field (based on combined LIS and other-field citations), this set is meant to represent the ideal citation patterns for the field. Of course, there may exist authors in the field of LIS more heavily cited by outside fields than the authors on this list, but the LIS acknowledged value of their work is meant to balance out any other methodological issues.

TABLE 1
Budd's List of Authors Ranked by Citation Rates

Author	**Rank**
Hal Varian	1
Nicholas Belkin	2
Tefko Saracevic	3
Gary Marchionini	4
Blaise Cronin	5
Marcia J. Bates	6
Christine Borgman	7
Charles McClure	8
Peter Hernon	9
Carol Kuhlthau	10

The ISI Web of Science database traces citations to and from articles within a set of indexed journals, and thus was used in this study. Using the Arts and Humanities, Social Science, and Science indexes, this study traced citations to the ten authors for the period of 1996-2001 (partial data for the final year). Within each of these three broad subject areas, ISI indexes core journals which are chosen by ISI as the most important

journals in a given field, citing Bradford's Law and the impracticality of indexing all a field's literature as the reasons for being selective. Bradford's Law states that the bulk of a field's significant results and publications are published in a relatively small number of journals. Thus, according to this Law and ISI's statements, using only those journals indexed in the ISI databases causes no methodological problems. However, it must be acknowledged that publications and citations will be excluded because of the constraints on the journal titles examined, and books and book chapters are also excluded.

By conducting a "general reference search," authors' last names and first initials were entered which reveal a list of works published by that author and cited in another article. Several authors may share names and initials, or publish under several variations. However, by trying variations of authors' names and comparing institute affiliation to curriculum vitae for each author, the record of their publications contained within this database can be considered as complete as possible.

Citations to authors come from other articles indexed by these databases. Articles citing the original author's works could be written by that same author, a process of self-citation, but these were counted as regular citations because they are part of the normal citation process. It is important to remember that a particular author may have written an article that appeared in a journal, or some other publication format, not indexed by ISI.

When a list of cited articles by a particular author is generated, articles will appear as either 'hot linked' or as a 'dead link'. 'Hot linked' articles lead to more bibliographic information, the full title of the article, the author(s) who wrote it, the institutional affiliation(s) of the author(s), possibly an abstract, the number of citations this particular article referred to, and the number of times this article has been cited in subsequent

literature. By following the link to "Times Cited", the database generates a list of articles that cited the original article. Again, it is possible that the article was cited in a journal or publication type not indexed by ISI, and the statistics collected for this study would not include that citation record.

'Dead link' articles do not lead to any more information in the ISI database. What appears on the screen is simply the last name and initials of the author, the title of the journal the publication appeared in, and the year it was published. Most likely, this article was published in a journal not indexed by ISI however because ISI does not monitor this data for quality or consistency, a variation on an abbreviation or a title for a journal included by ISI might show up. In this case, it is fairly certain the citation was to an article published in an ISI journal, but there is no information about who published the citing article because of the journal name variation. This leads to a dead end because the bibliographic information has not been verified by ISI and cannot be trusted, and these types of citations were ignored for the purpose of this study, based on the assumption that these types of errors would even out across disciplines and time.

Apart from issues with the ISI database in particular, citation analysis, in general, has many methodological concerns that should be fully understood before interpreting the results of this study. Not all documents used for a research project may have been actually cited in its bibliography, and this could lead to fewer citations to these authors. Similarly, articles that would have been relevant to a researcher's study may not have been found, either because of under-indexing or because they were published in a field not known about or under-used by the researcher. This happenstance may very well affect the authors studied here. Finally, an idea, technique, or theory may be so well-

known that a citation is not given for it because it is so widely used or understood (for a more in-depth discussion of these methodological concerns see Smith, 1981).

For each citation to an author's work, the field of the citing article was recorded as determined by the subject classification of the journal it appeared in. Journal subject classifications were based on the subject classifications given in ISI's *Journal citation report*. These subjects were then grouped for easier analysis, using common subject groupings seen in libraries and universities in the United States: science, medicine, social science, humanities, business, computing, and law. Self-citations were included in the study as a legitimate citation because self-citation is a recognized part of the citation process. Articles that were written by two authors from the list were counted twice to give credit to each contributor, as were articles where studied authors were not the first author. Citations to letters and editorials were also included as valid citations.

