Use of the *Journal Citation Reports* for Serials Management in Research Libraries: An Investigation of the Effect of Self-Citation on Journal Rankings in Library and Information Science and Genetics

Thomas E. Nisonger

This article explores the use of the Institute for Scientific Information's *Journal Citation Reports* (*JCR*) for journal management in academic libraries. The advantages and disadvantages to using *JCR* citation data for journal management are outlined, and a literature review summarizes reported uses of these data by libraries and scholars. This study researches the impact of journal self-citation on *JCR* rankings of library and information science (LIS) and genetics journals. The 1994 rankings by impact factor and total citations received were recalculated with journal self-citations removed; then the recalculated rankings were compared to the original rankings to analyze the effect of self-citations. It is concluded that librarians can use *JCR* data without correcting for journal self-citation, although self-citations do exert a major effect on the rankings for a small number of journals.

It is unnecessary to state that management of serials has been one of the largest challenges confronting academic libraries in the past decade. A growing number of university libraries are using *Journal Citation Reports* (*JCR*) data to help reach difficult serials collection management decisions, whereas scholars use the data for journal ranking and other research purposes. There is an underlying assumption that citation indicates use of a journal by a researcher, and thus the more a journal is cited, the greater is its research value. Although acknowledging some limitations, Theresa Dombrowski maintained that "Citation analysis … can provide a fairly accurate picture of a journal's value to workers within a specific discipline," and Thomas E. Smith asserted that "the *JCR* is a helpful objective tool."[1,2] Most authorities agree that

Thomas E. Nisonger is an Associate Professor in the School of Library and Information Science at Indiana University; e-mail: nisonge@indiana.edu. *The author thanks Stephen P. Harter, Professor Emeritus, Indiana University, School of Library and Information Science, for reading a draft of the manuscript and providing valuable comments; and Kenneth B. Thompson and Ted Baldwin, two of his graduate assistants, for helping to compile the data.*

for decision-making purposes, a journal's relative rank within its discipline, rather than the raw citation score, is the critical factor. Yet, many unresolved issues surround the *JCR*'s effective utilization, including how journal self-citations (which are included in the *JCR* totals) affect the relative rank of journals. The remainder of this article briefly describes the *JCR* and its benefits and drawbacks, as well as the purposes for which librarians and scholars have used the citation data it contains. The article also reports an investigation concerning the influence of journal self-citations on *JCR* rankings for library and information science (LIS) and genetics.

Critics consider "total citations" a crude measure that unfairly advantages larger journals that publish more articles and older journals with longer back runs.

The *Journal Citation Reports*

The Institute for Scientific Information (ISI), located in Philadelphia and founded by the well-known proponent of citation studies, Eugene Garfield, publishes three major citation indexes; the *Science Citation Index* (*SCI*), the *Social Sciences Citation Index* (*SSCI*), and the *Arts & Humanities Citation Index*. In 1975 and 1977, respectively, the *SCI* and the *SSCI* began publishing a separate section (actually one or two bound volumes) entitled the *Journal Citation Reports*. The *JCR* became available on microfiche beginning in 1989, on CD-ROM in 1994, and through a Web interface in 1999. It contains a wide variety of citation data for almost six thousand journals. New editions, containing data for the current year, are issued on an annual basis. The *Arts & Humanities Citation Index* does not contain a *JCR*, presumably because journals are considered less important for scholarly communication in the humanities. The most important citation measures contained in the *JCR* are explained below.

Total Citations Received

Total citations received is the oldest citation measure, dating back to the pre-*JCR* journal rankings published in the 1920s and 1930s. The total citations figure in the *JCR* tabulates citations made during the current year to all issues of the journal for which data are being reported (current as well as back issues) from all journals covered in the ISI database, termed "source journals" by the *JCR*. It includes citations to any type of item: article, book review, letter to the editor, etc. The figure also includes citations a journal receives from itself. Citations received from nonsource journals or any book are, of course, not represented in this figure.

Impact Factor

Critics consider "total citations" a crude measure that unfairly advantages larger journals that publish more articles and older journals with longer back runs. Accordingly, the ISI developed a citation measure termed "impact factor" that normalizes for journal age and size. Impact factor represents a ratio of citations received to the number of articles published. Thus, it may be viewed as the number of times an "average" article has been cited. Figure 1 illustrates the formula for calculating impact factor, using the year 1994.

