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Libraries Stuck in the Middle: Reactive vs. Proactive Responses to the Science Journal Crisis

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Abstract

Libraries and the scholarly community share a dream of creating a world where scholarly articles are easily available on the Internet to everyone who wants them, without any fees, restrictions or barriers of any kind. What is preventing us from fulfilling such a noble and worthy goal? This paper examines selected case studies that show how libraries and scholars are coping with the science journal crisis. By highlighting responses that are innovative and proactive, this paper hopes to contribute to a general awareness of responses that have the potential for transforming the current scholarly communication process into an open, unimpeded, author-controlled electronic-journal based scholarly communication process.

Introduction

The aim of this paper is to provide a survey of the emerging responses to the science journal crisis. Librarians have been aware for quite some time that the traditional scholarly publication process for scientific journals and monographs is not functioning at an optimum. As early as the 1970s, libraries were engaged in serious journal cuts that were necessitated by science journal overpricing at rates that far exceeded the existing and projected library budgets ([Whisler & Rosenblatt 1997](#)). Today, serial cancellations are so commonplace in libraries that the ability of libraries to acquire, store and make available materials for further study and research is greatly compromised. Serious changes are needed in the way scientific information is published, stored and retrieved. Changes are also needed in the roles played by commercial publishers, authors, and libraries in the scholarly journal communication model. An ideal science journal publication model is clearly one that excludes those commercial publishers that have completely failed to see science journals as a vehicle that authors use to communicate scientific research results to their peers for review and comment.

In this paper, we are especially interested in documenting the ways in which libraries and authors are responding to the serial crisis. We will highlight those initiatives and responses that show how libraries are trying to survive and respond to the continued sale of overpriced science journals. We also list those responses from libraries and authors that are innovative and hold the promise for restoring the scientific journal publication process so that authors, future scholars and libraries are guaranteed easy and unimpeded access to every published scientific paper or monograph.

Methodology

Responses to the serial crisis discussed in this paper are drawn from the authors' experiences managing science journal collections in science libraries, and from case studies reported in the journal literature, at conferences and on the Internet. Responses are highlighted below if they are judged to have the potential to help authors and libraries reclaim the published scholarly literature for the common good.

Responses to the Science Journal Crisis

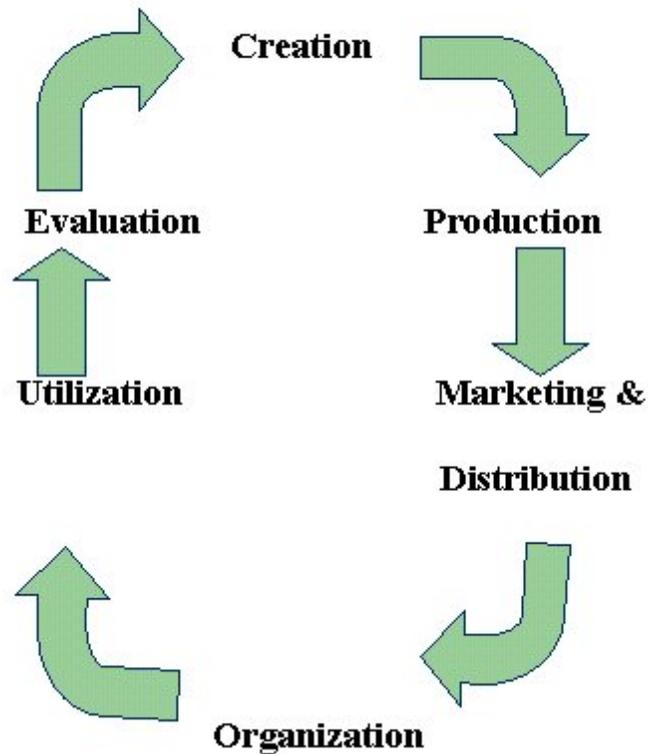
For the past 20 years, library administrators and all librarians with collection development and management responsibilities have been faced with a challenge and grim reality each year that they can no longer afford to buy many of the published works that their current and future library users need. This scenario is best illustrated by the book and serial purchasing patterns at Association of Research Libraries ([ARL 2002](#)). In the face of continued increases in science journal prices beyond inflationary values, libraries are buying fewer and fewer journals and monographs.

