

Printed scientific reprint: demise of a cherub

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According to bibliographer Ellen Wells, earliest 'true scientific reprints' were published in 1748 and 1750. The popularity peak phase of reprints lasted for 70 years (1900–1970) until photocopier became routine office equipment. Based on 52 brief letters published in 'Science' between 1920 and 1970, the functions, varied use and problems with reprints are noted. A few quantitative studies on reprint request patterns, as viewed from reprint senders and reprint recipients are reviewed. With the adoption of computers, e-mail use and use of pdf file sharing by scientists, Ellen Wells' 1986 prophesy on the obsolescence of reprints has come true.

I provide here definitions to scientific reprint and cherub that appear in the title. Ellen Wells¹, defined a reprint as 'a reprint is a portion of a greater published unit which is issued, usually for the distribution of the author of that portion, on a private basis. The issue or reissue of this portion of text may or may not involve resetting of type and provision of a separate title page'. The *New Oxford American Dictionary* (2001) defines a cherub as 'a winged angelic being described in biblical tradition as attending on God'. Irrespective of whether scientists are Christians or not, they all would agree that scientific reprints had performed a vital cherubic function in scientific communication for more than two centuries. According to Kaplan and Storer², 'scientific communication' refers to the exchange of information and ideas among scientists in their roles as scientists. Scientific reprints have quite a number of synonyms which include extract, offprint and separate. The word 'tear sheet' [literally the page(s) torn from the journal in which the original material appeared] is also used.

History

Wells¹ had traced the steps in the developmental history of scientific reprints up to 1900. As indicated in Table 1, the facts she had discovered were: (1) The third edition of the *Oxford Universal Dictionary* (1955) cites an early use of the verb 460 years ago, 'to re-print' (1551), to print again, a second time. (2) In the middle of the 18th century, 'the custom of printing off separate portions of text for broader distribution, for distribution to a specialized audience, or for friends' had gained acceptance. (3) The earliest 'true scientific reprints' that she had examined were published in 1748 and 1750. The first one was that of Tuberville Needham's 52-page paper with one plate ['Observations upon the

generation, composition and decomposition of animal and vegetable substances'] that first appeared in the *Philosophical Transactions* (December 1748). The second one was a 3-page short article entitled 'Description d'un Hermaphrodite' with three plates by Saveur Francois Morand that appeared in the 1750 *Memoires of the Academie Royale des Sciences*. (4) By the 1820s, 'use of reprints as intellectual calling cards seems to have been established'. (5) Payments for printing of reprints were made by authors in the past, and they 'made their own arrangements with the printers or publishers of the periodicals'. The cherub function of reprints in passing information relating to new discoveries among scientists lasted for nearly 150 years, until the emergence of the photocopier as a convenient source of reproduction in the early 1970s. This spanned the period of other early 'duplicators' such as typewriter, carbon paper and mimeograph

machine, which came into common use in the 1890s.

Role of reprints in the history of science

How scientific reprints might have advanced or delayed development of new disciplines has been studied by a few^{3,4}. Using Gregor Mendel's pioneering paper on genetics in 1866, Posner and Skutil³ have traced how 40 reprints of Mendel's landmark paper were distributed among his contemporary scientists in Europe, and inferred that 'practically all prominent biologists of the mid-nineteenth century had access to Mendel's paper but our inquiry as to whether any of them had consulted it produced no definite answers'. George Beadle⁵ had opined, 'We were all taught that Mendel's classic paper was lost for a third of a century. That is not so. It was not lost; it was un-

Table 1. Time line on the origin, explosion and eclipse of printed scientific reprints

Year	Event
1551	Early use of the verb form 'to re-print' in English language.
5 January 1665	First weekly issue of the <i>Le journal des Scavans</i> was published in France.
6 March 1665	First issue of <i>Philosophical Transactions</i> journal appeared in Britain.
1749	First reprint of Tuberville Needham's paper that appeared in December 1748 issue of <i>Philosophical Transactions</i> .
1780–90	Characteristic form of current scientific paper appeared.
1820s	Reprints began to be used as intellectual calling cards.
1830	The number of primary journals published reached 300.
1840	The word 'scientist' was introduced in English language.
1890s	Typewriter, carbon paper and mimeograph machine came into use.
1900–70	Explosion and popularity peak of printed scientific reprints with increasing number of scientists.
1959	First automatic xerographic office copier was introduced by Haloid Xerox.
1964	Xerox introduced the first facsimile (fax) device.
1965	Origin of electronic mail (e-mail).
1972	Xerox used laser technology to create electronic printing.
1981	IBM unveiled its first personal computer (PC).
1993	Portable document format (pdf) of file sharing was introduced by Adobe Systems.
1995	Internet use became widespread.

appreciated...One wonders if Darwin himself did not get a reprint, for Mendel was aware of Darwin's ideas and that his work provided the basic variability that so puzzled Darwin. If Darwin did receive one, or if he read the paper in the *Proceedings of the Brunn Society*, which was sent to more than 120 libraries, he too was unimpressed.'