Impact factor has been subjected to considerable criticism and controversy in the professional literature. For a recent example, the reader is referred to Stephen P. Harter and Thomas E. Nisonger.[3] Nevertheless, impact factor is the most frequently used citation measure for journal collection management.

FIGURE 1
Formula for Calculating 1994 Impact Factor

$$\text{1994 impact factor} = \frac{\text{Number of 1994 citations to 1993 + 1992 articles}}{\text{Number of articles published in 1993 + 1992}}$$

Other Citation Data in the *JCR*

A journal's "cited half-life" indicates the age of its issues that were cited in the current year and potentially might be used in weeding decisions (i.e., if older issues tend not to be cited, the back runs may be candidates for removal from the collection). The *JCR* defines *cited half-life* as "the number of years going back from the current year which account for 50% of the total citations received by the cited journal in the current year."[4] In contrast, the "immediacy index" reveals how quickly a journal is receiving citations but is seldom used in serials collection management decisions. According to the ISI, "immediacy index considers citations made during the year in which cited items were published. Thus, the immediacy index of journal X would be calculated by dividing the number of all current citations of current source items published in journal X by the total number of articles journal X published that year."[5] A more detailed description of these measures and the *JCR* itself may be found in Nisonger's textbook on serials management.[6]

Following is a list of the advantages associated with the use of *JCR* citation data for serials collection management decisions:

- Objective data are provided.
- The data are available for thousands of journals.
- Four citation measures (total citations, impact factor, cited half-life, and immediacy index) plus other citation data are provided for each journal.
- The data are relatively current because the *JCR* is issued annually.
- The data can be retrieved with minimal effort.
- The citation measures are easily understood.
- The *JCR* ranks journals in a subject area by impact factor, thus providing context for interpreting the data.
- The CD-ROM version allows manipulation of the data in numerous ways, including ranking journals in a self-defined group by a variety of citation measures.
- The data represent national and international citation patterns rather than local usage in a specific library.

Following is a list of disadvantages to or limitations of *JCR* citation data:

- Only a fraction of all scholarly journals are included in the *JCR*, so data may not be available for the journal the researcher is interested in.
- Because they are created from a national/international database, *JCR* citation measures do not necessarily reflect the local needs of a particular library's clients.
- The data may be biased against non-English journals and journals published outside North America and Western Europe.
- The data do not necessarily reflect a journal's importance to its own discipline because it includes citations from journals in other disciplines.
- A journal's rankings can fluctuate from year to year.
- Self-citations may exaggerate a journal's citation measures and ranking.
- Many libraries do not have access to the data.

Literature Review

A search of the Library and Information Science online database covering 1969 through August 1999 under the term *Journal Citation Reports* retrieved 102 items. However, this author, through his own bibliographical research, is aware of many other publications that mention the *JCR*, although they are not indexed under that term in the discipline's databases.[7] A comprehensive review of every reported use of the *JCR* in library serials management or research regarding serials is clearly beyond the scope of this article. Pertinent items retrieved from the search were organized into broad categories, outlined below. Typical examples from the literature are cited for each category.

Introductions to the JCR: Introductions to the use of *JCR* for library serials collection management decisions have been provided by Nisonger and Smith, and Katherine W. McCain included the *JCR* in

her review of bibliometric tools for serials management in academic libraries.[8–10]

Journal cancellation projects: Dozens of library journal cancellation projects have been reported in the literature. A number of these used *JCR* citation data—along with other criteria—in the decision-making process. The rationale is that librarians would wish to maintain journals highly ranked within their discipline, but lowly ranked titles are candidates for cancellation. The use of *JCR* impact factors in a cancellation project at the Stanford University Biology Library has been described by Joseph G. Wible and at Thomas Jefferson University by Kate Herzog, Harry Armistead, and Marla Edelman.[11,12]

Formal journal decision-making models: A journal decision model presents a formula for assigning numerical weights to various journal evaluation criteria (e.g., use, cost, indexing, relevance, etc.) and combining them to create a separate rating for each title in a set of journals. The journals then are placed in a rank order that can be used for either subscription or cancellation decisions.[13] More than a dozen such models have been published, and several include *JCR* citation data as a variable. *SCI JCR* total citation, impact factor, and immediacy index data were incorporated into a multivariate regression for physics journals by Bruce C. Bennion and Sunee Karschamroon and in a model developed at the University of Nijmegen Faculty of Medical Sciences (in the Netherlands) by Rikie Deurenberg.[14,15]