For centuries, libraries have played a key role in safeguarding everyone's right of free access to information with the belief that an informed citizenry is better empowered to participate in a democratic society and contribute to the social, technological and economic systems of their

respective societies. The ability of libraries to foster open access to knowledge for scholarship and research now and in the future is eroded.

In the traditional scholarly journal model that has existed for centuries, see Figure. 1, authors, publishers and libraries as key players worked together in partnership performing key roles in the knowledge cycle that resulted in the production of the scholarly journal which captured for perpetuity research contributions of all scholars. Scientists submit their works for publication to journals so that their works will be widely distributed and reach peers working in the same field who will provide evaluative comments in support of or against the prevailing paradigms that guide a given field at the time ([Kuhn 1970](#)).

**Figure 1. Key Roles in the Knowledge Cycle
Traditional Journal Publication Process**



The authors as creators of papers initiate the whole process by submitting their works to editors of established journals for review and editing leading to the paper production process. The publisher assumes the core functions of marketing and distribution of the finished journal. Libraries are a ready market for the finished journal which is organized into the library collections to be utilized and the content evaluated by an author's peers, who in turn generate more works incorporating results reported in all published work on the field to date. This traditional publication process ends with the publisher taking complete responsibility for the entire work, given the prevalent practice of authors signing away their copyrights for their work to the publisher. It is easy to see that this journal publication model is a self-sustaining author-

driven process. The quality of scientific papers and progress made increases dramatically when authors have access to all the published work in a field at a given time.

When commercial publishers continue to charge journal prices at rates that are beyond the budgets of libraries, the knowledge cycle becomes disrupted because only a few libraries can afford to pay the overpriced journals. Authors in turn are no longer exposed to all the key published literature in their field, in a timely manner. Their published works no longer have the benefits of insights from all the published literature. In the sciences, this is a serious omission given that the growth of scientific knowledge results from a careful critical analysis of all published contributions ([Kuhn 1970](#)).

From journal price studies by *Library Journal* ([2003](#)) and Harrassowitz ([2003](#)), we see that it is only a few European-based Publishers that are responsible for the uncontrollable costs of science journals that are destroying library budgets and disrupting the knowledge cycle.

Getting Rid of the Traditional Publication Process

In the traditional journal publication model, authors are no longer getting the widest possible distribution for their works, since most libraries can no longer afford overpriced science journals. The Internet and the availability of desktop publishing has made it possible for authors to assume responsibility for the entire journal publication process from creation to production and distribution of the published works; with libraries continuing to perform their roles of organizing, storing, archiving and making available for use published works. What should libraries and authors do to make this a practical reality? The following are among the key responses that will help libraries and authors transition fully to the emerging electronic journal based scholarly communication process.

Libraries Right to Refuse Purchasing Over-Priced Journals

The ultimate option for forcing change in the scholarly communication process consists of libraries refusing to purchase journals which they consider over-priced. Unfortunately, this is an option that very few libraries seem to have the courage to put into effect, because of the obligation most feel towards their customers, the scholars. It can be argued that for the long-term interests of their customers, libraries are going to be better off exercising this option sooner rather than later. Libraries stand to save a lot of money that is currently spent on only a few journals, by doing so. The fact is that if a critical mass of libraries decided not to purchase the overpriced science journals that take up a large proportion of their journal budgets, publishers of the overpriced journals will be driven out of business.

