The Crisis of Scientific Information Dissemination in North America

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Title: The Crisis of Scientific Information Dissemination in North America

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Brief curriculum vitae:

The author has a Bachelor’s degree in chemistry, a Masters degree in biochemistry and biophysics, and a Masters degree in information science. She has spent the past 17 years as a librarian at universities, research institutes, and working with state and federal agencies and Indian tribes. Her research, writing, and presentations center around issues concerning access to information and include topics such as scholarly communication, access to grey literature, subject mapping, and library standards. Another area of interest is how scientific information is valued in different cultures or countries, and how this is reflected in the dissemination of research information. This interest was a heightened by the author’s participation in a research tour of Cuban libraries in 2001. The author currently works at Portland State University in Oregon as their Science Librarian, Coordinator of Graduate Student Services, and Coordinator of Scholarly Communication Resources.
Introduction

Good afternoon. I am extremely honored to be addressing you here today……

Today, I wish to speak a little bit about my observations and concerns about what is happening in North America and in Europe in the area of scientific publishing. Part of my talk will touch upon economic and political environments as well, so a few disclaimers are needed: I am not an economist, I am not a political scientist, and I am not a publisher. I used to be a scientist, but I am not one now. I am a librarian, and my remarks are based on 17 years of observation and experience as a librarian. However, libraries exist in a political and economic context, not in a vacuum. Because of this, I believe that our context needs to be examined, as well as the intimate workings of our profession.

In my presentation, I will discuss the traditional or historic model of scientific communication, some changes that have occurred in the past two decades, how the political/economic environment affects the dissemination of scientific information, and some ways to meet some of the challenges presented.

The Traditional Model for Scientific Communication, Context, and Changes

When I was a scientist, and when I became a librarian, in the 1980’s, I learned about the importance of scientific societies. The societies were the guardians of what the scientists did. While it was, and still is true, that much funding for scientific research came from the government, as well as from private corporations – the societies were the gathering place of the
experts in a field of study. The societies provided meetings and conferences, such as this one, where people could meet and talk informally, and where they could present preliminary results of studies and receive useful feedback. The societies published the proceedings of the conferences, so that people unable to attend could share in the learning experience. The societies then also provided more formal means of publication for research results, in the form of professional scientific journals. The editorial boards of these journals were society members. Libraries were able to purchase these journals so that students and researchers could read the articles. Sometimes the librarians even joined the societies. The goal of all of this, of course, was to further the scientific knowledge of the greater community – both the scientific / academic / research community, but also the scientific knowledge of the general public. It was through this shared goal of increasing knowledge that scientific research moved in a forward direction. Because this was a goal, and because all of the participants in this model had a vested interest in this goal, this model was successful. The societies existed to foster communication, so the prices of their journals were set in a way to be able to pay for the production of the journal. Libraries could afford these prices, and scientists sometimes even contributed directly to the cost of production, in order to have their work published. This served the scientists, because, at least in North America, promotion and tenure in the academy has always been tied strongly to a researcher’s record of publication. This model also served the government and the corporations who provided funding for the research, because they received, as a product, not only the data resulting from the studies, but complete articles containing literature reviews and thoughtful analysis and discussion. They also received a product that had good quality control, as most published scientific research undergoes a peer review process. So - the recipient who pays for the research, in the case of a corporation, gets a quality product. In the case of publicly funded
research, the general public also gets a quality product – which gets used, hopefully, for the
development of responsible public policies.

What are some of the characteristics of this model? Other than the libraries, who play the role of
facilitators in this system, all of the players are both consumers and producers of the information.
Therefore, they are all stakeholders, and in being such, they all have a vested interest in the
success and vitality of the model.

Before we look at how this model has changed or stayed the same, let’s look at different
social/political systems in which a scientific information dissemination model can exist.

In a socialist country, like Cuba, this kind of model makes perfect sense, so long as it is in the
interest of the state to perpetuate scientific research and its dissemination, both to the public and
to the scientific community. The government funds the research and pays the scientists a salary
to carry out the research. The research is reported, I assume, at meetings such as this one, and is
then published in books or journals, which are controlled, again, by the government. Assuming
that the government operates in the interest of the people, the scientific findings will be used to
assist in the development of public policies that are good for the country’s people, for the
environment, etc.

In other words, if scientific research and its products are considered to be a ‘public good’, like
water or electricity, then the stakeholders all work together - like one big happy family.
Obviously, in a socialist country where the government does not want scientific information disseminated, this model fails – as would any model – since in a socialist country, governments do have a greater degree of control over the means of dissemination.