Journal rankings: A journal ranking places the journals in a subject area or discipline in an explicit hierarchical order according to some measure of value. The potential application of these rankings for serials collection management or for scholars for manuscript selection decisions does not require elaboration. Approximately a dozen rankings using *JCR* impact factor data have been identified in the bibliographical work of Mary K. Sellen and Nisonger.[16,17] Specific examples include the ranking of public administration journals by Harold Colson as well as the ranking of both sociology and political science journals by James A. Christenson and Lee Sigelman.[18,19]

Research on journal pricing: *JCR* impact factor data have been used to investigate journal cost-effectiveness. Henry H. Barschall as well as Barschall and J. R. Arrington calculated for physics journals the cost per 1,000 published characters in relation to the *JCR* impact factor.[20,21] They termed this measure "the cost/impact ratio" and contended that "This ratio is perhaps the most significant measure of the cost-effectiveness of the journal."[22]

Additional uses: *JCR* citation data have been used in a wide variety of other research projects. For example, Donatella Ugolini and others evaluated departmental research productivity at the National Institute for Cancer Research in Genoa, Italy, through the *JCR* impact factors of the journals in which their members published.[23] Other examples could be cited in all the above categories.

Turning to the issue of journal self-citation, one should note what P. Pichappan wrote in 1995: "Very little work has been done on journal self-citation."[24] Hajnalka Maczelka and S. Zsindely, using *JCR* data for twenty-two new chemistry journals, discovered that the self-citation rate was high immediately following a journal's founding but then decreased during the first two years of the journal's existence and finally stabilized after four or five years.[25] Nisonger reported preliminary findings concerning the effect of self-citation on *JCR* rankings of LIS journals.[26] Self-citation rates for approximately forty Australian journals were reported by Pam Royale.[27] "Journal Citation Studies," the well-known series of journal rankings (covering more than fifty subjects) published by Eugene Garfield, beginning in 1972, presented self-citation rates for each journal but did not correct the rankings for self-citation.[28] A few studies have analyzed journal self-citation using data derived directly from journals rather than the *JCR*, but they are not reviewed here.

Journal Self-Citation, *JCR* Data, and the Problem Statement

Garfield has defined journal self-citation as "the common tendency for a journal to cite itself."[29] This concept should be distinguished from author self-citation, which is defined as an author citing another work he or she wrote—a separate topic beyond the scope of this study.

There are two journal self-citation measures: the self-citing rate, the proportion of a journal's references that are to itself; and the self-cited rate, the percentage of citations received by a journal that derive from itself. The distinction between *citing* and *cited* is illustrated in figure 2. If journal A contains references to journals A, B, and C, journal A is citing A, B, and C, whereas journals A, B, and C are being cited by A. Accordingly, when a journal cites itself, it is both self-citing and self-cited. This investigation focuses on the latter because journal evaluations and rankings are based on citations received from other journals rather than citations given to other journals.

Many (but not all) observers have questioned the validity of both journal and author self-citations and attribute to them less value than citations received from others. C. K. Y. So commented that "a journal with a high self-citing rate means that it is relatively 'closed,' seeking intellectual inputs mainly from itself," and Pichappan asserted that "a number of scholars have reservations about the worth of [journal] self-citations."[30,31] In regard to author self-citation, Herbert W. Snyder and Susan Bonzi observed that "There appears to be a general feeling of condemnation toward the practice of citing one's own work."[32]

As previously explained, the *JCR* includes self-citations in the calculation of the data it presents for a particular journal title. The *JCR* itself states: "Self-citations often make up a significant portion of the citations a journal gives and receives ….You may wish to recalculate impact factors without self-cites and note any changes in rank."[33] Nevertheless, with a few exceptions, individuals using *JCR* data for the purposes outlined in the preceding section did not correct for these self-citations. Indeed, there is no evidence that libraries using the *JCR* for serials management have ever corrected the data. Thus, the distinct possibility exists that *JCR* citation rankings (past, present, and future) may be distorted by journal self-citations—whose value has been questioned by some scholars. This study addresses questions such as: Do top-ranked journals owe their high status to self-citations? How many journals would occupy notably different ranking positions if self-citations were eliminated? Would the overall rankings be fundamentally different if corrected for self-citations? Should *JCR* data be adjusted for journal self-citation by individuals using them for decision-making purposes?