Cornell University is an example of a library that has recently demonstrated the courage to refuse to buy any more of the journals that are published by one publisher, Elsevier, that routinely increases its journal prices well above inflation rates at substantial profits to the company ([Elsevier 2003](#)). In Cornell's case, ([Cornell University Library 2003](#)) the journals purchased from Elsevier, although important, made up only 2% of its total journal collections but were worth

\$1.7 million equivalent to 20% of the journal budget. More libraries need to follow Cornell's lead and engage in wise use of their budgets. Just this week, Hane ([2003](#)) reports that Harvard and the University of California system are preparing for similar cuts of Elsevier journals, in an effort to regain control over their libraries' budget(s) and collection building decisions.

Library Consortial Purchasing of Overpriced Journals

As the pricing of journals has far outstripped the ability of any individual library to afford journals, it is much more common for a group of libraries to band together and negotiate the terms for gaining access to commercial journals. Purchasing materials through a consortia requires the crafting of carefully worded licensing agreements ([Jacobson 1996](#)). Guidelines for drawing up licenses are made available by the International COalition of Library Consortia ([ICOLC 1998](#)).

The elements involved in drawing up licensing agreements are proactive in nature in that they help shape the nature, formats, accessibility and availability of e-journals. However, the choice to buy journals through consortia is a reactive response to the serials crisis, and as such it just offers libraries a way to survive the current harsh journal marketing forces the best way possible, with no real influence on the scholarly communication process. Consortia are just another way of delaying the inevitable time when commercial publishers will again out-price the collective budgets and buying power of consortia as a whole.

Recent Examples of New Online Journal Publication Models

In the last few years, many teaching and research faculty have become aware of the crisis in journal pricing that has wreaked such havoc on library budgets. Many are also aware of the technological advances that have enabled easy and relatively inexpensive online publishing and are starting their own online peer-reviewed publications. Editors of non-profit, online scholarly journals have differing levels of interaction with academic libraries. Three journals illustrate the range of these interactions: the *Journal of Insect Science*, *Conservation Ecology*, and the *Journal of Machine Learning Research*.

Library and Scholar Publishing Initiatives

The *Journal of Insect Science* is an example of a proactive stance taken by the University of Arizona Libraries; Carla Stoffle, their Dean; and Harry Hagedorn, editor of the journal (Pfander personal communication 2003). The journal is published by the library and made available online, free-of-charge. The groundwork for the joint publication of this journal was laid in good communications between librarians and research/teaching faculty, in efforts to make faculty aware of the changes and issues in scholarly communications, and later, in locating resources to get started. The editor contributes his time, while the library provides the server space and around ten hours of staff time per week. Advantages stated by the editor include: the libraries dedication to freely accessible information, available expertise within the library, availability of

archiving and understanding of its importance, library leverage of resources through coalitions such as the Scholarly Publishing and Academic Resources Coalition (SPARC), and the understanding of the non-profit status of university research.

Professional Societies Taking the Lead

[*{Conservation Ecology}*](#) is an example of an electronic journal published by a non-profit professional society, the Resilience Alliance, a consortium of university, government, and non-government agencies. Many scholarly societies are choosing to publish peer-review journals online. Some of these are new publications while others are electronic versions of print publications. Many of these societies are still experimenting with pricing. Availability and pricing for institutions change often. Scholarly societies are often choosing to archive their own publications, but are usually aware of the importance of maintaining past issues. *Conservation Ecology* is funded by a standard \$400 charge to authors for each article. It is expected that the page charges will be incorporated into grant budgets or will be paid through institutional support of the authors. However, waivers can be given for authors who don't have access to these kinds of support.

More examples of professional societies that are involved in e-journal and other publishing initiatives include the [American Mathematical Society](#); Physics Pre-prints; [state academies of sciences](#); [{E-answers for agricultural experiment station reports}](#); [USAIN/NEH Core historical Literature of Agriculture](#); and many others. Under OAI guidelines, professional societies are encouraged to archive their publications themselves, to prevent the commercial publishers from re-entering the knowledge cycle as distributors or aggregators.