To determine which fields, other than library and information science, are citing LIS literature, subject classifications of the journals in which the studied authors' articles appeared in were recorded, as were subject classifications of the citing journals. Subject classifications were based on ISI journal subject assignment. Because of the size of the study sample, subject classifications were not assigned at the article level, although this should be part of a follow-up to this study.

Data was then entered in Excel spreadsheets and statistics run within the collected data variables. Variables include the discipline of both the citing and cited work, the rank of the author (taken from the Budd study), the number of cites from each field category, and the other-field affinity value for authors and journals. These same variables were plotted in an Excel spreadsheet to run more basic statistics.

Journals that published articles by these ten authors (and were subsequently cited) are mentioned with the latest title. For instance, although an author may have published an article *in Journal of the American Society for Information Science*, if they also published an article in the later title name of *Journal of the American Society for Information Science and Technology* the latter name was recorded only. But, if a later name exists for a journal title that did not contain articles by these ten authors, the earlier name (being the name it was cited under) is reported.

RESULTS

For the ten authors, for the years 1996-2001 (partial data) there was a total of 2,140 citations. Library and information science accounted for 1,764 of those citations, and other-fields outside LIS contributed 376 of the citations. This results in an other-field affinity value (OFV) of 17.6%, found by taking the other-field citations (376), dividing it by all citations (2,140) and multiplying by 100. Table 2 shows authors ranked by the total citations they received, both LIS and other-field combined, for the time period of this study. Belkin, Borgman, Cronin and Saracevic all received over two hundred and fifty citations, while Cronin wrote the most articles out of the ten, with fifty-six, with McClure close behind, with forty-four. The breakdown of authors and their other-field and LIS citations are shown in Table 3, ranked in descending order by other-field citations. Belkin, Borgman, Varian and Marchionini each received over fifty citations from other-fields, Cronin and Bates received twenty or more, while Saracevic, McClure, Kuhlthau, and Hernon received less than twenty.

TABLE 2
Authors Ranked by Total Citations Received

Author	# of Articles Written	Total Citations Received
Belkin	20	384
Borgman	35	298
Cronin	56	288
Saracevic	29	254
Bates	26	219
Marchionini	24	172
McClure	44	151
Kuhlthau	12	135
Hernon	50	130
Varian	8	109

TABLE 3
Authors Ranked by Other-Field Citations Received

Author Name	**# of Other-Field Citations Received**	**# of LIS Citations Received**	**Other-Field Affinity Value (OFV)**
Belkin	84	300	21.9%
Borgman	67	231	22.5%
Varian	72	37	66.1%
Marchionini	57	115	33.1%
Cronin	33	255	11.5%
Bates	20	199	9.1%
Saracevic	15	239	5.9%
McClure	11	140	7.3%
Kuhlthau	10	125	7.4%
Hernon	7	123	5.4%

A breakdown of these other-fields is shown in Table 12, with fifteen discrete subjects shown. Only one subject gave over one hundred citations, computer science, and only one other subject gave over fifty, communications. Two subjects gave over twenty citations, education and medicine, while five gave between ten and twenty citations; economics, psychology, engineering, business, and general social science. The rest of the other-field subjects gave less than ten citations each; general science, political science, environmental science, music, biology, and law. These subjects were then grouped together into six more general subject categories: social science (which includes communications, education, economics, psychology, general social science, and political science), humanities, science, computer science, business/law, and medicine, shown in Table 13. Computer science and social science gave the most other-field citations to LIS literature with one hundred and seventy-five and one hundred and thirty-two respectively.

Two subjects gave over twenty citations; science with twenty-nine, and medicine with twenty-two. Business/law and humanities each produced less than twenty citations.

Table 4 shows the percentage of the authors' cited articles published in non-LIS journals and the percentage published in LIS journals. Varian published all eight of his articles in non-LIS journals. Marchionini and Borgman each published five of their articles in non-LIS journals (which equaled 21% of Marchioni's total articles and 14% of Borgman's). Belkin published three articles in non-LIS journals which was 15% of his total, and Saracevic two articles or 7%. McClure only published one article in a non-LIS journal, and all of the rest of the authors published only in LIS journals.