About 110 years ago, Albert Einstein (1879–1955) had used the reprints of his first paper on capillarity [Theoretische Folgerungen aus den Kapillaritätsercheinungen, *Annalen der Physik*, 1901, 4, 513–523] as a supporting document in soliciting job opportunities from elite scientists of his period. *The Collected Papers of Albert Einstein*⁶, published in 1987 revealed that after receiving his diploma from Zurich Polytechnikum, Einstein had written brief letters to Wilhelm Ostwald (1853–1932) and Heike Kamerlingh Onnes (1853–1926), both future Nobel laureates in science, in March and April 1901. Unfortunately, Einstein failed to receive positive offers from either Ostwald or Kamerlingh Onnes. As a result, he had to settle for a clerk job at the Federal Office for Intellectual Property, Bern, as a Technical Expert Class 3 from July 1902.

In 1994, Joshua Lederberg⁷ reminisced how he came across the landmark paper by Oswald Avery and his colleagues in 1944 about the chemical nature of the substance inducing transformation of pneumococcal types. To quote, 'Reprints of the Avery *et al.* (1944) article were circulated in the department. I borrowed one from Harriett Taylor (later Ephrussi), a graduate student working on yeast budding kinetics, who would shortly join Avery's laboratory for her postdoctoral research. My personal exclamatory notes were "...unlimited in its implications. ... Direct demonstration of the multiplication of transforming factor... Viruses are gene-type compounds [sic]...' [dots, as in the original].

As is evident, the popularity peak phase of reprints lasted for 70 years (1900–1970) until the photocopier became routine office equipment. This fact was noted by mathematician Paul Halmos (1916–2006) as follows: 'Xerox didn't exist yet and the use of preprints, while technologically possible, was not widespread – how then did you assimilate the currently available scientific information? Answer: you could subscribe to the journals, or use the library copies, or ask authors to send you reprints. ... Writing away for reprints was a

common practice. Almost everyone was pleased to be asked and sent what was asked for. Sometimes the printed matter was accompanied by a more personal communication. ... I was an avid collector: I wrote to France, Germany, Denmark, Russia, Poland and Japan, and, of course, all over the US, and I accumulated a splendid collection. ...'⁸.

Functions, use and problems with reprints

On the functions, use and problems with reprints, I have studied 52 letters on reprints that appeared in *Science*^{9–60} from 1920 to 1970. The issues covered in these letters include: (1) appeals for reprints from other financially strained European nations to facilitate research⁹; (2) requests by bibliographers and authors for reprints in their chosen themes^{10–13}; (3) suggestions for filing accumulating reprints^{14–19}; (4) gripes by librarians about the physical dimensions and absence of essential bibliographic detail in the printed reprints and storing reprints^{20–22}; (5) good Samaritan appeal by an American researcher to purchase extra reprints for supplying to researchers from other nations during the war period²³; (6) survey data on the policy of biological journals in America in issuing reprints²⁴; (7) standardization of reprint size for appropriate storage²⁵; (8) sales angle on reprints by scientific journals²⁶; (9) apology for not citing a prior publication²⁷; (10) establishing a reprint exchange centre²⁸; (11) merits and demerits on the responsibility of purchase and distribution of reprints^{29–39}; (12) the role of reprints in information race⁴⁰; (13) format of reprint requests^{41–43}; (14) costs for photocopying and copyright privileges^{44–46}; (15) managing the economic cost of reprints for authors^{47–56}; (16) function of reprints as one of professional courtesy⁵⁷; (17) questionnaire survey on the reason for requesting reprints from recipients⁵⁸; (18) a philatelist's plea for the use of stamps⁵⁹, and (19) free distribution of reprints of a deceased scientist to students⁶⁰. It should be stated that in most instances, these letters have eluded the screening of the indexers of *Science* journals.

