

### Can Reprint Requests Serve As A New Form of International Currency For the Scientific Community?

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Five years ago I estimated that the costs of the international reprint exchange system were at least \$10 million per year.<sup>1,2</sup> My estimate at that time did not fully consider the costs of printing the reprints. Today, I would at least double my original estimate. And even that would not take into account the doubling of *Current Contents*<sup>®</sup> readers—a key factor in the number of reprints requested—and the significant growth in the scientific literature.

One author claims that the cost of reprint exchange is between \$1,000 and \$2,000 for the "average" article.<sup>3</sup> Therefore, the total cost of reprints for 500,000 articles per year would be over a half-billion dollars. Obviously, this author is including many other costs of publication, since reprints would not be possible unless the articles were printed for journals in the first place. Until someone does a definitive study of the costs of the reprint system, we can only speculate. It is certainly a large-scale activity which involves many millions of dollars in real money and energy.<sup>4</sup>

The true cost of the system includes postage for both the request and the reply as well as the cost of printing—not only those reprints which are sent, but also those which lie unused on the shelf. A complete accounting would include the labor and materials required to send requests, to answer them, and to maintain the files of reprints requested, sent, and received.

There can be no doubt that ISI<sup>®</sup> services like *Current Contents* and *ASCA*<sup>®</sup> foster, indeed aid and abet, the reprint exchange system. To encourage this process even further, we designed the *Request-A-Print*<sup>®</sup> (*RAP*) card to make reprint exchange easier for requestors, authors, and their clerical support. *RAP* is best described as a reprint request/reply device that reduces effort and errors through a unique combination of preprinted and fill-in adhesive labels which are typewriter-compatible. The fact that we sell more than a million *Request-A-Print* cards a year indicates that they are performing a needed function. But this represents only a fraction of the world's reprint traffic.

To facilitate reprint exchange ISI has also done much to improve the accuracy and completeness of authors' addresses included in our services. We have encouraged journals to provide complete addresses,<sup>5,6</sup> but, though we have been somewhat successful, we still must complete thousands of partial addresses and correct many that are simply wrong.

The acceptance of the reprint exchange system is by no means universal. Some say that it is an obsolete form of communication that should be eliminated. Recently, strong criticism of the system has come from authors who bear the cost of satisfying large numbers of requests. This is not hard to understand if you happen to be someone like Jan Koch-Weser of Merrel International in Strasbourg, France, who received 3,000 requests for his article on "Binding of Drugs to Serum Albumin."<sup>7</sup> Estimating that it would cost \$2,000 just to send regrets, he announced in the *New England Journal of Medicine* that he would send out only 300 reprints. He neglected to say on what basis he would select the lucky 300.

There are some people who would like to have Koch-Weser's "problem." Whether one has the budget for reprints or not, the psychological and other rewards of such an outpouring of interest are often priceless. Financial rewards may also be involved. Most chemists working at commercial chemical firms would undoubtedly be overjoyed to present the marketing department with 3,000 requests for an article an-

nouncing a new compound. And certainly more than a few academics facing evaluation committees have tried to establish the importance of their work by counting reprint requests received. It would be interesting to learn how often the number of reprint requests received serves as an indication of how heavily cited the article will become.

What I'm saying is that at the present time reprint exchange meets very real needs in disseminating scientific information and supporting the sociological structure of the scientific community. To discard the system entirely would be tantamount to "throwing out the baby with the bath water." What we need to do instead is devise a modification to the reprint exchange system that will keep it viable, but eliminate some of its abuses and inequities. In particular, an improved reprint exchange system should help the author who is occasionally inundated with requests.

