THE FUTURE OF SCIENTIFIC PUBLICATION

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Abstract

Publication is gradually moving to the World Wide Web, and this process will continue until print publication is rather rare. The process will be faster for scientific publication, because the relative economic advantages are greater and the technology is more available and familiar to the scientific community. It looks like the process will not even have to for a generation of die-hards to be replaced.

While present technology is good enough to get the process started, new technology will make the transition even more attractive.

There are already many on-line scientific journals, and many print journals are already have on-line editions.

The main resistance is coming from conventional publishing organizations that face drastic down-sizing, but since they haven't even tried to outlaw competition (and won't succeed if they try), the down-sizing is inevitable. Library organizations may also face down-sizing.

Scientific publication will take many new forms.

1 Introduction

Here are some contentions.

1. Publication is gradually moving on-line, and this process will continue until print publication is rather rare.

2. Publication on CD-ROMs is a temporary phenomenon, because on-line is better.

3. The pace of publication going on-line depends partly on both technological and economic factors. Here are some.

   (a) The arrival of the display that can be read on the beach and also in the bathtub.

   (b) The development of a radio system that permits downloading reading material anywhere in the world—indoors or out.

   (c) The development of a standardized system for paying for reading copyrighted material.

   (d) Since on-line publication is much cheaper than print publication, many organizations dependent on print publication will inevitably be reduced in personnel. These people will have to find jobs elsewhere in the economy. Eventually, this down-sizing will affect libraries as well as publishers. It is important that the down-sizing not be blocked by the establishment of monopolies motivated by the preservation of particular kinds of jobs.

   However, the present technology and economic situation is already adequate for a large expansion of on-line publication, and it is already taking place.

4. The current system of paper scientific publication is a great drag on the integration of countries into the world scientific system that cannot afford spending millions of dollars per year per first rate scientific libraries. Even with rich countries like the U.S., many institutions cannot afford first class libraries. The commercial scientific publishers offer the greatest problems, but the scientific societies are only about a factor of two better.

5. On-line scientific publications can be supported entirely by page charges to the authors' institutions and be entirely free to readers. The cost will be only a small fraction of the cost of the research that gives rise to the publication. Exceptions can be made for unsupported research and research from poor countries. $100 per page should be more than adequate for journals where the articles do not require professional editing for the insertion of pictorial material.

6. Present scientific publishers and their employees will resist going on line, because it will greatly reduce the need for their services, although

it seems that some need for professional editing will be required. Their idea is that on-line services will be value-added services to print publication, so they will get more money rather than less. I think competition with journals that are on-line from the beginning will demonstrate that this idea is not viable.

7. Editing for on-line reading is likely to be an art rather different from editing for print publication. It can use color and Web links to good advantage, and it can put up additional windows, for example with terminology and definitions. It may be that professional on-line editors will be able to do such a good job at this as will justify the cost of their employment.

8. It seems unlikely that print publishers will be able to advocate legal barriers to on-line publication, although they may defend copyrights they presently hold.

9. Publishers have always opposed the notion of fair use, and have consistently maintained that there is no fair use on line. There haven't been any lawsuits about this yet, so we don't know what the courts will presume.

10. Scientists should defend at least the following concept of fair use. An author who has not been paid for an article should be able to keep a copy on a publicly available, free Web page without any interference from the publisher.

11. Scientists should insist on retaining copyright to their own published scientific papers. Journals should merely get "permission to publish". In fact, authors who insist on this are generally successful. Allowing authors to retain copyright is an explicit official policy of the American Mathematical Society. (Assigning copyright to the Society is also an option). Scientific societies, e.g. AAAI and ECAI, should adopt this policy,

12. Authors may want to keep papers on their home sites. If they do, research announcment journals will become more important.

2 Refereeing

Publishing on line permits much smaller delays. However, the time for referees to report is often the major delay with print publication. Refereeing serves four functions.

1. It conserves the limited resource of a publication for editorial time, printing and mailing and library shelf space. All of these limitations go away if publication is on-line and the author, as is increasingly the custom, does the typesetting.

2. It serves as a competitive quality filter, so that authors can compete on how many publications in refereed journals the have gotten accepted. Other systems, such as inclusion in specialized lists can serve this function even better. The very best hiring and promotion committees don't just count refereed publications, they actually evaluate the work.

3. It makes the papers better. Authors often acknowledge contributions of anonymous referees.

4. It has an archival function. Once published, the paper cannot be revised by the author without a new publication. This helps historians and provides a basis for settling disputes about priority. On the other hand, it leads to unnecessary publication when an old paper could be improved, but a new one has to be written. With electronics we can have the best of both worlds. There can be two copies of a paper—one at the journal which is archival and another at the author's site subject to revision. The journal can link to both.

On-line publication will be entirely viable even if it imitates print publication in its refereeing style, but here is a proposal that might make it better. I call it *light refereeing*, and it has a distinguished precedent. I was curious how the unknown Einstein, an employee of the Swiss patent office, got four papers into *Annalen der Physik* the world's leading physics journal, in the year 1905 and wondered how long the refereeing process took. These papers revolutionized physics, but how could the editor know that in advance?

It seems that Einstein was not quite an unknown, having published before in *Annalen der Physik*. That journal's custom was that the first paper submitted by an author would be carefully examined, and Einstein's first paper had been reviewed by Max Planck. Once the author had been blessed, his papers would be published on receipt, and this is was the case with Einstein's four 1905 papers. Alas, we don't get to see a referee's report on the first paper about the theory of relativity.

Returning to the present, we can imagine the following *light refereeing* system. An author's first paper is refereed in the standard way. Once an author is blessed his papers are lightly refereed. Namely, they are immediately scheduled for publication after three months, but are sent to a referee who is asked to suggest improvements in style or content. If the referee does not respond, the paper is published as received or as the author has spontaneously revised it. Such a system will be more prompt than present journal publication and may be preferable to the growing custom of using preprint servers. Of course, the editor could decide that a particular paper required more or less refereeing than the standard light refereeing.

Jeff Ullman makes similar points in his Diatribe Against Paper Journals[1], also published in *Computing Research News*, May 1996 with the title "Web will change the role of journals".

/@sail.stanford.edu:/u/ftp/jmc/publications.tex: begun 1995 Feb 14, latexed 1996 Jul 5 at 6:34 p.m.

[1] http://db.stanford.edu/~ullman/nopaper.html