DOLPHIN SPONSOR PRESENTATION

COPYRIGHT VS. OPEN ACCESS: WHAT IS THE FUTURE OF SCIENCE PUBLISHING? *

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Abstract:
From its beginnings, copyright has been an instrument to disenfranchise the authors of published texts. In the 16th and 17th centuries, copyright regulations were used to exercise censorship, and in the 19th and 20th centuries, copyright was introduced across the globe for the purpose of protecting the interests of publishers and of authors' employers. In the 19th century, copyright was limited to periods of a few decades, to secure long-term accessibility to information for the public domain; in recent years, however, the duration of copyright has been extended considerably. Together with high-price policies (for subscriptions and other services) of most science publishers in the second half of the 20th century, this has severely curtailed access to primary scientific information, prompting the development of an Open Access (OA) movement. Modern information technology — with or without OA — is converting publishers' efforts to make copyright more restrictive into a fight against windmills: The restrictions cannot be enforced effectively, and the demise of copyright in science publishing appears unavoidable. Current developments will probably provide universal access to research results; at the same time, however, they may force quality-oriented commercial publishers into sacrificing accuracy and reliability of publications in order to remain competitive, thus compromising scientific communication as a whole.

Keywords: Communication; authorship; writing; publishing; scientific journals; copyright; Open Access; public domain.

1. History
There is a persistent myth that copyright is designed to safeguard an author's economic ownership of the work that s/he has created (e.g. CSE 2006, p. 21: "The economic rights enable the creators to control the reproduction, performance, and broadcast of their intellectual property"). In reality, the purpose of copyright regulations since their inception in the 16th century has been to exercise censorship and to protect the interests of publishers and of the authors' employers. Copyright legislation does ensure authors' perpetual moral right to be identified as creators of the works, but it does not protect their economic rights.
The publishing industry was born in Europe in the 15th century, when mechanized printing made mass production of literature possible and profitable. In the mid-16th century, the Charter of the Stationers' Company in England gave publishers monopolistic control over printed works, initially for the purpose of suppressing writings advocating Protestantism — and after Protestants gained power, for the suppression of Catholic writings (Crosskey & Jeffrey 1953).

Censorship was eroded at the beginning of the Age of Enlightenment. Publisher copyright was abolished in England in 1694, thus creating "a public domain for literature" (Patterson 1993, p. 11). To regain control over the printed word, British publishers initiated a campaign in the early 18th century, advocating that authors had a "natural law" right to the works they created — and that this right could be transferred to the publisher, in payment for the publisher's services.

The "natural law" postulate laid the groundwork for restoring the publishers' monopoly in Britain (Patterson 1993), a practice that spread internationally during the 19th century. In most countries, however, there was concern over the vitiation of the public domain, i.e. the obstruction of access to publications. Germany's rise as an economic power during the 19th century, for instance, is attributed in part to the absence of copyright restrictions, which facilitated an "explosion of knowledge" (Höffner 2010).

To promote the dissemination of information over the long term, copyright was limited to periods of a few decades; this was formalized internationally in the Berne Convention of 1886 (WIPO undated). Intellectual property law has evolved further, however, undermining the public domain. Today, copyright duration has been extended to a century or more in some countries (see also http://en.wikipedia.org/wiki/Public_domain), and the copyright in many (if not most) countries is granted by law to the author's employer (in the USA the employer is often considered to be the author: CSE 2006, p. 23–29).

2. "Natural Law" vs. Public Domain
The central issue in the copyright debate is: Who should "own" the information — the creator (or copyright holder), or the user (i.e. the community at large)? This has been the subject of extensive litigation, for instance in the entertainment industry. Courts of law more often than not side with copyright owners, on the basis of the "natural law" postulate (e.g. Kalven 1967, and references therein).