Alternatives to Highly Priced Journals

The [Journal of Machine Learning Research](#) (JMRL) is a third example of a new publication model for electronic journals. JMRL was started as an alternative to *Machine Learning*, a Kluwer publication. Disgruntled by high pricing and restrictive copyright agreements, nearly half of the editorial board left to set up their own online journal. The price of JMRL is approximately one-third the cost of *Machine Learning*. One year after start-up JMRL joined the SPARC initiative. The advantages of SPARC membership include better access for readers of the journal through library cataloging and direct links through library web sites. Quarterly print issues are published by MIT Press and sold to libraries for archiving. According to an article published soon after JMRL began publishing, "Many of the scientists who resigned from *Machine Learning* said they believe that traditional publishers, such as Kluwer, have become superfluous to the circulation of scientific articles" ([Foster 2001](#)).

There are many other authors who have courageously exercised their right not to serve on editorial boards of over-priced journals. *Theory and Practice of Logic Programming* (TPLP) published by Cambridge University Press was founded by the former editorial board of Elsevier's *Journal of Logic Programming* when the editors quit working with Elsevier in protest over the overpricing of *Journal of Logic Programming*.

Changing the Peer-Review Process?

It is apparent that the publishing and also the peer-review process are undergoing a major revolution. The role of libraries in the knowledge cycle will inevitably change also. The [{Public Library of Science}](#) (PloS) offers one model for the future shape of scientific publishing. PloS was launched in December 2002 with a grant from a private foundation. The goal of PloS is to provide free access to peer-reviewed articles and instant publication. PloS "is a nonprofit organization of scientists committed to making the world's scientific and medical literature a public resource".

Commercial publishers have traditionally published research that is primarily publicly funded. Neither authors nor reviewers are paid as a rule. Authors may be billed for page charges for publication. In the past, print publishers made a tangible contribution to the publication through their investment in printing presses, the labor of photo-typesetting, and the distribution of the print journal. The Internet, on the other hand, is largely publicly funded and has superseded traditional printing presses and distribution channels. In addition, the Internet facilitates dissemination of scientific literature to a wider audience, a feature that is consistent with the needs of the scientific community. PloS intends to make their journals freely accessible. Any costs in publishing will be recovered through page charges to the authors, which will usually be included in budgets for grants. PloS Biology and PloS Medicine began publication in October 2003.

BioMed Central : An Innovator in Electronic Publishing

[BioMed Central](#) is an independent publisher dedicated to making the results of scientific research freely accessible. Like PLoS, some funding for the project is provided by page charges. Additional income is provided by institutional memberships and sales of supplemental products such as reprints and paper copies of journals to libraries and individuals. Page charges are waived for institutional members. Charges for institutional membership vary depending on the number of faculty from about \$1550-\$7000. BioMed Central intends to permanently archive research articles and submits articles to [PubMed](#) for archiving as well. Archiving by other institutions and by authors is encouraged and authors retain copyrights for their works. Innovation in the peer review process is encouraged. BioMed Central now produces about 128 journals in many sub-disciplines of medicine and biology. Some require subscriptions for access. BioMed Central will also assist editors in starting new journals.

' Both PLoS and BioMed Central support the Open Access Initiative, which grew out of a meeting convened by the [Open Society Initiative in Budapest](#) in December 2001. The Budapest Open Access Initiative is an international effort to make research articles in all academic fields freely available on the Internet. Supporters of the initiative include researchers, libraries, universities, laboratories, foundations, journals, publishers, and scholarly societies. Scientists have traditionally made their results available without charge. They may benefit from Open Access by opening up their research results to a wider audience. The public gains access to the fruits of research, which they have largely funded and applications of research are facilitated

when results are more widely available. Information have-nots are no longer excluded under the Open Access guidelines. The two strategies that the Budapest Open Access Initiative most encourages are self-archiving through deposition of articles in freely available electronic sites and the establishment of open access journals. The Budapest Open Access Initiative web site includes business plans for converting a subscription-based journal to an open access format and also for establishing new open access journals.