In a capitalist country, such as my own, this model has also worked well for most of the last century. Not so much because the government controlled it, but because science was seen as a sleepy little province that pretty much operated outside of ‘the mainstream’ of society. While the findings of science had a great deal of commercial potential, for example in the aerospace, chemical, and pharmaceutical industries, the actual publishing of this material for such small audiences, was perceived to have little or no commercial value. However, this view came under some change.

During the mid to late 1980’s, publishers began to offer their services to the societies that were publishing prestigious scientific journals. The conversation probably went something like this: ‘You are scientists’, said the publishers, ‘wouldn’t you rather spend your time doing research and writing? We understand publishing, and since we publish so many other things, we can do this job for you faster and more inexpensively.’ This, of course, sounded good to the scientists – they could do research and write, and someone else could take care of that messy business of printing and mailing, and keeping track of subscriptions. This worked well for awhile. Commercial publishers could indeed produce scientific journals more easily and more cheaply than societies, who do not have the advantage of economy of scale, and it was appealing to be able to spend more time doing science, rather than becoming amateur publishers.
But then, some other changes came about. In the old model, copyright ownership belonged to the writer of the article. This made sense – the person who spent the long hours doing the work and writing up the findings, owned the intellectual content of their work, and could do with it what they pleased. Soon, publishers began to ask the scientists to assign copyright ownership to them, the publishers. While this was not something enforceable by law, many scientists, eager to have their work published, did so willingly (remember what I said earlier about the importance of publication to their career advancement). Another thing also happened - even though the publishers had made the case of how much more cheaply they could produce these journals, the prices began to rise. This slide shows a chart of selected journal price increases over a five year period.

[FIRST SLIDE]

There is an old folk-tale, probably common to all of our cultures, where the clever fox finds a way to guard the chickens, and then, of course, eats them. Please forgive me for being so cynical, but I see some similarities in these stories.

So now, whether library budgets decrease, stay the same, or increase at very modest rates, we are forced to cancel subscription to many journals, just so that we can maintain some of what we have spent so many years building. I do not know of any library that has received a materials budget increase equal to or surpassing the rate increase of an average scientific journal. Many of the researchers who work at our universities, who have conducted research, funded by their own
tax dollars, and subsidized by their own institutions, do not have access to their own articles at their institutional library. What is wrong with this picture?

And what happened to the characteristics of the model, under these changes? In our original model, you will recall, that everyone was a stakeholder in the viability of the model. At this point in our story, the publishers are also stakeholders, because, if the model fails, they will lose the business that they are getting from the societies.

Over time, though, publishers increase their ownership of scientific information by (a) increasing the # of publications that they control, (b) selective discontinuation of titles due to lack of profitability and (c) transfer of copyright ownership away from the scientist.

At the same time, their role as a stakeholder in any particular journal, or in any particular field, becomes more dilute and more removed and they, as owners, become even more estranged from the other stakeholders.

**Other trends in the World Market**

Now, to let you all know how cynical I really am, let’s look at some other trends that we can observe in the ‘free world’ of capitalism. Many years ago, when life was simple, Time produced a news magazine, and Warner Brothers distributed cartoons and rock and roll albums. A few years later, America Online made a splash on the Internet scene. Before we knew it, we had a media conglomerate of Times-Warner-AOL. I haven’t checked recently to see who else has joined the merger. I’ve been too busy trying to find money to pay for my university’s journal subscriptions. But, it should be obvious that all of these companies have an interest in the communication of information. And now THEY are the ones operating like one big happy family - a very rich family. Up until now, I haven’t mentioned the names of any publishers in
particular, partly because I am trying to speak about trends, and not point fingers at any particular company, but also because I am not looking for any legal trouble, should I make a careless statement. However, the following chart shows some of what has happened in the world of scientific journal publishers in the last few years:

[SECOND SLIDE]

Dr. Mark McCabe, from the Georgia Institute of Technology, wrote an excellent report on the economics of publisher mergers and journal prices. Information for accessing this article is available on a handout.

So, how much of a stakeholder would you expect some of these publishers to be, when they become just one more piece of a multi-national media conglomerate? While others may not predict the future in quite such depressing terms, the alarm has clearly been sounded.
The response from the scientific and academic communities

Obviously, this has not gone on without some reaction on the part of the other stakeholders. One example is that given by Michael L. Rosenzweig, the editor in chief of the journal Evolutionary Ecology Research. Dr. Rosenzweig started a journal in 1986 that charged $100 per year to libraries and $35 per year to individuals. Within twelve years, the ownership of the journal changed twice. The price for libraries had increased to $800 per year. He calculates that the publisher made a profit of approximately $200,000 each year, and charged 275% more than the cost of production and distribution. The response of his editorial board was to start a new journal, to compete with this old one. His venture has been successful.