A majority of theorists, however, give the public domain primacy over the authors' rights, and consider the "natural law" argument to be an artificial construct (e.g. Patterson 1993; see also: http://en.wikipedia.org/wiki/Natural_law). Without unfettered access to all published information, education and progress would be constrained, since all publications are founded upon previously published information — every author is primarily a reader before s/he becomes a writer. In science, the issue is complicated by the fact that most research is publicly funded, but privately published.

The dichotomy between the "natural law" and "public domain" postulates manifests itself in the copyright asserted for works authored by government employees under the British Crown (UK, Canada, Australia and New Zealand) on one hand, and in the USA on the other. Whereas Crown copyright cannot be transferred to another party, the USA asserts that the work of a government employee is in the public domain. As the Crown retains copyright, it can reproduce and distribute (or limit distribution of) scientific articles, i.e. the Crown forces publishers to provide a free publishing service to the government, and thus obtains free Open Access (OA) through the back door. The public domain aspect for work created by employees of the US government entails a similar free service (CSE 2006, p. 26, 29).
Publishers invest about 2000 € for every published article (costs for the review process, production of accepted papers, maintenance of online services, etc.). Manuscripts that are rejected entail a financial loss. Who reimburses the publisher? If we follow the "natural law" argument, then the public should pay for access to published information — as is usually the case today in the form of library subscriptions; if the public domain is regarded as having priority, however, then access should be free, and authors or their institutions should cover the publication costs — this is represented by the Open Access (OA) option that is becoming increasingly popular.

The issue may be moot in wealthy societies where scientific institutions have the resources to pay for either the publication of papers or for journal subscriptions. Poorly funded institutions, however, e.g. in developing countries, may be excluded from access to information, because they lack the money to subscribe to scientific journals. Switching from a "reader pays" to an "author pays" model would give scientists everywhere access to all published information; those with lack of funds might be limited in their ability to publish in expensive primary journals, but they would still have possibilities to publish online, with worldwide visibility, in outlets that are free of charge; additionally, some OA publishers waive the fees for authors who cannot pay. Moreover, publication costs can be funded by the authors' institutions, or included in research budgets, where they constitute a minor item.

3. Commercial Interests
Scientific publishing traditionally had little commercial purpose, being directed at a small, specialized market. Until the mid-20th century, most scientific publishing was undertaken by scientific societies, universities, or small academic publishers, which historically published without paying royalties or reviewers, and publications were funded from membership fees, journal subscriptions, and university or government budgets (e.g. Balaban 1978).

From the mid-20th century, technological advancements in printing required considerable investment. At the same time, the increasing number of publishable studies, and the view that being a publisher is not a core task of public institutions, meant that government agencies, universities, and societies increasingly handed over publishing to commercial entities. Over the past 50 years, scientific publishing has become a big business and corporate publishers have bought up nearly all scientific journals (see e.g. [http://en.wikipedia.org/wiki/Academic_publishing#Publishers_and_business_aspects](http://en.wikipedia.org/wiki/Academic_publishing#Publishers_and_business_aspects)).

As commercial profits became the driving force, journal prices skyrocketed; e.g. from 1977 to 1990, the average subscription fee per journal quadrupled (Young & Hammell Carpenter 1990, their Table VII). Since the 1980s, library budgets have been limited, and large corporate publishers sought to wring more money out of their publications by toughening their attitudes with regard to copyright and reproduction of scientific information; e.g. a review article published a few years ago by an Inter-Research (IR) journal cost the author hundreds of Euros for permission to reproduce figures from other papers. The high-price policies of the major publishers have long been an impediment to scientific information exchange.

