POLICY FORUM: INTELLECTUAL PROPERTY

Who Should Own Scientific Papers?

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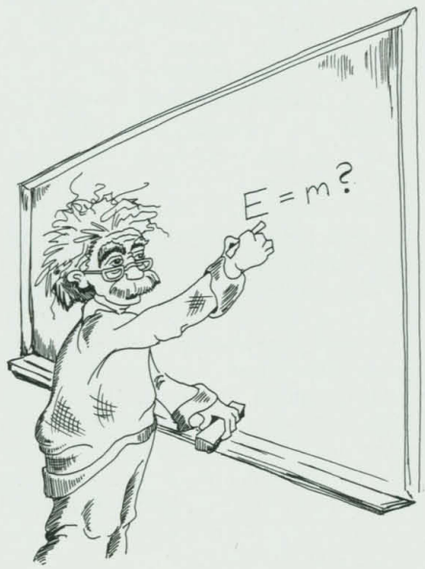
Publishing the results of scientific research was, for many years, a symbiotic interaction between researchers and publishers, because the most effective way scientists could disseminate their results was through journals, produced by professional societies and independent publishers. Electronic communication has created new ways to distribute such results and is forcing researchers and publishers to reassess the old procedures and consider new possibilities as we learn to use the Internet. Now, not only can authors easily disseminate their results, but networked readers can have cheap, fast access to more scientific literature and have it in a form that facilitates its use in their own research.

Because the electronic world offers many potential improvements to enhance traditional publication, scientists, administrators, and federal science policymakers must reconsider both how the results of publicly funded research are best disseminated and how that dissemination is best supported.

As members of the American Academy of Arts and Sciences' study on electronic communications "The Transition from Paper" (*1*) our experience has led our working group (representing the natural sciences, publishing, and library science) to express a common and deeply felt goal for the age of electronic communication: The authors of scientific works based on government-supported research should be free to distribute those works as they see fit, via journals, electronic postings, and other new modes that may appear. Starting with this perspective, we offer a proposal to advance toward that goal in a way that accommodates the needs of both traditional and modern publishing.



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"And I can't tell you the rest until the journal comes out."

The U.S. Copyright Act of 1976, as revised and extended by U.S. adherence to the Berne Convention in 1989, shifted the legal balance of control from publishers to authors. Previously, copyright law protected a work only if an author or publisher formally registered it, which the publisher invariably did. Copyright now inheres in a work from the moment it is "fixed in a tangible medium of expression" and by statute belongs initially to the creator. It is now standard practice for most publishers, particularly those of science, technology, and medical (STM) journals, to require authors to transfer to them the copyrights that the law has vested in creators.

However, one key exception to this process is mandated by Section 105 of the act, "United States Government works," which reads, "Copyright protection under this title is not available for any work of the United States Government. ..." Works created by employees of the U.S. government as part of their duties are inherently in the public domain, free for use by anyone and therefore not to be copyrighted. The authors of such works routinely inform publishers that their work is exempt from copyright transfer. In contrast, authors of articles originating in federal laboratories, such as Argonne National Laboratory and Los Alamos National Laboratory, whose operations are subcontracted by the government to nongovernmental organizations, do not themselves assign copyrights to journals. Rather, the laboratories assign the copyrights to journals and retain a license themselves for governmental distribution. Many private corporations consider research done in their labs to be work for hire and similarly retain distribution rights to works published by their employees. Publishers of scientific journals have in general accepted such variations and restrictions on the transfer of copyright.

Matching Scientific Research Goals to Public Policy Goals

The goals and motivations of scientists writing up their research are very different from those of professional authors, although they may be the same people in different settings. The scientist is concerned with sharing new findings, advancing research inquiry, and influencing the thinking of others. The benefits the scientist receives from publication are indirect; rarely is there direct remuneration for scientific articles. Indeed, scientists frequently pay page charges to publish their articles in journals. The world of the directly paid author is very different. There, the need for close protection of intellectual property follows directly from the need to protect income, making natural allies of the publisher and the professional author, whether a novelist or the author of a chemistry text.

Thus, the goals and motivations of the publishing research scientist are consonant with the purpose of Section 105 of the U.S. Copyright Act and with federal funding of basic research. Serving the public good, which is why publicly funded research is supported, is possible only if research results are widely disseminated.

The Internet is a natural, widely accessible mode of affordable distribution of scientific research results. Yet widespread distribution of research results directly through the Internet has materialized in few STM fields. Instead, the traditional printed journals are rapidly being posted in electronic mode. In many instances, publishers enforce tighter controls over Internet copyright, dissemination, and pricing than exist

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in the traditional print world, and this conflicts with the new environment for communicating about science.