TABLE 4
Authors' Journals Grouped by LIS and Other-Field

Author	**# Articles Published in LIS Journals**	**# Articles Published In Other-Field Journal**	**# of Articles Written During Time-Span**	**% Articles Published in Other-Field Journals**
Varian	0	8	8	100%
Marchionini	19	5	24	21%
Belkin	17	3	20	15%
Borgman	30	5	35	14%
Saracevic	27	2	29	7%
McClure	43	1	44	2%
Hernon	50	0	50	0%
Kuhlthau	12	0	12	0%
Bates	26	0	26	0%
Cronin	56	0	56	0%

These ten authors' cited articles were published in fifty journals during the time span of this study. Table 5 lists these journals ranked by the percentage that other-field citations comprised of the total citations received, or the OFV. It also shows what field each journal was designated, the number of LIS citations each received, and the number

of total articles these ten authors combined published in the journal. Table 6 shows these same journals ranked by the number of other-field citations they received. Two journals received over sixty other-field citations*; Journal of the American Society for Information Science and Technology* and *Communications of the ACM*. Three journals received over twenty other-field citations; *IEEE Journal on Selected Areas in Communication, Journal of Documentation and Human Communication Research*. Three journals received over ten other-field citations; *Journal of Economic Perspectives*, *Information Processing & Management*, and *International Journal of Man-Machine Studies*. The rest of the journals received eight or less citations from non-LIS fields.

TABLE 5
Journals Ranked by OFV

Journal Title	**# of Citations from Other-fields**	**# of Citations from LIS**	**# of Articles**	**Journal OFV**	**Subject Field of Journal**
Behaviour & Information Technology	1	0	1	100%	Social Science
Biotechnology Research and Development Trend	1	0	1	100%	Science
Byte	1	0	1	100%	Computer Science
Harvard Business Review	2	0	1	100%	Business
Journal of Economic Perspectives : a journal of the American Economic Association	19	0	2	100%	Economics
Telecommunications Policy	1	0	1	100%	Communi-cations
IEEE Journal on Selected Areas in Communication : a publication of the IEEE Communications Society	31	1	1	97%	Communi-cations
Human Communication Research	24	2	2	92%	Communi-cations
Computer	4	1	1	80%	Computer Science
Bulletin of the American Society for Information Science	3	1	2	75%	LIS
Scientific American	2	1	1	67%	Science

TABLE 5, cont.
Journals Ranked by OFV

Journal Title	**# of Citations from Other-fields**	**# of Citations from LIS**	**# of Articles**	**Journal OFV**	**Subject Field of Journal**
ACM Transactions on Information Systems	7	8	1	47%	Computer Science
Communications of the ACM	64	79	5	45%	Computer Science
Computer Networks and ISDN Systems	2	3	1	40%	Computer Science
International Journal of Man-Machine Studies	13	24	3	35%	Computer Science
Scientometrics	7	13	3	35%	LIS
Communication Research	4	8	1	33%	Communi-cations
Internet Research	5	12	2	29%	LIS
Expert Systems with Applications	6	23	1	21%	Computer Science
Information Technology and Libraries	2	9	3	18%	LIS
Online and CD-ROM Review	6	28	3	18%	LIS
Social Science Information Studies : SSIS	4	19	2	17%	LIS
Annual Review of Information Science and Technology	7	34	7	17%	LIS
Journal of Education for Library and Information	1	5	1	17%	LIS
Information Processing & Management	19	117	16	14%	LIS
Journal of Documentation	29	198	24	13%	LIS
Canadian Journal of Information Science	8	55	5	13%	LIS
Journal of the American Society for Information Science and Technology	69	513	45	12%	LIS
Library Resources & Technical Services	1	8	1	11%	LIS
Journal of Information Science	5	57	11	8%	LIS
College & Research Libraries	2	25	9	7%	LIS
Library & Information Science Research	7	93	27	7%	LIS
Library Trends	2	28	7	7%	LIS
Proceedings of the ASIS Annual Meeting	7	109	32	6%	LIS