In various countries, copyright clearance agencies issue licenses and collect fees on behalf of publishers and authors. The right to act as an agent for the publisher is assumed under powers issued by copyright tribunals, international agreements, or publisher associations presumed to act for members and non-members alike. Thus, publishers may be unaware of the agencies that act on their behalf, of the licenses that they issue, and the fees that they collect.
The fee collected by a clearance agency — though termed the "publishers' copyright fee" — is not paid out to the publisher. Internationally, a portion of the fee is transferred to the licensing agency in the publisher's country (e.g. for Germany, VG Wort). The onus is on the publisher to register with the agency, submit various financial and publishing details, and (up to 18 months later) receive a payout the agency calculates to be a fair share; the payout calculation itself is not transparent. Before the advent of online publication, IR participated in the US Copyright Clearance Centre (CCC) scheme; after the CCC subtracted its fees, the amounts received were so small (cents) that IR did not bother cashing the checks.

In the 17th century, censored works were often published abroad (Amsterdam made a lively business of this; Shorto 2013). In the 21st century, Amsterdam is everywhere — on the Internet. Copyright issues are more fluid than ever before, as modern information technology (IT) makes it possible to copy and disseminate publications worldwide at negligible cost. While copyright regulations are becoming more restrictive, and works are transferred from the public domain back into private ownership (e.g. Liptak 2011, LAT 2012), it is also becoming impossible to enforce the copyright — a problem for the entertainment industry, where pirated material may have great commercial value (cf. MacKinnon 2011, NYT 2011).

Commercial publishers need a reasonable income guarantee, following the "natural law" postulate, in order to exist. Submitting a manuscript to a journal for eventual publication is contracting a service, but it is perfectly possible for an article to be published at no expense to the authors. Traditionally, cost recovery has been guaranteed by copyright transfer and covered by the sale of the article to subscribers; these, however, bear more than their share of the cost when non-subscribers obtain the same articles for free (the "shoplifting effect"). Free distribution and "green" OA (see below) — as well as reductions in library budgets — cause a decline in subscriptions and reduce the economic viability of the present model of science publishing.

4. Open Access (OA) and the Future Of Science Publishing
The Open Access (OA) movement has gained force since the 1990s in reaction to the diminished accessibility of primary literature that resulted from publishers' high-price policies. There is a variety of OA models (see e.g. http://creativecommons.org/licenses/), and we focus on 2 broad categories: (1) "Green" OA, by which the authors make their manuscript freely available on the World Wide Web, either through a personal website or via an institutional repository. (2) "Gold" OA, by which the publisher makes the journal article freely available, after copy editing and typesetting, usually for a fee.

Computer software and the worldwide web have made it easy to produce and distribute literature. Publishing is not necessarily cheaper, however, as often thought by people who do not see the costs of the hardware, utilities, license fees, third-party services etc. that lie behind the IT delivered to their desktops. IT has also facilitated the rise of new publishing enterprises that specialize in the production of OA journals.

Government and academic institutions originally installed IT infrastructure for functions other than publishing, but this also enables them to wrest control of the production and dissemination of scientific literature back from the commercial publishers, e.g. by requiring "green" OA for accepted papers authored by their employees (cf. Dawson 2013, Sutton 2013), a practice that is increasingly common in the USA, and that we expect will spread farther.
Publishers acknowledge that the OA movement has caught them by surprise (see http://www.stm-assoc.org/events/frankfurt-conference-2013/). "Green" OA repositories may be ethically desirable, but they undermine the subscription-based system by taking a value-added service provided by the publisher (e.g. organization of the peer review process), and then dodging the bill for it. Moreover, "green" OA is based on the faulty assumption that the accepted manuscript is error-free and ready for distribution — i.e. that copy-editing and typesetting add little but tidiness and style.

Peer review, however, does not guarantee a scientifically accurate report. For instance, 221 reviewers of a trial manuscript spiked with 8 flaws found on average only two of these errors (Godlee et. al 1998). Among >300 OA journals to which a Science reporter submitted a spoof manuscript, only in 36 did the referees recognize any of the grave scientific mistakes that had been introduced, and 16 of the journals accepted the manuscript for publication without requiring revision, despite damning reviews (Bohannon 2013). Jefferson et al. (2008) evaluated 28 studies on the review process and concluded that peer review alone cannot ensure the quality of research papers. With review by two referees, as used by most journals, as many as half of all accepted manuscripts can be flawed, while with pre-screening by the editorial board and review by 3–4 referees (the system employed by IR), probably one-fourth of all manuscripts remain flawed at the time of acceptance (e.g. Neff & Olden 2006).