Methodology

The effect of journal self-citation on *JCR* rankings of LIS (selected as a social sciences discipline) and genetics (chosen to represent the sciences) journals is investigated in this study. Rankings by impact factor and total citations received are examined because these are the two most frequently used citation measures for serials management decision making. The analysis is based on the CD-ROM version of the 1994 *JCR*. The fact the data are three years old (as of the summer of 1999 when this paper was written, the most current *JCR* was 1997) should not be of concern because there is neither evidence to suggest nor intuitive reason to believe that

FIGURE 2
Distinction between Citing and Cited

If journal A contains references to:
Journal A
Journal B
Journal C

Journal A *is citing*: Journals A, B, and C
Journals A, B, and C *are cited by*: Journal A

FIGURE 3
***College & Research Libraries* Impact Factor Calculation Data**

Citations in 1994 to articles published in:
1992 = 44
1993 = 48
1992 + 1993 = 92

Number of articles published in:
1992 = 35
1993 = 35
1992 + 1993 = 70

Calculation:

$$\frac{\text{Citations to recent articles}}{\text{Number of recent articles}} = \frac{92}{70} = 1.314$$

journal self-citation patterns have changed in the past three years.

To ascertain the influence of journal self-citations on *JCR* rankings, revised rankings, corrected for journal self-citation, were compared with the original rankings, which included self-citations. The following steps were used in this process:

1. *Determine the original rankings*. This information is readily gathered from the CD-ROM. One "filters" by subject category to identify the set of fifty-nine journals classified as information and library science in the social science *JCR* and the seventy-four genetics and heredity journals in the science version. Next, one "sorts" first by total citations and then by impact factor to create separate rankings according to these two citation measures. This is how the four rankings on which this analysis is based were derived: LIS journals ranked by total citations; LIS journals ranked by impact factor; genetics and heredity journals ranked by total citations; and genetics and heredity journals ranked by impact factor. The rankings can be printed or exported into another database.

2. *Recalculate the data for each journal with self-citations removed*. In this step, the total citation and impact factor scores were recalculated with journal self-citations eliminated for each journal in the study. The necessary data are obtained from the "Impact Factor Calculation" and the "Cited Journal Listing" boxes that can be displayed for each journal in the *JCR*. (The data also are available in the *JCR*'s print version.)

Figure 3 depicts the data from the "Impact Factor Calculation" box for *College & Research Libraries*, a journal of obvious interest to readers.

Table 1 presents selected data from the "Cited Journal Listing" box for *College & Research Libraries*. The two bits of data required for recalculating the impact factor with self-citations removed are underlined.

The total citations datum for *College & Research Libraries* can easily be recalculated with the information presented above: 140 (the number of times that all years of *College & Research Libraries* were cited by itself in 1994) is subtracted from 420 (*College & Research Libraries'* total 1994 citation figure) to produce a corrected total of 280. The recalculation of *College & Research Libraries* impact factor with self-citations removed is illustrated in figure 4.

TABLE 1
Cited Journal Listing Data For *College & Research Libraries*

	Number of times articles published this year were cited in 1994					
Citing Journal	**All years**	**1994**	**1993**	**1992**	**1991**	**1990**
All journals	420	7	48	44	48	44
College & Research Libraries	140	2	18	18	16	15
Journal of Academic Librarianship	87	2	12	10	4	10
Library Resources & Technical Services	23	0	1	0	6	0

FIGURE 4
Recalculation of *College & Research Libraries's* Impact Factor by Removing Self-Citations

$$\frac{\text{(1994 citations to 1992 + 1993 articles) - (1992 + 1993 self-citations)}}{\text{number of articles published in 1992 + 1993}}$$

$$\frac{(92-36)}{70} = \frac{56}{70} = 0.800$$

The thirty-six citations that *College & Research Libraries* made to itself in 1992 and 1993 (eighteen each year) are subtracted from the ninety-two citations it received from all journals, including itself, during those two years. The revised citation count is then divided by the number of articles published in 1992 and 1993 (which, of course, remains the same), resulting in a corrected impact factor of 0.800. These recalculations were done for all 133 journals under analysis.