There are several initiatives that many of you may know about, but I will briefly describe a few of them. One of them is called SPARC – The Scholarly Publishing and Academic Resources Coalition, and the other is the Public Library of Science. These two initiatives are related to each other, in that they are both working to put the ownership of and access to scientific information back in the hands of the scientific community. To quote their own materials: “SPARC is an international alliance of over 200 college and research libraries building a more competitive scholarly communication marketplace to address the high cost of information.” Dr. Rosenzweig is working with SPARC to encourage scientists to critically examine the policies and profits of their journals, and if they find that these journals do not serve the needs of their communities in a responsible way, to engage in negotiations with their publishers and, if no progress can be made, to declare independence and create competitive publications.
Another initiative, the Public Library of Science, is, to quote their website – ‘a non-profit organization of scientists committed to making the world's scientific and medical literature freely accessible to scientists and to the public around the world, for the benefit of scientific progress, education and the public good.’ They have been circulating an open letter to publishers, urging them to allow articles to be freely accessible to anyone in the world over the web, after a certain amount of time in commercial publication. As of this writing, this letter has been signed by over 29,000 scientists from 175 different countries.

One response from the physics community to barriers to dissemination, has been the posting of electronic pre-prints, or ‘e-prints’ as they call them, to the websites of the premier physics research laboratories, such as Los Alamos and Cornell University. Some scientists are wary of using e-prints, as some publishers will not publish research that has previously been posted on the web, and the more junior scientists, as I’ve mentioned, are still bound by their obligations to publish for career advancement. More information about some of these initiatives is available through the websites listed on the handout.

**The impact of electronic publishing**

When electronic publishing came along, it was obvious to everyone that this held great promise. Journal articles could now be disseminated more quickly, and, with the associated reduction in printing and mailing, the product could be offered at a much lower price. If journal prices decreased due to this new, labor saving technology, then libraries could subscribe to more journals and make more information available to people. Also, with costs reduced, libraries in developing countries or places where the currency was simply not as strong, would be able to
access this information - global access could finally become more of a reality. But this also did not happen. What happened instead was that the profit margin just grew larger.

Some other changes came with this development, notably, the idea of ‘leasing’ rather than owning the content that is purchased through an annual subscription. It didn’t take librarians too long to figure out that archiving this content was something to be concerned about and soon, publishers had to amend contracts to include provisions for archival access. There are also a few initiatives, in the hands of academics or non-profit entities, to preserve content of journals in the public domain.

Because the prices of these journals in electronic format did not decrease, and in fact mostly increased, libraries are still being forced to cancel many titles just to keep up with the inflation rates of the subscriptions. One of the more insidious incentives offered by publishers, are the ‘package deals’ – where full-text online access is offered to everything a publisher has, for one price that is lower than it would be to buy the journals individually. And they always offer a free trial to your university campus, which librarians almost never turn down. Why do I view this with disdain, when it is a common marketing ploy in other industries? Because, if other journals emerge, as a result of initiatives, such as SPARC, they will be difficult to purchase, because all of the library’s budget will be committed to these ‘packages’, which are very, very expensive. The trials also ‘hook’ the users, just like drug dealers use free samples to ‘hook’ their addicts, and the pressure is then strong to purchase these products. The result is that the large, monopolizing publishers gain even MORE control over the rest of the stakeholders.

So, by increasing electronic access to scientific journals, all we have done, is to increase the expectations of our users, which brings me to another change I’ve observed in the past 15 years.
Fifteen years ago, students and faculty understood that library research took some time, and that it was important to gather all of the pertinent information about their topic. Since it took time to search an index, identify important articles, locate the articles, either in the home library, or through inter library borrowing networks, and read the articles – the occasional article that was located that was written in the student or faculty member’s non-native language did not pose a significant problem. A translator was found, or a few hours were spent with a language dictionary, to obtain the important information that a colleague from another country had written.

In these times of immediate electronic access to full-text journal literature, the idea of reading a foreign language article is out of the question for your average American researcher. (An excellent researcher will still pursue this, but they are becoming fewer in number). So, what happened to the idea that electronic dissemination would improve global access to information? Between the fact that electronic journals cost more, rather than less, than the printed journals, and the fact that user behavior has become so addicted to convenience at the sacrifice of comprehensiveness – little has been gained in the area of improved global access.

There is one more change that comes with electronic publishing that concerns me in the area of global education. Historically, one of the ways that North American libraries have been able to help libraries in developing countries, has been to donate issues of paper journals that were no longer needed. While this practice will continue for awhile, what happens as we slowly convert to purchasing or leasing the majority of our ‘content’ in electronic format? Our licenses may not permit us to ‘donate’ these electronic products to other libraries. So, not only do we have barriers to access due to high cost, but those in wealthier countries, may soon not even be able to
provide aid in the form of donated materials – ‘trickle down economics’ may not work in an electronic publishing world.