Articulating the Public Benefits of Research Publication

Some major U.S. institutions of research and higher learning have taken positions on this issue. Harvard University's copyright policy (*2*) says, "First, the policy should encourage the notion that ideas or creative works produced at the University should be used for the greatest possible benefit. This would normally mean the widest possible dissemination and use of such ideas or materials. Thus, every reasonable incentive should be provided for the dissemination into use of ideas, and the production and introduction into use of creative works or educational materials generated within the Harvard community. Such a policy should be favorable to the concept that public benefit should take precedence over financial gain, either by the University or the individual scholar." Other universities, such as Yale, are reexamining their copyright management practices.

A Proposal from the "Transition from Paper" Working Group

Here we present, for public discussion, a proposal to the science and publishing communities and to the federal departments and agencies that fund research. The suggested policy is this: Federal agencies that fund research should recommend (or even require) as a condition of funding that the copyrights of articles or other works describing research that has been supported by those agencies remain with the author. The author, in turn, can give prospective publishers a wide-ranging nonexclusive license to use the work in a value-added publication, either in traditional or electronic form. The author thus retains the right to distribute informally, such as through a Web server for direct interaction with peers. The license would have to be carefully drawn to allow publishers to include the works in their own collections, such as the American Physical Society's *Physical Review* On-Line Archive (http://prola.aps.org), or other, still-to-be-invented modes of distribution. A publisher may request or require as a condition of publication that the author cite the formal publication reference in all further postings of the manuscript.

We recognize the potential insidious problems of placing any new requirements on the acceptance of federal funds for research, but current federal policy already obligates the recipient of such funding to make the results of the research publicly known. The policy proposed here is more protective of both author and publisher than is the more open public domain course that now applies to the results of in-house government laboratory research. We believe that this polar extreme of unrestricted publication, as well as the current practice of publishers holding copyright and in some cases limiting other distribution, must be examined in the assessment and formulation of a new policy. The positive aspects of these other publication policies should be discussed and protected in some manner.

This proposal addresses only research supported by the U.S. government. We recognize that a large fraction of papers published by U.S. scientific journals come from other countries and that adoption of this proposal would be only a first step toward solving the problem globally.

Our examinations of this approach indicate that the winners will be scientists, who can rapidly distribute, read, and respond to new results; publishers, who provide significant added value beyond what individual authors offer, in response to the opportunities in the new electronic environment; and the public, for whom the benefits of research will accrue as fast as new information is gathered. The losers will be only those publishers who fail to find new ways to enhance a contribution's value and to obtain revenue from that added value.

The precise form of this publication policy will require careful crafting, because it is important to preserve the rights of publishers to protect the value-added journals they create and to make them available as they wish. These journals, after all, require expert editing and are themselves intellectual achievements, in no way simple "sweat-of-the-brow" compilations. Journals will continue engaging referees, and can require authors to cite references to publications as a condition for publishing; this not only advertises the journal but ensures the integrity of the text. At the same time, open commentary of the sort now common on the Los Alamos "xxx" e-print server (http://xxx.lanl.gov) will provide a new, added form of critical discussion.

Not-for-profit professional societies, as well as commercial for-profit publishers, will be divided in their reaction to this proposal. Some, such as *Science*, the *New England Journal of Medicine*, and the *Journal of the American Chemical Society*, have adamantly opposed authors' posting of their own articles on Web pages or e-print servers, whereas others, such as the *American Journal of Mathematics*, the *Journal of Neuroscience*, *Nature Medicine*, and *Physical Review*, have considered such distribution consistent with, and even advertising for, their own journals (*3*). It is expected that some journal publishers will feel threatened by so fundamental a change in ownership practice. The most important concern for publishers and authors alike is that the Internet enables anyone to create new electronic publishing means. Such new distribution outlets may well overtake traditional publishing institutions, particularly when those institutions fail to keep up with the evolving needs of a scientific community.

Although scientific journals have been important in all fields of science for many years, we should not assume their continued unchanged existence. Radical changes in the publication of scientific research are already taking place and more are inevitable (*3*). It is publishers, not scientists, librarians, or archivists, who face the problem of ensuring the viability of STM journals in some form. As beneficial changes take place in the working environment of scientists, such changes should be employed for the benefit of our society, and publisher-created added value can be an important part of this.

SITEFINDER

INTELLECTUAL PROPERTY ISSUES

http://www.research.att.com/~amo/doc/eworld.html
A. Odlyzko maintains a list of papers on electronic publishing in text, PDF, and Word format.

http://www.amsci.org/amsci/articles/98articles/walker.html
An article in *American Scientist* concerning free internet access to traditional journals.

http://www.sciencemag.org/feature/data/980465.shl
Science's feature on Patents in 1 May 1998.

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Copyright: Evolution, Not Revolution, J. Liedes, *Science* **276**, 223 (1997).

References

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2. *Introduction to the Statement of Policy in Regard to Inventions, Patents, and Copyrights*, Harvard University, adopted 3 November 1975; amended on 17 March 1986 and 9 February 1998.
3. A. M. Edelson, *Science* **280**, 359 (1998).