3. *Construct new rankings corrected for journal self-citation.* The journals were placed in descending order according to their recalculated citation scores to create new rankings corrected for journal self-citation.

4. *Compare the rankings based on corrected data with the original rankings*. Three techniques were used:

- *Pearson Product Movement correlation*: The original and corrected scores were correlated with each other using the Pearson Product Movement, a frequently used statistical test in social science research. Needless to state, the higher the correlation, the greater the similarity between the two rankings. A high correlation would indicate that the rankings are very similar to one another and that journal self-citations had minimal influence on the original *JCR* rankings.
- *Overlap among top-ranked journals*: The original top five and top ten journals were compared to the top five and ten titles in the corrected rankings. To the extent that the original and corrected rankings overlap with each other at the top (i.e., contain the same serial titles), one can conclude that elite journals do not occupy their positions because of self-citation. In contrast, a low level of overlap indicates that self-citations are impacting the rankings. Analysis of overlap among top-ranked journals has been used previously by a number of researchers, including Pauline A. Scales and Maurice B. Line, who studied the correspondence between journals requested at the British Library Lending Division and cited in both *SSCI* and *SCI*, and Nisonger, who investigated the year-to-year consistency of *JCR* rankings.[34–36]
- *Tabulation of journal movement in rank*: In calculating the ranking position, ties were prorated by adding the positions and dividing by the number of titles involved. Thus, two titles tied for tenth and eleventh place would be assigned a position of 10.5. This is a modified form of a method used by Carole J. Mankin and Jacqueline D. Bastille to compare two different journal ranking approaches for a periodical use study at the Massachusetts General Hospital Library.[37] The modified approach was also used by Nisonger to study the year-to-year consistency of *JCR* rankings.[38]

Results

The overall self-citation rate in 1994 for LIS journals was 27 percent (1,703 of 6,296 citations received were self-citations) and 11.7 percent (28,757 of 246,235) for genetics journals. Two LIS journals had a 100 percent self-citation rate: *Knowledge Organization*, which received all four of its citations from itself; and *Journal of Government Information*, with two citations both from itself. In contrast, eleven LIS titles had no reported self-citations: *Li-*

brary Trends, *Online Review*, *Government Publications Review*, *Canadian Library Journal*, *International Classification*, *Library and Information Science*, *Interlending & Document Supply*, *Journal of the American Medical Informatics Association*, *Behavioral & Social Sciences Librarian*, *Nauchno-Tekhnicheskaya Informatsiya Seriya 1*, and *Nauchno-Tekhnicheskaya Informatsiya Seriya* 2. Among genetics journals, *Genetika* displayed the highest self-citation rate at 60.6 percent (534 of 881 citations were from itself), followed by *Mammalian Genome* at 41.9 percent (677 of 1,616) and *Mutation Research* at 31.4 percent (4,727 of 15,078). Seven genetics journals had no self-citations: *Advances in Genetics, Evolutionary Biology, Journal of Genetics*, *Journal of Evolutionary Biology*, *Disease Markers, Evolutionary Trends in Plants,* and *Revista Brasileira de Genetica*.

One is tempted to speculate why the journal self-citation rate is higher for LIS than for genetics.

One is tempted to speculate why the journal self-citation rate is higher for LIS than for genetics. Although a definitive answer is elusive, several factors probably contribute to this phenomenon. Genetics journals receive a much larger number of citations (246,235 compared to 6,296), so self-citations are diluted and result in a lower self-citation rate. Because the number of LIS journals in the ISI database is smaller (fifty-nine as opposed to seventy-four genetics journals), they have fewer opportunities to be cited by other journals in their area. LIS represents an entire discipline, whereas genetics is usually considered a subarea of biology and not a discipline unto itself. Because genetics is a cutting-edge topic that receives considerable scholarly and popular attention, its journals undoubtedly receive more citations from other subject areas and disciplines than do LIS journals. Finally, it should be noted that the LIS 27 percent self-citation rate falls in the above average range, whereas the 11.7 percent figure for genetics is clearly below average. Garfield asserts that a 20 percent self-citation rate is "about normal," a figure also cited by Royale.[39,40] Further investigation concerning the question is beyond the scope of this article.