The present situation was foreseen by Kinne (1999, p. 1): "(T)he Internet is a giant with a powerful body but without a head (...) electronic publishing can not only trim the publication process, it can also make it cheaper. All this is good for science and may increase the competition between publishers — a desirable feature for correcting overrated publication costs (...) At present we can neither fully assess the extent of the resulting changes nor their consequences. With respect to science, three things are certain, however: (1) There will be no principal changes in the ways knowledge is created, quality-controlled and utilized by researchers. (2) There will be significant changes in the ways scientists communicate with each other, in which research results are presented, and in which knowledge is analyzed, disseminated, and digested. (3) There will be risks that endanger science as we know it today."

The presentation of research results may be undergoing a paradigm shift. Kinne (1999, p 3) concluded that "As yet insufficiently tapped possibilities for reducing publication cost lie in cutting down on wordiness and jargon". Recently, a major publisher suggested that science publishing could be reduced to producing a single page of abstract, key points, key references, and a couple of figures and marketed through apps on smartphones or tablets (presumably with the full dataset accessible upon request, or in an OA repository), on the grounds that people do not want to read much anymore (E. Kittel-Prejs, Int Symp Ecohydrol Biotechnol Eng, Sep 17, 2013, Lodz, Poland; after B. Moss, pers. comm.).

5. Where Does This Leave High-Quality Publishers Such As Inter-Research (IR)?
At IR, copy-editors and proofreaders do much more than correct grammatical and spelling mistakes — detailed quality control is by far the greatest expenditure. Contradictions between data in figures and text, tables that obfuscate data rather than present them simply, illegible graphs, contradictions between methods and results are often found during production, and they sometimes require extensive correspondence with the authors.

There is a possibility that future researchers will consult only the "green" OA version, and never cross-check this with the version of record (the final, published version), especially when the latter is locked behind a subscription barrier. The solution to this, according to OA enthusiasts, is to force publishers to permit authors to deposit the final published versions of all papers in a "gold" OA repository. Whether "green" or "gold", however, OA eliminates sales revenue protection. If subscriptions continue to fall,
publishers will have to shift toward pre-payment for publication (a return to the system that predated the 16th century), e.g. via manuscript submission fees, page charges and OA fees.

In the next 2–3 years, IR will probably convert its newest journals, which have the lowest subscription figures, to fully author-funded OA. This entails another risk, however. As long as funding of journals/publishers occurs via the libraries, we can expect that professional decisions will be taken to subscribe to the best journals, generally those with more thorough review and production processes. If the authors — who are under constant pressure to publish much, fast, and (maybe) cheaply — disburse the funds, they could favor publishing in the easiest and most inexpensive OA journals, even if these have a faulty review process that sometimes looks more like an unmoderated web blog — authors might even welcome the opportunity to liberate themselves from the "tyranny" of strict academic review.

Will science publishing descend into intellectual anarchy? Will publishers that invest heavily in quality control be able to compete with "cheap" OA providers that forego strict peer review, as well as copy editing and typesetting, i.e. producing what is almost "grey" literature and providing no more service than any "green" OA repository? This is yet unknown; the work that e.g. IR invests into any manuscript is often insufficiently appreciated by users, and sometimes even resented by authors.

We think that quality in science publishing is already threatened (cf. Seaman 2011), and the OA movement — particularly in the form of "green" OA — will further reduce the accuracy and reliability of scientific communication. The next years will be challenging for a quality-oriented publisher like IR. With respect to the theme of the 2013 IAMSLIC conference, the future will be bright only if "green" OA and cheap mass-production of articles that have barely been quality-controlled do not displace high-quality publishing and "gold" OA.

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