TABLE 5, cont.
Journals Ranked by OFV

Journal Title	**# of Citations from Other-fields**	**# of Citations from LIS**	**# of Articles**	**Journal OFV**	**Subject Field of Journal**
International Journal of Information Management	1	16	4	6%	LIS
Government Information Quarterly	3	55	23	5%	LIS
Library Journal	2	42	5	5%	LIS
Library Quarterly	1	21	2	5%	LIS
Journal of Academic Librarianship	2	56	19	3%	LIS
RQ	1	42	7	2%	LIS
ASIS&T Monograph Series	0	1	1	0%	LIS
Aslib Proceedings	0	22	6	0%	LIS
Education for Information	0	3	1	0%	LIS
Information Society	0	1	1	0%	LIS
Interacting with Computers	0	3	1	0%	Computer Science
International Information and Library Review	0	3	1	0%	LIS
Journal of Library History Philosophy & Comparative Librarianship	0	2	1	0%	LIS
Libri	0	15	3	0%	LIS
Online	0	7	1	0%	LIS
Special Libraries	0	1	1	0%	LIS

TABLE 6
Journals Ranked by Other-Field Citations Received

Journal Title	**# of Other Cites**	**# of LIS Cites**	**# of Articles**	**Journal OFV**	**Field**
Journal of the American Society for Information Science and Technology	69	513	45	12%	LIS
Communications of the ACM	64	79	5	45%	Computer Science
IEEE Journal on Selected Areas in Communication : a publication of the IEEE Communications Society	31	1	1	97%	Communi-cations
Journal of Documentation	29	198	24	13%	LIS
Human Communication Research	24	2	2	92%	Communi-cations
Journal of Economic Perspectives : a journal of the American Economics Association	19	0	2	100%	Economics
Information Processing & Management	19	117	16	14%	LIS
International Journal of Man-Machine Studies	13	24	3	35%	Computer Science
Canadian Journal of Information Science	8	55	5	13%	LIS
ACM Transactions on Information Systems	7	8	1	47%	Computer Science
Scientometrics	7	13	3	35%	LIS
Annual Review of Information Science and Technology	7	34	7	17%	LIS
Library & Information Science Research	7	93	27	7%	LIS
Proceedings of the ASIS Annual Meeting	7	109	32	6%	LIS
Expert Systems with Applications	6	23	1	21%	Computer Science
Online and CD-ROM Review	6	28	3	18%	LIS
Internet Research	5	12	2	29%	LIS
Journal of Information Science	5	57	11	8%	LIS
Computer	4	1	1	80%	Computer Science
Communication Research	4	8	1	33%	Communi-cations

TABLE 6, cont.
Journals Ranked by Other-Field Citations Received

Journal Title	**# of Other Cites**	**# of LIS Cites**	**# of Articles**	**Journal OFV**	**Field**
Social Science Information Studies : SSIS	4	19	2	17%	LIS
Bulletin of the American Society for Information Science	3	1	2	75%	LIS
Government Information Quarterly	3	55	23	5%	LIS
Harvard Business Review	2	0	1	100%	Business
Scientific American	2	1	1	67%	Science
Computer Networks and ISDN Systems	2	3	1	40%	Computer Science
Information Technology and Libraries	2	9	3	18%	LIS
College & Research Libraries	2	25	9	7%	LIS
Library Trends	2	28	7	7%	LIS
Library Journal	2	42	5	5%	LIS
Journal of Academic Librarianship	2	56	19	3%	LIS
Behaviour & Information Technology	1	0	1	100%	Social Science
Biotechnology Research and Development Trend	1	0	1	100%	Science
Byte	1	0	1	100%	Computer Science
Telecommunications Policy	1	0	1	100%	Communi-cations
Journal of Education for Library and Information	1	5	1	17%	LIS
Library Resources & Technical Services	1	8	1	11%	LIS
International Journal of Information Management	1	16	4	6%	LIS
Library Quarterly	1	21	2	5%	LIS
RQ	1	42	7	2%	LIS
ASIS&T Monograph Series	0	1	1	0%	LIS
Aslib Proceedings	0	22	6	0%	LIS
Education for Information	0	3	1	0%	LIS
Information Society	0	1	1	0%	LIS
Interacting with Computers	0	3	1	0%	Computer Science

TABLE 6, cont.
Journals Ranked by Other-Field Citations Received

Journal Title	# of Other Cites	# of LIS Cites	# of Articles	Journal OFV	Field
International Information and Library Review	0	3	1	0%	LIS
Journal of Library History Philosophy & Comparative Librarianship	0	2	1	0%	LIS
Libri	0	15	3	0%	LIS
Online	0	7	1	0%	LIS
Special Libraries	0	1	1	0%	LIS