The Pearson Product Movement (based on the raw data rather than the ranking position) correlations between the original *JCR* rankings and those corrected for journal self-citations are presented in table 2. The correlations range from a low of 0.9390 to a high of 0.9972.[41] One does not have to consult a statistics textbook to know that these correlations are exceedingly high and that they indicate that the original and corrected rankings are very similar to each other. The logical conclusion is that journal self-citations are not exerting a major influence on the rankings from a broad, macro perspective.

Table 3 summarizes overlap among top-ranked journals, which ranged from 80 to 100 percent. For LIS total citation rankings, *Library Journal* replaces *Scientometrics* in the top five, while *Social Science Information* and *Journal of Information Science* take the place of the *Bulletin of the Medical Library Association* and the

TABLE 2
Pearson Product Movement Correlations Between Original *JCR* Ranking and Ranking Corrected for Self-Citations

Ranking	Correlation
Library and information science—total citations	0.9801
Library and information science—impact factor	0.9390
Genetics—total citations	0.9935
Genetics—impact factor	0.9972

International Journal of Geographical Information Systems among the top ten, after correction for self-citations. In the LIS impact factor ranking, the top five titles remain the same, but *Library and Information Science* enters the top ten at the expense of *Journal of Academic Librarianship.* Turning to genetics journals, after deletion of self-citations, *Molecular & General Genetics* replaces *Mutation Research* in the top five of the total citations ranking, but there is 100 percent overlap among the top ten. The top five journals in the genetics impact factor ranking do not change, but *DNA and Cell Biology* displaces *Genomics* in the top ten. Thus, one can confidently conclude that most upper-echelon journals do not owe their status to self-citations.

The third method of analysis consisted of calculating the change in ranking position for the research project's 133 journals after their *JCR* citation scores were corrected by eliminating self-citations. In calculating changes in position, the direction of movement was not considered, so that a movement from tenth to eighth place would be equivalent to moving from tenth to twelfth place (i.e., each counting as two). The summary data are presented in table 4.

It is apparent from table 4 that the majority of titles do change their ranking position after self-citations are eliminated, but for all but a relatively small number, the changes are not especially large and would not influence practical decision making. Of the four rankings analyzed,

TABLE 3
Overlap among Top Ranked Journals after Correction for Self-Citation

Library and Information Science Journals

	Total Citations Ranking[1] Remain the Same		Impact Factor Ranking[2] Remain the Same	
	Number	Percentage	Number	Percentage
Top 5	4	80%	5	100%
Top 10	8	80%	9	90%

Genetics Journals

	Total Citations Ranking[3] Remain the Same		Impact Factor Ranking[4] Remain the Same	
	Number	Percentage	Number	Percentage
Top 5	4	80%	5	100%
Top 10	10	100%	9	90%

1. The original top ten, in order, were *Journal of the American Society for Information Science*, *College & Research Libraries*, *Scientometrics*, *Information Management*, *Information Processing & Management, Library Journal, Journal of Documentation, Bulletin of the Medical Library Association, International Journal of Geographical Information Systems,* and *Journal of Academic Librarianship.*
2. The original top ten, in order, were *College & Research Libraries, Journal of the American Society for Information Science, Journal of Documentation, Annual Review of Information Science and Technology, Library Quarterly, Bulletin of the Medical Library Association, Journal of Academic Librarianship, Information Management, International Journal of Geographical Information Systems,* and *Information Processing & Management*.
3. The original top ten, in order, were *Genes & Development, Gene, Mutation Research, Genetics, American Journal of Human Genetics, Oncogene, Molecular & General Genetics, Genomics, Nature Genetics,* and *Human Genetics*.
4. The original top ten, in order, were *Nature Genetics, Genes & Development*, *Annual Review of Genetics, Trends in Genetics, American Journal of Human Genetics, Human Gene Therapy, Oncogene, Advances in Genetics, Genomics,* and *Genes, Chromosomes, & Cancer.*

TABLE 4
Summary of Journal Movement in Rank after Correction for Self-Citation

Library and Information Science Journals (N = 59)		
	Total Citations Ranking	Impact Factor Ranking
Mean movement in rank	2.94	3.85
Number of journals maintaining identical position	5	3
Number of journals moving 5+ positions	13	19
Number of journals moving 10+ positions	1	4
Genetics journals (N = 74)		
	Total Citations Ranking	Impact Factor Ranking
Mean movement in rank	1.38	1.91
Number of journals maintaining identical position	27	25
Number of journals moving 5+ positions	4	11
Number of journals moving 10+ positions	2	0

only in the LIS impact factor ranking does the mean movement in rank exceed three (3.85). In both disciplines, the mean movement is larger for the impact factor than for the total citations ranking. This observation may indicate that impact factor is subject to greater fluctuation because its calculation is based on data from only two years, whereas "total citations" considers a journal's entire back run. That the journals in the two genetics rankings display a smaller mean movement than in the two LIS rankings can easily be understood because of the lower self-citation rate in genetics.

