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Rempel, J.

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Closing an Open Discussion?

Applying the Social Construction of Digital Technology Framework to the Open Access Movement

Jennifer Rempel

Jennifer Rempel is the Information Literacy and Resource Access Librarian at Athabasca University Library (Alberta, Canada). She participated in the *Book and Digital Media Studies* program in 2021-2022 while on sabbatical. Her main research interests include the Open Access movement and its impact on libraries and novel modes of delivering information literacy instruction in an online environment.

The rise of digital technologies over the last thirty years has upended the traditional academic publishing model. Amidst calls from the scientific community for more free and open access to academic scholarship, major academic publishers have, in the age of the Internet, still maintained a “publishing oligopoly” over access to this material through establishing paywalls and online subscription models (Larivière et al. 10-15). Academic publishers have therefore been able to maintain and even increase profits by charging subscription fees to academic libraries. Because publishers have effective control over a closed market, this has resulted in a “serials crisis”, leaving libraries struggling to afford the high subscription rates offered by publishing firms, putting strain on budgets, and sometimes resulting in subscription cancellations (12).

The Open Access (OA) movement has gained ground in the last twenty years as an alternative to the traditional academic publishing model. This movement involves a complex ecosystem of digital technologies, business processes, and social actors offering proposed solutions to the problem of the academic publishing oligopoly and the serials crisis. This article will feature an analysis of the OA business model as a proposed solution to the academic publishing oligopoly and the serials crisis, with the help of two related theoretical frameworks that open up areas of inquiry into why some innovations succeed and others fail.

Pinch and Bijker’s Social Construction of Technologies (SCOT) framework, firstly, provides an evolutionary model of technological change that is non-linear and allows for the exploration of the success or failure of a given technological solution (411). SCOT takes the position that technological innovation and adoption is not a linear process, but rather one that is shaped by the social groups for whom a technological artefact is relevant (414). In SCOT, “the developmental process of a technological artefact is described as an alternation of variation and selection”, which results in a non-linear, multi-directional model of technological innovation (411). In this model, solutions to technological problems are proposed and adopted by different social groups that have been impacted by the artefact, and those solutions that are seen to solve the problem become more widely adopted (414). Not all social groups impacted by the artefact

will have found it to be problematic or will find the proposed solutions satisfactory; these groups will then propose alternative innovations, thus resulting in a multi-directional model of change. Those relevant social groups who have found the solution to be satisfactory will then, according to SCOT, attempt to close the discussion and “stabilize the artefact” (claiming the problem to be solved and entrenching the adopted solution) through a process of rhetorical closure and closure by redefining the problem (424). What is key here is that closure in technology

involves the stabilization of an artefact and the “disappearance” of problems. To close a technological “controversy” the problems need not be solved in the common sense of that word. The key point is whether the relevant social groups see the problem as being solved. (426-427)

Social groups can use “rhetorical closure” to simply claim that the problem is now solved. Social groups also attain closure by redefining the original problem “in such a way as to establish consensus with other social relevant groups – thereby neutralizing arguments for alternative interpretations” (Van Baalen et al. 3).

The SCODT Framework

Secondly, Van Baalen et al. extend the SCOT theory to make it relevant for the digital era. They build upon the evolutionary implications of the variation/selection model of technological innovation described by SCOT by situating technological change with a digital ecosystem, defined by McCormack as “the combination of all relevant digital touchpoints, the people that interact with them, and the business processes and technology environment that support both” (qtd. in Van Baalen et al. 4). The SCODT theory that they propose takes “into account the nature of digital technologies underpinning digital ecosystems, networked individualists as active stakeholders, the sociodigital context, and the interaction between people

and digital technologies” (5). Van Baalen et al. extend SCOT along four dimensions:

- (1) *Technologies – from organizational IS to digital technologies: Extending the unit of analysis to digital ecosystems from information systems;*
- (2) *Interaction – from interpersonal interaction to interpersonal, person-technology, technology-technology and technology-physical environment interactions: Taking into consideration how humans and technologies interact;*
- (3) *Social Groups – from relevant social groups to networked individualism: Recognizing that the Web has allowed for the growth of “fragmented, opportunistic, fast connecting individuals and organizations forming temporary relevant social groups”;*
- (4) *Context – from social context to socio-digital context: Recognizing the power asymmetries which “give different relevant social groups asymmetric access to (information) resources that are relevant in the construction of technology”, and the implications these power differentials have on the construction of digital ecosystems (5).*

While OA is not a technology per se, some social groups in the OA movement see it as the solution to the problem of the publishing oligopoly and the high costs of accessing research articles and data. The SCODT framework extends the SCOT model so that its applicability reaches beyond the mere artefact, and the OA publishing movement can be viewed as a “digital touchpoint” open to analysis from the point of view of SCODT (5). Applying the SCODT framework to the OA movement, as a response to the problem of the academic publishing oligopoly and the serials crisis, illuminates the myriad ways in which social actors respond to technological change. Puehringer et al. distinguish five

different actors within the debate evolving around OA, who have partly opposing goals, claims, possibilities and perspectives:

(i) authors, (ii) publishing companies, (iii) (public) funding agencies (iv) universities and libraries and (v) the scientific community (4).

All these social groups have proposed solutions to the publishing oligopoly and the serials crisis, and their perspectives are worthy of exploration. For the purposes of scope, however, this study will be limited to the exploration of the response of academic publishers to the OA movement. As a social group within the OA ecosystem, publishing companies by virtue of their oligopoly over the market bear significant responsibility for the serials crisis and the OA movement which has arisen in response to it, and the OA business model they propose as a solution provides a useful case study in applying SCODT to digital technological innovation.