Journals are then organized according to the number of broader general subject other-field category citations received. Table 7 shows journals with the most social science citations. *The Journal of the American Society for Information Science and Technology* comes out with twenty social science citations, followed closely *by IEEE Journal on Selected Areas in Communication*, *Journal of Economic Perspectives*, and *Human Communication Research*. *Communications of the ACM and Journal of the American Society for Information Science and Technology* received the most computer science citations, with *Journal of Documentation* a distant third (Table 8*). Journal of the American Society for Information Science and Technology* received the most science and medicine citations (Table 9, 11), and *Human Communication Research* received the most business/law citations (Table 10).

TABLE 7
Journals Ranked by Social Science Citations Received[3]

Journal Title	**# of Social Science Citations Received**	**Subject Field of Journal**
Journal of the American Society for Information Science and Technology	20	LIS
IEEE Journal on Selected Areas in Communication : a publication of the IEEE Communications Society	16	Communications
Journal of Economic Perspectives : a journal of the American Economics Association	15	Economics
Human Communication Research	14	Communications
Communications of the ACM	12	Computer Science
Journal of Documentation	8	LIS
ACM Transactions on Information Systems	6	Computer Science
International Journal of Man-Machine Studies	4	Computer Science
Scientometrics	4	LIS
Information Processing & Management	4	LIS
Library & Information Science Research	4	LIS
Communication Research	3	Communications
Proceedings of the ASIS Annual Meeting	3	LIS
Computer	2	Computer Science
Social Science Information Studies : SSIS	2	LIS
Journal of Information Science	2	LIS
Government Information Quarterly	2	LIS
Library Journal	2	LIS
Telecommunications Policy	1	Communications
Scientific American	1	Science
Online and CD-ROM Review	1	LIS

TABLE 7, cont.
Journals Ranked by Social Science Citations Received

Journal Title	**# of Social Science Citations Received**	**Subject Field of Journal**
Annual Review of Information Science and Technology	1	LIS
Journal of Education for Library and Information	1	LIS
Canadian Journal of Information Science	1	LIS
College & Research Libraries	1	LIS
Library Trends	1	LIS
RQ	1	LIS

TABLE 8
Journals Ranked by Computer Science Citations Received[4]

Journal Title	**# of Computer Science Citations Received**	**Subject Field of Journal**
Communications of the ACM	45	Computer Science
Journal of the American Society for Information Science and Technology	38	LIS
Journal of Documentation	18	LIS
Information Processing & Management	12	LIS
IEEE Journal on Selected Areas in Communication : a publication of the IEEE Communications Society	10	Communications
International Journal of Man-Machine Studies	9	Computer Science
Human Communication Research	5	Communications
Online and CD-ROM Review	5	LIS
Canadian Journal of Information Science	5	LIS
Expert Systems with Applications	5	Computer Science
Annual Review of Information Science and Technology	4	LIS
Journal of Economic Perspectives : a journal of the American Economics Association	3	Economics

TABLE 8, cont.
Journals Ranked by Computer Science Citations Received

Journal Title	**# of Computer Science Citations Received**	**Subject Field of Journal**
Proceedings of the ASIS Annual Meeting	3	LIS
Scientometrics	2	LIS
Library & Information Science Research	2	LIS
Computer	2	Computer Science
Journal of Information Science	2	LIS
Social Science Information Studies : SSIS	1	LIS
Library Trends	1	LIS
Behaviour & Information Technology	1	Social Science
Byte	1	Computer Science
Computer Networks and ISDN Systems	1	Computer Science

TABLE 9
Journals Ranked by Science Citations Received[5]

Journal Title	**# of Science Citations Received**	**Subject Field of Journal**
Journal of the American Society for Information Science and Technology	5	LIS
Communications of the ACM	3	Computer Science
IEEE Journal on Selected Areas in Communication : a publication of the IEEE Communications Society	3	Communications
Journal of Documentation	2	LIS
Information Processing & Management	2	LIS
Internet Research	2	LIS
Journal of Academic Librarianship	2	LIS
Canadian Journal of Information Science	1	LIS
Annual Review of Information Science and Technology	1	LIS
Proceedings of the ASIS Annual Meeting	1	LIS
Library & Information Science Research	1	LIS
Journal of Information Science	1	LIS
Social Science Information Studies : SSIS	1	LIS
Biotechnology Research and Development Trend	1	Science
ACM Transactions on Information Systems	1	Computer Science
Scientific American	1	Science
International Journal of Information Management	1	LIS