About five years ago I proposed a system that would expedite reprint exchange by reducing the effort involved in ordering reprints.<sup>1,2</sup> While this system, called "Reprint Expediting Service" (REX), would have established a mechanism for delivering reprints more rapidly, it did not deal with the fundamental problem of how authors could afford to pay for them. So now, instead of Project REX, I hereby propose an ISI Reprint Exchange Stamp (RES) system. To enter the RES system you might buy 100 stamps at a cost of 25 cents each. Then, to each reprint request card you sent you

would attach one or more stamps as prepayment. The stamps could be used by the recipient to request other reprints or they could be saved and eventually redeemed for cash or services.

The ISI Reprint Exchange Stamp system is a simple solution to the problem of providing an international paper currency for small payments. Since authors do not mail reprints COD (cash on delivery), they could now receive prepayments. The stamps would not be universally exchangeable, so there would be little incentive to steal them. The system would also have the kind of advantages inherent in any open marketplace subject to the laws of supply and demand. For example, under such a system, people would tend to request reprints more carefully because it would cost something to get them. Thus, the perceived value of the article involved would become a more important factor in each request.

One might think that payment for articles in this direct fashion would spur authors to produce better articles—but the prospect of payment also might encourage mediocre authors to increase their output.

The main disadvantage to my proposed stamp system is that it does not solve the problem of those authors who cannot afford or are unable to obtain "reprint currency." We then face the question of who shall be the banker or benefactor of these "impoverished" authors. Quite simply, I can't understand why the National Science Foundation, the National Institutes

of Health, and other research funding agencies couldn't subsidize them in one way or another. Those scientists who have grants could simply charge the cost of the stamps to their projects. Those who do not already have grants could be allowed to apply for small grants for stamps or be issued stamps directly. After all, these agencies now pay for page charges and the reprinting of articles. So why not help pay for the ultimate use of the articles. I would also hope that internationally-minded organizations such as the Canadian International Development Research Center would support scientists in the developing nations.

If such organizations consider this problem trivial, perhaps the following literature review will enlighten all concerned as to just how widespread and complex the practice of reprint exchange really is.

For example, about 10 years ago, Warren O. Hagstrom of the University of Wisconsin found that the average number of reprints sent out varied considerably according to the author's field.<sup>8</sup> Data he gathered from 1,400 scientists indicated that, for each article published, over 100 reprints were sent out by 61% of experimental biologists and 56% of other biologists. Only 16% of theoretical physicists, 14% of chemists, 8% of experimental physicists, and 7% of mathematicians sent so many. In fact, 21% of mathematicians sent out no reprints. It seems likely, Hagstrom comments, "that the large number of reprint requests stems from the confused

nature of specialization in biology and from the utility for clinicians of knowledge produced by a wide variety of biological research." Unfortunately, when discussing the "number of reprints sent," Hagstrom does not differentiate between those sent out automatically by the author and those requested. I suspect that the figures represent the combined totals.

In an effort to see if reprint response behavior is subject to modification, Leonard H. Epstein of Auburn University and Peter M. Miller and Diana O'Toole of the University of Mississippi Medical Center requested 216 reprints in three different ways: via standard request cards, standard cards with handwritten notes (prompts) to respond quickly, and standard cards with prompts plus praise for the article.<sup>9</sup> Not surprisingly, on average the "standard card" group took the longest to respond (27 days). Contrary to what people would expect, the "prompt without praise" group responded more quickly (18 days) than the "prompt plus praise" group (21 days). However, the investigators concluded that the difference between the last two groups was not significant.

William F. Harris of the University of Witwatersrand, South Africa, also examined the speed of response.<sup>10</sup> Selecting articles from the SDI (selective dissemination of information) reports of the Council for Scientific and Industrial Research in Pretoria (which uses *Science Citation Index*<sup>®</sup> magnetic tapes), Harris requested reprints of

3 to 4 articles of interest per week. Within six months after mailing, 70% of the requests were filled.

Roger K. Lewis of the University of Alabama School of Medicine requested reprints of 761 medical articles in American journals to test the effect the age of the article had on reprint response.<sup>11</sup> Articles requested immediately upon publication had the highest response rate, 77%. The response rate was 50% for year-old articles, 25% for two-year-old articles, and 21% for three-year-old articles.