BioOne Journals: Publisher-Library-Society Partnerships

BioOne journals are an initiative aimed at making high impact biological science journals readily accessible and available at cost-effective prices. BioOne is a project resulting from a unique partnership between libraries, professional societies, and commercial publishers all whom are interested in experimenting with newer pricing and publishing models of electronic journals. There are about 67 journals in this collection.

Beyond the journal?

In a paper-based information world, it made sense to gather up a number of articles on a particular subject area and then publish them together periodically. In an electronic world, individual papers can be posted as they are received and reviewed. Does the "periodical" concept still have validity? [CYFERNET](#) at is a national collection of peer-reviewed documents on family, child development, and community life provided by the Cooperative State Research, Education, and Extension Service. Submissions are reviewed by an editorial board of nationally recognized experts in each subject area. The web site is maintained by a coalition of eight land grant institutions. Material is arranged by subject rather than by date as in a journal.

Another possibility for scholarly communication on the Internet is to forego the idea of gathering articles in one place and allow authors to post their own articles on web sites at their individual institutions. Endorsements by specific professional societies could be indicated by a society logo.

Role of Libraries

Many of the electronic journals and initiatives mentioned in this paper emphasize the role of libraries in the transition to a new model of scientific communication. Often the importance of libraries in archiving and in making information accessible is mentioned. Libraries can assist in the transition to open access, Internet-based scholarly communication by promoting open access journals to their institutions, indexing services, readers, funding agencies, and other libraries. Libraries can join consortia, and work to provide easy access, and can cancel over-priced journals when open access alternatives are available. More libraries are recognizing their important role in capturing the intellectual output of their individual institution. The ACRL provides a road map through their [Create Change](#) web site.

In March of 2000, the [{Tempe principles}](#) were set out as a set of guidelines to aid in the transformation of scholarly publishing. These nine principles include: cost containment for continued access, electronic access, secure archiving, evaluation of quality, protection of copyright and fair use, faculty assignment of copyrights to maintain access, timely publication, an emphasis on quality versus quantity of publications, and privacy of users. As libraries reassess their role in the rapidly changing information world, it is important to keep in mind the ultimate work that librarians perform of preserving information and providing research guidance to that information for our current and future scholars. What librarians do is vital to the information cycle and will be so in the future.

Government Control of Monopolistic Commercial Journal Practices

There are some in the scholarly community who believe that it will take government regulation and intervention to convince commercial publishers to give back records of published scientific works for the common good and for the continued progress of science and technology. Many in the scientific community, including Nobel prize winner Harold Varmus ([Weiss 2003](#)), are convinced that open unlimited access to all published scientific works will speed up scientific discoveries, medical cures, and technological progress. With this belief, Elias ([2003](#)) reports on legislation that was recently introduced to help regain access to published scientific work. In this initiative, it is argued that the federal government issues out an estimated \$50 billion of taxpayer monies to research scientists most of whom are publicly funded. The results of this publicly funded research are research papers that get published in various journals. Many scientific journals own the copyright to works published therein, and charge individuals and libraries fees to access their journal contents. Proponents of this legislation see that commercial publishers charge the public repeatedly for the same information, initially for the funding and subsequently on an annual subscription basis for access to the resulting published research.

This response is also among some of the best proactive approaches aimed at resolving the science journal crisis. There are similar moves abroad where scientists are fighting to reclaim results of publicly funded research. In the United Kingdom, the library and scientific communities strongly opposed the merger of Elsevier and Harcourt Brace Javanovich in 2001 on the grounds that the merged company will have a monopoly and undue dominance over the science journal market ([Meek 2001](#)).