TABLE 10
Journals Ranked by Business/Law Citations Received[6]

Journal Title	# of Business/Law Citations Received	Subject Field of Journal
Human Communication Research	5	Communications
IEEE Journal on Selected Areas in Communication : a publication of the IEEE Communications Society	2	Communications
Harvard Business Review	2	Business
Journal of the American Society for Information Science and Technology	1	LIS
Communications of the ACM	1	Computer Science
Internet Research	1	LIS
Communication Research	1	Communications
Journal of Economic Perspectives : a journal of the American Economics Association	1	Economics
Computer Networks and ISDN Systems	1	Computer Science

TABLE 11
Journals Ranked by Medicine Citations Received[7]

Journal Title	Med	Subject Field of Journal
Journal of the American Society for Information Science and Technology	5	LIS
Communications of the ACM	3	Computer Science
Bulletin of the American Society for Information Science	3	LIS
Internet Research	2	LIS
Information Technology and Libraries	2	LIS
Journal of Documentation	1	LIS
Information Processing & Management	1	LIS
Annual Review of Information Science and Technology	1	LIS
Scientometrics	1	LIS
Government Information Quarterly	1	LIS
College & Research Libraries	1	LIS
Library Quarterly	1	LIS

DISCUSSION

The purpose of this study was to determine whether, and if so how much, Library and information science literature is applicable to other-fields, and which other-fields it is applicable to. In So's original study, which covered 1983-1985, LIS received an Other-field Affinity Value (OFV) of 8%, the lowest out of the disciplines he looked at. He stated that developed fields generally have an OFV of 25% or higher, and commented on communication's low OFV of 18% (So, 1988). Cronin and Pearson found LIS had an OFV of 9.5% (although he termed it "exports" following an economic metaphor throughout the paper), a slight increase over So's findings, for the years 1980-1989 (Cronin and Pearson, 1990). Meyer and Spencer's study shows an OFV of 13.4% for the years 1972-1994. The study reported here resulted in an OFV of 17.6% for the years 1996-2001/partial (Meyer and Spencer, 1996).

As the previous studies broadened the date range, the OFV percentage rose. This study's date range falls in-between So's and Cronin and Pearson's in the number of years studied, and yet the OFV is considerably higher than previous findings. It comes closer to So's cut-off for developed fields, possibly indicating a deepening of the applicability of LIS research, and/or an increase in quality.

TABLE 12
Citations Given by Specific Subjects

Subject	**Number of Citations Given**
Communications[8]	53
Education	37
Economics	17
Psychology	17
Social Science, General	12
Political Science	4
Computer Science	175
Engineering	15
Science, General	8
Environmental Science	2
Biology	2
Business	14
Law	1
Medicine	22
Music	3

TABLE 13
Citations Given by Grouped Subjects

Subject	**Citations Given**
Library and Information Science	1764
Computer science	175
Social Science	132
Science	29
Business/Law	15
Medicine	22
Humanities	3

Computer science gave more citations to LIS literature than any of the other-field disciplines (Tables 12,13). This makes sense considering the overlap of the two disciplines. If library science could be reliably separated from information science (although whether this would be beneficial to either sub-field is questionable), it is most probable that computer science citations to library science, specifically, would be greatly decreased. However, a possible reason for so many computer science discipline citations

might stem from the fact that this group of authors published the majority of their other-field publications in computer science journals. From the raw data 63 of the 176 computer science citations (36%) came from just these thirteen articles published in the computer science designated journals. This would seem to indicate that LIS articles published in other-field journals will generate other-field citations.