The results of this research project strongly suggest that librarians and others do not need to adjust *JCR* data for journal self-citations.

Throughout the four rankings, only a few titles move ten or more positions. *Library Acquisitions: Practice & Theory* declines thirteen positions, moving from 27.5 to 40.5, in the ranking of LIS journals by total citations. In the LIS impact factor ranking, *Scientometrics* falls 14.5 positions from 11.5 to twenty-six, the largest movement of any journal in the study. *Library Acquisitions: Practice & Theory* drops eleven places (thirty to forty-one), while ten place increases in rank are displayed by *Library Trends* (twenty-five to fifteen) and *Interlending & Document Supply* (twenty-six to sixteen). For genetics journals, *Genetika* declined fourteen ranking positions (forty-five to fifty-nine) and *Mammalian Genome* fell ten positions (thirty-two to forty-two) in the ranking by total citations received, while in the impact factor ranking no journal moved ten positions. The largest change was eight places, displayed by *Theoretical and Applied Genetics* (twenty-four to thirty-two) and the *American Journal of Medical Genetics* (forty-three to fifty-one).

There are not enough cases to allow definite conclusions concerning the journal characteristics associated with large movement in ranking position other than the obvious observation that titles with high self-citation rates will drop in rank. *Library Acquisitions: Practice & Theory* is a practitioner-oriented title and *Scientometrics* is research oriented, but

both focus on fairly narrow, specialized areas. One is tempted to speculate that specialized journals tend to decline in rank and that titles with a broad subject focus (e.g., *Library Trends*) or ones that deal with a "hot" topic (such as *Interlending & Document Supply* in an era emphasizing access) will increase their standing. Further research is needed on this issue. Finally, it should be noted that five of the seven titles moving ten or more positions actually declined rather than rose in rank. This fact seems to indicate that the *JCR*'s policy of including self-citations is more likely to advantage titles with high self-citation rates than disadvantage journals with low rates.

Conclusions

The author contends that the *JCR* is a useful tool that can assist research librarians in the serials decision-making process. Yet, serials collection management decisions should not be made strictly on the basis of *JCR* citation data but, instead, in conjunction with other traditional factors such as cost, use or potential usage, indexing, relevance to the library's collecting priorities, etc. One of the challenges facing librarians and researchers is that of knowing how to use the *JCR* efficiently and effectively. The results of this research project strongly suggest that librarians and others do not need to adjust *JCR* data for journal self-citations. Except for a minute number of titles, self-citations do not exert an appreciable enough effect on a journal's relative rank within its discipline to influence practical decision making.

This study's major findings may be summarized as follows:

- From a macro perspective, the rankings change very little after self-citations are eliminated.
- Most top-ranked journals maintain their position after correction for self-citation.
- For most journals, the change in ranking position is minimal after self-citations are removed, although a few journals do display large changes in rank after correction for self-citation.
- For most practical decision-making purposes, one can use *JCR* rankings without adjusting the data for journal self-citations.
- Previous studies that did not correct *JCR* data for self-citation probably would not have obtained significantly different results by doing so.

It should be acknowledged that this research represents only one piece of some larger puzzle concerning the *JCR*'s effective use by librarians and the implications of journal self-citation for scholarly communication. Further research questions regarding the *JCR* include:

- How many libraries use *JCR* data?
- Which data do they used?
- How are the data used?
- For what purpose are the data used?
- What decision rules can be developed for effective use of the *JCR* by librarians?

For the topic of journal self-citation, further investigation is needed concerning:

- Would similar journal self-citation patterns be found in other disciplines?
- What characteristics are associated with high self-citation rates in a discipline?
- What characteristics are associated with high self-citation rates in a journal?
- What implications does journal self-citation have for scholarly communication?
- Do electronic journal self-citation patterns correspond to those of print journals?

Notes

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41. The Pearson Product Movement correlations were calculated with Kwikstat, version 1.3.