Challenges and Opportunities

So what are some of the things that we can do, to reverse some of these unpleasant trends that accompany the wonderful applications of technology to scientific publishing?

One of the things that we could do is to simultaneously digitize articles in multiple languages. There are many electronic translating products available, and we know that none are perfect, so we could employ bi-lingual humans to make the necessary corrections and to provide quality control. Another improvement would be to follow the lead of the physicists by increasing the opportunities for ‘e-prints’, and, if necessary, create quality control mechanisms for these so that these kinds of publications will garner the same respect as formal journal publications.

Thirdly, SPARC claims worldwide projects and lists North America, the U.K., Ireland, Europe, Asia, Australia and New Zealand as partners – but there is no mention of Latin America or Caribbean countries. Contact SPARC, and partner with them, to help to make this a truly worldwide effort. A fourth approach, applicable to capitalist environments, is to lobby for government subsidies to societies to allow them to reclaim control over scientific publications.

Fifth, we can ‘just say no’ (that’s an American joke) to publisher centered digital packages. And lastly, we can support existing efforts to return science to the public domain in countries where this information is being privatized. The over-riding challenge to us, I believe is to educate our users and to emphasize to them THEIR role as stakeholders in the scientific communication process and their increasing loss of control of their own product and access. I’m sure many of you also have ideas of how we can turn this situation around, these are just a few of mine.
**Concluding Remarks**

In an optimal world, all information, like the air we breathe, is free, accessible, and comprehensible to all. We all realize though, that there is indeed a capital cost to produce the work that provides the information, and to package and disseminate the findings. It is how society values this information that decides how close we can get to that optimal world.

The governing leadership in my country has a strong influence on public and economic policy. Our system allows for a change in our leadership every four years. One way to view this is that there is an opportunity to improve policies governing things like, for example, treating information as a public good, rather than as a commodity. Another way to view this is that, because the governing vision can change so frequently, and our country is so large and powerful, both internally and externally, that REAL change does not happen at the government level at all.

Since our economic system of capitalism is the actual persistent law of the nation, (in other words, we don’t get to vote on a new economic system every four years), it is indeed our economic system that determines whether information is a public good or a commodity, to be bought and sold on the free-market.

Libraries in my country are as close to an American socialist institution as you can get, without receiving the dreaded label of socialism. But as much as libraries do cooperate and avoid the profit motive in their operations, we, as librarians are products of our culture, and the values of ‘collectivism’ are not deeply engrained. So, while we hope and plan and create initiatives that will preserve the written record of scientific research for posterity, I am fearful that there are many holes in these efforts that still need to be plugged. At the same time, I am hopeful, that it is not too late. It depends a lot on how many people hear the alarm, and how enabled we can be to respond to it.
So – why am I making these comments? First of all, I make them to applaud any country represented here who has decided to treat scientific information as a public good, and to let you know that I think you are on the right track. Secondly, for countries that are currently on the horns of this dilemma, I am hoping to give you something to think about in the decision making that you will be forced to do. And for the countries that are in the same situation as the United States, I hope to learn from you how you have been able to make the commodification of information work in a way that serves your scientists, your students, and your libraries. I also hope that you will join some of the international efforts of putting scientific information back into the hands of the scientists and the public, where it should be.

Thank you very much for listening.
### EXAMPLES OF EXPENSIVE SCIENCE JOURNALS AND THEIR COSTS

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(adapted from: [http://www.arl.org/create/faculty/issues/silent.html#](http://www.arl.org/create/faculty/issues/silent.html#))
Some Recent Scientific Journal Publisher Mergers and Acquisitions

1987: Elsevier merges with Reed
1991: Elsevier buys Pergamon from Maxwell
1992: Reed and Elsevier merge
1996: Wiley buys VCH
1997-2000: Kluwer / Elsevier merger fails
1998: Bertelsman buys Springer; Elsevier buys JAI Press
2000: Elsevier buys Endeavor Information Systems
2001: Kluwer buys Silver Platter; Elsevier buys Harcourt

(compiled by G. Siegel, with assistance from M. McCabe)
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A few places to go for further information:

Scholarly Publishing and Academic Resources Coalition (SPARC):
http://www.arl.org/sparc/

The Public Library of Science:
http://www.publiclibraryofscience.org/

Physics e-prints at Los Alamos National Laboratory :  http://xxx.lanl.gov/

McCabe, Mark J. ‘The Impact of Publisher Mergers on Journal Prices: A Preliminary Report’ , Georgia Institute of Technology
September,1998 – available at:
http://www.arl.org/newsltr/200/mccabe.html