TABLE 14
Articles Published in Different Disciplines' Journals

Discipline of Journal Published In	**# of articles published in**
Library and Information Science	280
Computer science	13
Communications	6
Science	2
Economics	2
Business	1
Total # of Articles:	304

The field of communications cited the studied body of LIS literature 53 times (the second-highest citing field, behind computer science). Again, there is a high degree of relatedness between LIS and communications, and it makes sense that the two disciplines would draw on each other's body of literature. Communications accounted for only 2.5% of the total citations, and 14.1% of the other-field citations (Tables 12, 13). However, considering there were fifteen discrete subjects comprising the other-fields that gave LIS citations, a single field generating 14.1% of the citations is a significant portion. The issue highlighted here is not the lack of communication citations to LIS literature in comparison to other-fields, but the dearth of other-field citations in general. Communications and computer science thus emerge as logical places to increase 'citations from' as this data shows relatedness.

An indication of where to begin this process occurs in looking at the six articles published in communications journals. They received, together, 28 of the 53 citations (52.8%), and 37 of the 132 larger grouped social sciences citations (28%) (Table 14). Again, as in computer science, publishing in the journals of related fields will yield heavier citations from those fields. In fact, looking at the 24 articles published outside of LIS journals, they account for 101 of the 376 other-field citations, which is 27%, fairly remarkable considering these articles made up only 7.9% of the total articles studied.

Generating OFVs for each journal, that is the number of other-field citations each journal received, and ranking the journal list does not give much enlightenment (Table 5). Not surprisingly, the top journals are other-field journals, with a couple of LIS journals weighing in at the top; *Behaviour and Information Technology and Bulletin of the American Society for Information Science*, and those with only one and three other-field citations respectively. Only two other LIS journals came out with an OFV above 20%; *Scientometrics* and *Internet Research*. However, OFV for journals is not the best way to measure other-field citation rates in this case because it balances their other-field citations against their LIS citations. In this case, it makes more sense to look at the actual number of other-field citations a journal received (Table 6). Two journals leap far ahead of the rest of the pack; one an LIS journal*, Journal of the American Society for Information Science and Technology* with 69 citations, and one a computer science journal, *Communications of the ACM* with 64. Focusing just on LIS journals, the second place journal is *Journal of Documentation* with 29 citations, with third place held by *Information Processing & Management* with 19. There are eight LIS journals with between 5 and 10 other-field citations, and fourteen journals with between 1 and 4 other-

field citations. Nine LIS journals received no other-field citations whatsoever. For those researchers interested in reaching wider audiences, publishing in those top five journals may help, although notice again that three out of the top five journals in this table are from other-fields.

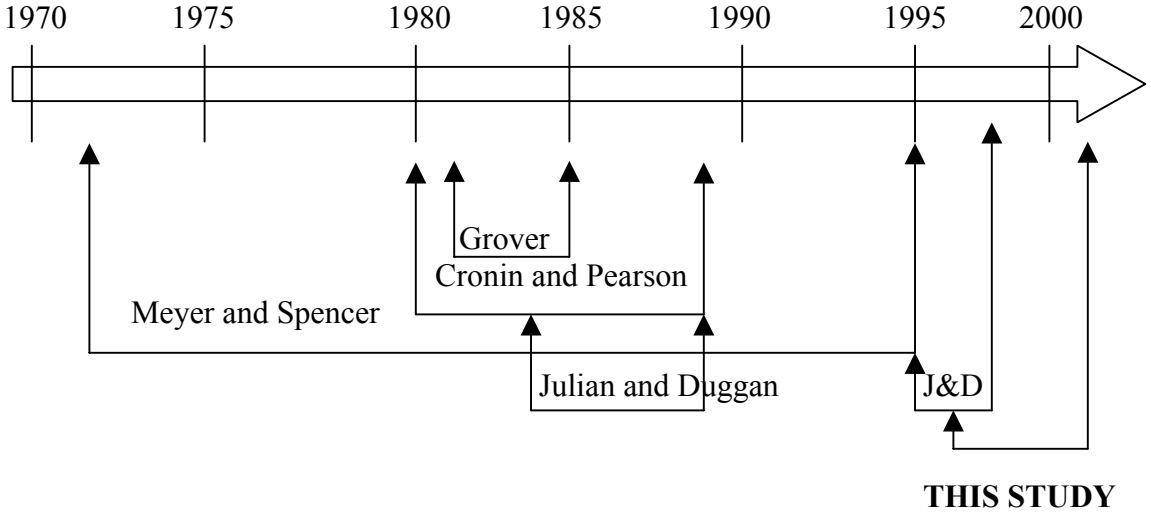
Besides publishing trends of other LIS literature in other-field journals, this study indicates which LIS journals tend to garner more other-field citations (Table 6). Tables 7 through 11 indicate which fields are citing which journals, with JASIST coming out in the top on each table.