Educating scholars on Copyrights & Intellectual Property Rights

In the traditional print-based journal publication model, authors from the academic community routinely signed over their copyrights for book and journal articles to publishers in return for publication of their works. In an electronic journal based publication system, authors are advised to be extra careful not to sign the standard copyright agreements which require the author to assign copyright in the work to publishers to the extent that even the author's own use of their

work constitutes infringement Okerson ([1996](#)) provides an informative overview of copyright and how authors can assert and stay informed about their rights.

Authors should carefully consider all possible future uses they may wish to reserve for their information needs and the needs of their peers in the field as well as libraries that serve them. With this in mind, authors should engage in the practice of giving some rights away while retaining others. There is a proliferation of alternative copyright agreements now in place, some of which should fit every author's unique needs. The University of Arizona Library {[Copyright Resources](#)} provides useful information on copyright basics and researching alternative copyright agreements. Authors should also exercise similar care not to give away their other intellectual property contained in their research work in form of patents, trademarks, and trade secrets.

Copyright laws are reviewed continuously to encompass the changing digital information environment ([Okerson 1999](#)). At a minimum, authors will do well to consistently reserve the right to post for free all electronic pre-prints of their papers on their homepage when discussing copyright transfers to journal publishers.

Authors carefully managing their copyrights and intellectual property rights is a single most critical proactive response for helping authors and libraries regain the rights to published works. If all authors were careful to retain their copyrights, there would be no serial crisis.

Redefining Tenure and Promotion Criteria

The academic reward system is designed to encourage scholarship, learning and the creation of new knowledge consistent with the mission of institutions of higher education. Formal contributions in form of scholarly publications to the knowledge base of specific disciplines are expected of every academic faculty. Publications are therefore one important tangible measure used in tenure and promotion decisions, and for merit raises. The quality of scholarly publications produced by faculty is measured by the quality of the journal. Observations of science journals show that highly ranked journals happen to also be the ones that are highly priced. Faculty who are working to achieve tenure and promotion or high merit raise can be so focused on getting published in the expensive highly ranked journals, they fail to consider the fact that they are fueling the demand for highly priced journals, which their local libraries can not afford. Publishing in peer-reviewed journals in general is considered important given the careful reviewing of the quality of the paper before it is accepted for publication in a journal.

With the various emerging electronic publishing initiatives, universities need to redefine their tenure and promotion criteria to establish values for digital works produced in non-traditional publication systems.

Revised tenure and promotion guidelines with lessened emphasis on publishing in highly ranked journals, or on number of papers would also be considered an important proactive stance for helping authors and libraries regain the repository of published literature. Unfortunately, we are not familiar with any university that has undertaken a review of its tenure and promotion criteria for the purposes of contributing to open access to scholarly information. Perhaps library

administrators should lead discussions in these areas with their provosts, faculty, and university senates.

Change in Attitudes

While some scholars are actively engaged in helping free scholarly communication, there are still some who are unaware of the practices and marketing forces that are threatening their intellectual and academic freedoms and their rights to quality information. The technology is in place for authors and libraries to assume more influential and pivotal roles for producing and managing scholarly information for the common good. However, a change in attitudes is needed from passively waiting for someone else to create databases or journals to purchase and access to a mindset of proactively partnering with authors to assist and support their efforts in producing open access newer electronic journal publishing initiatives.

Conclusions

This paper has discussed a selected proactive responses to the serial journal crisis that include authors and libraries refusing to purchase overpriced journals; educating authors about their role in the knowledge cycle; educating authors about the management of their copyrights; authors and libraries experimenting with new journal publication models; creating electronic institutional repositories of scholarly information; encouraging publication and archiving of journals by professional societies; seeking governmental intervention and regulation in preventing publisher monopolistic practices and empowering authors to abandon editorial and authorship roles in overpriced journals. It is our hope that an increased awareness of these emerging proactive responses to the serial crisis will spark a renewed commitment from authors and librarians to assume and perform their pivotal roles in the knowledge cycle of the scholarly journal publication process.

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