To test the response rate from different geographic areas, Jan Svoboda of Czechoslovakia sent 1,000 reprint requests to scientists working in solid state physics, particularly nuclear magnetism.<sup>12</sup> Table 1 shows the results for countries to which at least ten requests were sent. All countries except two had a response rate greater than 85%.

The lower response rates for the USSR and India can be explained primarily on financial grounds. The cost and availability of reprints in these two countries are significant factors. And while postage is not generally a problem in the USSR, it is a significant component of cost in India. At the same time I believe the lower response rates indicate a lesser appreciation of the value of international communication by local authorities in these countries. Typically, these authorities are willing to finance scientific research through salaries and instrumentation but not through scientific information. Journals, reprints and other scientific information tools,

TABLE 1. Response rates for reprint requests (mainly in solid state physics and nuclear magnetism) sent to various countries.

Country	Number of Requests Sent	Percent of Requests Filled
Canada	68	100
Czechoslovakia	12	100
Finland	16	100
Italy	16	100
France	74	96
Federal Republic of Germany	56	93
Japan	25	92
Switzerland	37	92
Belgium	10	90
German Democratic Republic	21	90
Poland	21	90
Rumania	10	90
United States of America	381	88
Holland	40	87
England	139	86
U.S.S.R	246	57
India	12	40

Courtesy J. Svoboda

such as *Current Contents* are frequently given low priority. The situation is complicated by the fact that foreign hard currencies are in short supply.

Of course, one cannot generalize from this single study in one special field. The results might be significantly different for the earth sciences, which are given high priority in the Soviet Union, or for electrochemistry, in which the Indians do quite well.

As indicated earlier, the advent of *Current Contents*, *ASCA*, and other

secondary information services has had a dramatic effect on reprint requests. This effect has been documented in various ways.

In 1973, E.F. Hartree reported that his article describing a modification of a method for measuring protein concentration elicited a "trickle" of reprint requests.<sup>13</sup> After the title appeared in *Current Contents*, however, the trickle "swelled into a torrent and passed the 2,500 mark...." By carefully examining the form of the address on requests, Hartree determined that

at least 85% of them were directly attributable to the *Current Contents* listing. Five years earlier, Solomon and Jennifer Posen of Sydney Hospital studied 2,500 reprint requests for their own articles.<sup>14</sup> They found that about 40% of the requests came from scientists who had learned of the article through *Current Contents*.

There is still some latent resentment that anyone would request a reprint simply on the basis of reading a title in *Current Contents* or elsewhere. In 1970 a group of Cambridge physicists published a letter in *Nature* entitled, " 'Evolution'—'development'—anatomical and cerebral features and the pathological consequences."<sup>15</sup> The entire text of the letter follows:

We recently published papers in the oceanographic field which contained in their titles the words "development," "evolution," "triple junctions," and "fingers." These keywords were dispatched by computers to thousands of child psychiatrists, biologists, neurologists and medical practitioners. Hundreds have requested reprints. We are curious to know how many are going to request a reprint of the present communication on the same basis.

Other pranksters in Zambia published a letter on reprint exchange with the deliberately misleading title of "Hormones and Blood Chemistry."<sup>16</sup> The stated purpose of this deception was to enable the authors to further study the pheno-

menon of reprint requests. In their trick article the authors discussed the result of an earlier study that showed that over 70% of 188 requests for two of their earlier articles were generated by *Current Contents*.

I'm not sure what these efforts to dupe people who use secondary information services are supposed to prove. The implication is that anyone who has not seen the full text of an article should not request a reprint. Are the authors suggesting that somehow we can go back to the days when scientists could personally scan all the journals in their field? And doesn't it make sense to consider a reprint request a *redundancy* if the requestor has *already* seen the article? Actually, this last point is a bit of hyperbole on my part. There are plenty of good reasons why people want to have reprints of an article they've already read.