Though the first automatic xerographic office photocopier was introduced in USA in 1959 and generated a sale of 33 million dollars⁶¹, it took another decade for routine use in an office and universities in developed countries. Correspondingly, by early 1970s, the pristine rank

held by scientific reprints declined in developed countries. However, for researchers from the Third World countries this was not so, as communicated by an Indian researcher⁶² in 1971. To quote, 'It has been the experience of many Indian research workers that requests for reprints, particularly when made after the journals were received in this country, invariably brought regret cards. ... Many of the foreign journals are not within the reach of all Indian workers for one reason or the other. Further, Indian workers do not have the privilege of having a "Xerox" service. Even where it is available, the cost involved is prohibitive.'

There have been numerous kind-hearted researchers in USA and Europe, who have been benign to such pleas. A typical example is that of Sanderson⁶³, who wrote in 1978, 'Reprint requests, which from civilized countries having an abundance of copying machines have diminished greatly in recent years, may be regarded as nuisance by some, but to me there are a welcome indicator of the extent of interest...'

Quantitative studies on reprint request patterns

Some short reports published by authors who had carried out surveys on their reprint requests were humorous at best. Briggs and Briggs⁶⁴ concluded from their study that 'the average reprint-requester is American, works in a university, requests publications without having seen the original, and is able to afford airmail postage rates. We also note that his post office is uncertain of rates to Central Africa, for almost a third of our requests are incorrectly stamped'. Welsby⁶⁵ (from London) inferred, 'If the number of reprint requests reflects the interest generated, it seems an author ought to receive over 110 requests for a paper of above average interest. Most authors accept a moral responsibility to provide reprints and this must be balanced against the costs. ... money has to be spent and if borne directly by the individual concerned, as in my case, almost certainly would be better spent on more worthwhile projects or persons.' In 1981, Macfarlane *et al.*⁶⁶ (from Nottingham City, UK) surveyed fellow medical doctors on the true relevance of reprint requests and canvassed the views of other doctors. From the 161 replies they received and analysed, they concluded that 'the large majority of doctors regarded

reprint requests as a waste of time and money’.

For balance, I also provide three reports from quantitative studies by reprint recipients. To quote the numbers cited by Hamilton-Miller⁶⁷ (a microbiologist from London), ‘For the past five years I have kept a record of reprints I have requested (on specially printed postcards, written in my own handwriting). . . It may be that microbiologists respond more kindly to requests for reprints than do members of other disciplines.’ Lauren Seiler⁶⁸ (a sociologist from New York) concluded that: (1) correct reprints were received for about two-thirds (106/168). (2) While typed postcards received the highest return rate (80%), hand-written postcards received the lowest return rate (38%). In a study with larger sample, Searleman *et al.*⁶⁹ (from New York) inferred that: (1) reprints requested from 1200 authors of psychological articles by men and women of varying academic rank, elicited 76% of response within the first eight weeks. By 16 weeks, 81% had responded, that included 15 authors who answered that they had exhausted their supplies of reprints. (2) Reprint requests were more likely to be honoured by male authors than by female authors. These authors also noted that the second finding is ‘open to several interpretations’, including that ‘women, because of their lower status, may have less clerical assistance, less money for reprints, etc.’.

Coda

With the advances and adoption in computer technology, e-mail and use of pdf file sharing format by scientists, Wells’ prophesy made 25 years ago has come true. The final paragraph of her entry read as follows: ‘The ubiquitous use of the photocopy machine, rising costs of printing and the birth of the age of electronic information spell the end of 200 years of reprint publication, and the existing working collections may in some fields become rendered obsolete and vulnerable to destruction. Collectors, historians and antiquarians, however, will probably continue to find space for many as mementos of an earlier form of networking.’¹

A humorous anecdote that appeared in a *Nature* editorial⁷⁰ on the eccentric whim of an impatient scientist deserves mention. ‘Among the scientists, like other members of the community, we have the impatient ones. Consequently, either the editor or the printer receives

inquiries from some authors who think there has been undue delay in the fulfillment of their reprint orders. Recently one author telephoned such a query (quite a common present-day practice), and, in order to save time, he was asked in which issue of *Nature* his article had appeared. He replied: “I don’t know, I never have time to look at *Nature*; but so long as I know it has been published that is all that really matters”. A sobering thought for publisher, printer and editor. Publish or perish!’ Though the editorial was unsigned, I presume it was authored by L. J. F. Brimble (1904–1965)⁷¹.

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