CONCLUSION

Obviously, something is awry with library and information science literature. As pointed out in the literature review, there is a low level of theory present in LIS research publications, the literature often does not conform to the necessary structure of presentation (i.e. no hypothesis, etc) and it poorly explores its findings. Also, the citation rates to LIS literature have traditionally been extremely low, lower than any other social science, and LIS rarely cites outside of its own field even when other-field research would be particularly applicable.

This study looked at the applicability of library and information science literature to other fields. It found that LIS has an Other-Field Affinity Value (OFV) of 17.6%, much higher than previous studies have shown in the past. Looking at Figure 1, this study deals with later research then previous studies have looked at, so it is possible that there has been a greater improvement in other-field citations of our literature, as the results of this study show.

FIGURE 1



This could be due to a greater applicability of the LIS literature, or the possibility that it is now including more theory than before. However, the Grover and the Julien and Duggan articles do not seem to bear this hypothesis out (Grover et. al, 1991; Julien and Duggan, 2000). Therefore, LIS should strive to improve its theory base, both by defining what exists now as LIS theory, and then by broadening it. LIS literature might also be indexed in more databases relevant to other fields.

This higher OFV might be because all fields' OFV percentages are higher, indicating a more interdisciplinary approach among all of the fields. If this is the case, LIS could take advantage of this by publishing in other-field journals. As the results of this study showed, this seems to yield higher citation rates from other fields to library and information science. If there truly is a higher level of interdisciplinarity across all disciplines, or at least across the social sciences, then other-field journals might be striving to increase their interdisciplinarity and searching for other-field publications. By getting LIS literature on the radar screen of the other related fields through publishing in their journals, our citation rates from these fields will increase.

This study showed a high degree of relatedness between computer science and communications to LIS, and publishing in these fields' literature seems a natural choice. However, neither of these fields are "big players" in the social sciences. While there is a greater chance of citation rates from these fields, psychology, economics, business, and sociology should be strongly considered as fields to tailor research towards as these fields not only cite outside their fields more often than do LIS, computer science, and communications, but other fields cite them much more often (So, 1988).

Another possible explanation for this higher OFV may be that LIS is taking over another fields' place in So's hierarchical list. It is possible that LIS is taking over the role traditionally occupied by education or communication. If this is the case, then analysis needs to be done on what these other fields were supplying to other social sciences that LIS is not supplying. Focusing on these areas of applicability may strengthen the LIS field as a whole, suggesting worthwhile research pursuits.

The options for further study in this area are numerous. In addition to the ideas mentioned above, a logical next step for this study would be to pursue content analysis of a random sample of LIS literature following the methods of Grover et. al. and Julien and Duggan. The burgeoning of sub-fields in LIS, and the growth of the depth of LIS research, may well have boosted the amount of theory present in the LIS literature. However, it is possible that this growth has done just the opposite, making our research even more shallow than before. Another topic for further research is looking at how much LIS cites other fields.

By studying the research situation in detail to learn more about current citation patterns, while at the same time conscientiously increasing pure theory-based research articles, LIS may be able to continue raising the OFV for LIS as a discipline

END NOTES

1. No attempt will be made to discern between the two intertwined fields in this study. Some of the reviewed research has made this distinction, however , and this is noted where appropriate.
2. Cronin and Pearson term these “exports” rather than other-field citations, using an economic metaphor throughout the paper.
3. Excludes journals that received no social science citations.
4. Excludes journals that received no computer science citations.
5. Excludes journals that received no science citations.
6. Excludes journals that received no business/law citations
7. Excludes journals that received no medicine citations
8. Includes telecommunications and journalism

APPENDIX A

Authors' Various Ranking Methods

Author	Rank by Total Citations Received	Ranked by Other-field Citations Received	Ranked by OFV	Ranked by Citation Average Per Article
Belkin	1	1	4	1
Borgman	2	1	3	5
Cronin	3	5	5	8
Saracevic	4	7	9	4
Bates	5	6	6	6
Marchionini	6	4	2	7
McClure	7	8	8	9
Kuhlthau	8	9	7	3
Hernon	9	10	10	10
Varian	10	3	1	2

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