What these studies (both the trick ones and the straightforward ones) do show is that secondary information services can cause an unexpected strain on an author because of the magnitude of the exposure they give to an article. Escalating costs for printing and postage, not to mention the value of one's own time or the cost of clerical help, have turned the fulfillment of reprint requests into an expense that many authors cannot afford. This situation is aggravated by the fact that a relatively small percentage of the world's scientists publish a large percentage of the articles. Thus, there is a need to support a system

where the requestor bears more of the financial burden. If such a system existed then we would, I believe, observe better response rates, since authors could afford to purchase larger quantities of reprints.

To implement such a system scientists and scholars would—as mentioned earlier—purchase reprint “currency” or stamps from some central source, such as ISI. These stamps would be pasted on reprint-request cards or enclosed in letters. For lengthy review articles, several stamps could be used. The author who received the currency could later use it to request reprints from other authors. Eventually the more popular authors could be expected to accumulate more currency than needed for their own requests. At that point they could use their stamps to pay for reprinting articles they publish, to purchase other types of services, or they could turn them in for cash. In some respects the system is similar to the Unesco coupon system.<sup>17</sup> Unesco coupons are still used by some libraries as a form of international currency, but they never had widespread support for reasons not clear to me. Unesco coupons could of course be used to purchase reprint stamps.

Obviously, someone who has no funds to buy reprint currency will have a hard time entering the system. But it would not be impossible. Some scientists would *receive* reprint currency for their own articles, even though they hadn't purchased any currency themselves. Gifts from other scientists could also get some people into the system. At present it

is difficult to send money in small denominations to collaborators or colleagues in Eastern European and other countries. For such scientists, a gift of reprint currency would certainly be welcomed. Of course, those authors who are easily able to pay for the reprints they give could return reprint stamps with the reprint. They could indicate in this way that they will continue to supply them free in the future. For scientists at the beginning of their careers, it would be appropriate for their institutions to help support their needs in the same way that they support library and other services.

Until reprint currency becomes a reality, however, there are certain things that can be done to help the present situation. While it may seem degrading to some, it is not unreasonable for requestors to state briefly why their circumstances require special attention. Most authors would give priority to those who are least likely to get the information any other way.

K.P.M. Heirwegh of the Rega Institute, Leuven, Belgium, has a practical suggestion for those authors whose supply of reprints is running low.<sup>18</sup> Heirwegh suggests that the reply to the requestor consist of the full citation of the article, the authors' names, and a summary of the article. The summary would help those who have not seen the article to decide whether it is worth following up (in the library or through more correspondence with the author), or whether the request can be removed from the “waiting”

file. Even if the summary is not included, it seems an excellent idea for authors who cannot supply reprints to include the complete citation of the article in their replies. This is far preferable to the answer, "The article you requested is no longer available"—especially when such notes are signed by secretaries or when the signature is unreadable. Such an answer makes it difficult to clear up open requests without additional correspondence.

Publishers can help by keeping the cost of reprints at reasonable levels. I believe it is a fallacy to think that reprints hurt journal sales. The more authors can afford to buy and send reprints of their articles, the less dependence there is on photocopying. Also, each reprint is an advertisement for the journal involved. When an author distributes reprints, it's a way of telling the recipient that he or she should consider publishing in and/or subscribing to that particular journal.

The custom of reprint exchange is crucial to the social process called science as it is now conducted. It is true that a few outstanding scientists receive many thousands of reprint requests and it may be impossible for such scientists to read every card. But those who complain about such problems remind me of authors who would *prefer* to be listed in the *Index Oblivionis*.<sup>19</sup> The fact is that most scientists *do* read reprint cards, and that their exchange does constitute an important form of scientific communication.

In my experience, reprints are not thrown away or relegated to the back shelf, but are usually filed and indexed. Thus, reprint files become important collections of scientific information. Back in 1902, a time when libraries still catalogued individual reprints (a function now performed mainly by individual scientists according to their own needs), C.D. Spivak said the following, in a letter recently republished in the *Journal of the American Medical Association*:<sup>20</sup>

An article in a modern periodical is like a pin in a stack of hay. That an article nowadays may make a lasting impression upon the reader, it must be an extraordinary production, indeed. The individuality and force of the majority of writings is obliterated in the "crowd." Hence, the writer unconsciously makes an attempt to rescue his production from oblivion by giving it at least the form of individuality. A reprint is an entity, a whole, not a part of a conglomerate.

There is, besides, a utilitarian reason for the existence of the reprint. It is a time-saving contrivance, since it is easier to handle and, therefore, more serviceable for purposes of reference. This is especially true in the case of long articles running through several numbers of a periodical. By using a reprint one avoids the annoyance of hunting for continuations through a maze of irrelevant literature.

## REFERENCES

1. **Garfield E.** Reprint exchange. I. The multi-million dollar problem "ordinaire." *Current Contents* No. 36, 6 September 1972, p. 5-6.\*
2. ----- . Reprint exchange. II. Project REX is ISI's code name for contemplated reprint expediting service. *Current Contents* No. 38, 20 September 1972, p. 5-6.\*
3. **Lundh B.** Reprint requesting—time for a revision? *New England Journal of Medicine* 295:736, 1976.
4. **Bergmans L, Burgess J, Masson G, Parker C G A, Richards G F & Schroer M.** Reprint policies of scientific journals. (Personal communication to members of International Group of Scientific, Technical & Medical Publishers, Amsterdam) September 1972. 5 pp.
5. **Garfield E.** The place for an author's address is upfront—where it can be counted! *Current Contents* No. 47, 22 November 1976, p. 5-6.\*
6. ----- . Reducing the noise level in scientific communication: how services from ISI aid journal editors and publishers. *Current Contents* No. 30, 25 July 1977, p. 5-15.
7. **Koch-Weser J.** Inundation by requests for costly reprints. *New England Journal of Medicine* 295:55, 1976.
8. **Hagstrom W O.** Factors related to the use of different modes of publishing research in four scientific fields. *Communication among scientists and engineers.* (Nelson C E & Pollack D K, eds.) Lexington, Massachusetts: Lexington Books, 1970, p. 85-124.
9. **Epstein L H, Miller P M & O'Toole D.** Factors influencing prompt responding to reprint requests. *Behavior Therapy* 6:414, 1975.
10. **Harris W F.** Return on reprints. *South African Journal of Science* 71:167, 1975.
11. **Lewis R K.** Responses to reprint requests. *Journal of Medical Education* 47:827, 1972.
12. **Svoboda J.** Personal communication, 23 May 1977.
13. **Hartree E F.** Reprint distribution. *Nature* 243:485, 1973.
14. **Posen S & Posen J S.** The geography of reprint requests. *Journal of Medical Education* 44:648, 1969.
15. **Davies D, McKenzie D P & Turner J S.** 'Evolution'—'development'—anatomical and cerebral features and the pathological consequences. *Nature* 225:636, 1970.
16. **Briggs M H & Briggs M.** Hormones and blood chemistry. *Nature* 240:490, 1972.
17. **Gardner A L.** Unesco coupons assist documentation services. *Unesco Bulletin for Libraries* 16:86, 1962.
18. **Heirwegh K P M.** Personal communication. 13 July 1977.
19. **Garfield E.** How *SCI*<sup>®</sup> bypasses "the road to scientific oblivion." *Current Contents* No. 56, 22 December 1971, p. 5-6.\*
20. **Spivak C D.** Reprints, whence they come and whither they should go. *Journal of the American Medical Association* 237:1705, 1977.

\*Reprinted in: **Garfield E.** *Essays of an Information Scientist.* Philadelphia: ISI Press, 1977.