Applying SCODT: Academic Publishing and the Rise of OA

The traditional print model of academic publishing can be traced back to the seventeenth century. The first scientific journal, the *Journal des Sçavans*, was published in 1665, and a few months later, Henry Oldenburg's *Philosophical Transactions of the Royal Society of London* introduced the practice of peer review (Eger and Scheufen 12). Subsequently, the number of scholarly journals published on specialized topics began to increase exponentially, and by the beginning of the nineteenth century, the scholarly journal was recognized as "the fastest and most convenient way of disseminating new research results" (Larivière et al. 2). Journals at this time were usually published by learned societies, with university presses joining the field later in the nineteenth century (Eger and Scheufen 12). The mid-nineteenth century in Europe saw widespread university reform and the increasing professionalization of academic scholarship (Fyfe et al. 6). The now-widespread "concept of a university as a community of scholars, in which both students and staff engaged in critical enquiry, meant that professors were expected to engage in both teaching and research" (5). Thus, the quality and quantity of a researcher's publications

came to be central to their reputation as a scholar and their suitability for teaching appointments, and scholarly publishing became ever more central to academia (6).

After the Second World War, the academic publishing industry grew further, and commercial publishers came to dominate the market. These publishers relied on a subscription model whereby readers could access publications based on a fee; academic libraries and learned societies typically subscribed to print journals to allow students and scholars access to this material (Eger and Scheufen 12). With the advent of the Web and the PDF in the 1990s (van Baalen et al. 3), academic publishing moved mostly online. Although some saw this digital paradigm shift as a potential means of lowering subscription fee costs,

the form of the scholarly journal was not changed by the digital revolution. The PDF became the established format of electronic journal articles, mimicking the print format. What was affected by the digital revolution is the economic aspect of academic publishing and the journal market (Larivière et al. 2).

Academic publishers retained their subscription access model, instituting electronic toll access to academic journals. These publishers have generally seen their revenues increase, with profit margins of between 35 and 40 per cent (Eger and Scheufen 13). Currently, the ‘Big Five’ academic publishers – Wiley-Blackwell, Springer Nature, Elsevier, the American Chemical Society (ACS), and Taylor & Francis – control up to 75% of the academic publishing market (Puehringer et al. 2), and prices for access have only increased (Eger and Scheufen 55). Libraries are still required to pay high fees for access to research output, such that they are unable to keep pace with rising costs due to increasingly tight budgets for subscription purchases (Larivière et al. 11). Compounding the issue is that publishing is now central to the reward structure of academia, and so authors continue to submit their research to the high-impact journals owned by the Big Five academic publishers, thus further entrenching the problem (Eger and Scheufen 35).

Multi-Dimensional Innovation

The development of the Web and the PDF represented a paradigm shift in the realm of textual media. Larivière et al. claim that, during the 1990s, it seemed that digital publishing could go one of two ways: although some saw the Web as a potential solution to the serials crisis, “most authors hypothesized that it would actually make the situation worse or, at least, not provide a solution” (2). In fact, through the lens of SCODT, one can trace the multi-directional lines of innovation suggested by the interdependent social groups invested in academic publishing and OA. It is useful to outline these here, as they constitute lines of innovation proposed by other stakeholders, to which academic publishers are in turn responding. The OA publishing ecosystem is complex, and SCODT takes into account “networked individualism,” whereby sub-groups and sub-interactions between and among social groups can take place. Relevant social groups considered here, aside from publishing companies, include authors, (public) funding agencies, universities and libraries, and the scientific community. Some members of these relevant social groups have also gone along with the OA business model and are happy to promote OA within their institutions and social groups; others have proposed alternative solutions. These myriad responses also constitute examples of multi-directional technological innovation as described by SCODT.

The OA movement arose in reaction to both the possibilities offered by the Web and to the nascent domination of academic publishing by major firms. It is a broad international movement that seeks to grant free and open online access to academic information, such as publications and data. A publication is defined as “open access” when there are “no financial, legal or technical barriers to accessing it... [W]hen anyone can read, download, copy, distribute, print, search for and search within the information, or use it in education or in any other way within the legal agreements” (“What is Open Access?”).

The scientific community, authors, and other relevant social (sub)groups of networked individuals began to promote the ideas of OA and open science, providing a possible path of innovation as well as an ideological

and ethical framework through which to view the digital textual revolution. For “cyber-optimists”,

digital technologies offer[ed] collaborative, non-market approaches to scholarly publishing, releasing it from the grip of corporate publishers and breaking down the knowledge hierarchies and high paywalls that lock resource poor scholars out of subscription journals. (Meagher 342-343)

The scientific community also began to endorse OA, suggested means of promoting OA, and securing funding for OA publishing. Three influential public statements, the *Budapest Open Access Initiative* (February 2002), the *Bethesda Statement on Open Access Publishing* (June 2003), and the *Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities* (October 2003) further defined and popularized the growing OA movement, fueling an interest in OA publishing that has continued apace (Suber 7). Authors, libraries, and research institutions developed green OA repositories such as CogPrints, arXiv, and the Social Science Research Network (SSRN) (Eger and Scheufen 13-15). Academic libraries promoted OA through instruction and advocacy, and by committing to investing in open scholarship (Scott et al. 368). Authors frustrated by the current academic publishing environment have decided to boycott major academic publishers and only publish in OA journals; some universities and consortia have also attempted this (Khoo). Some authors even banded together to create their own Open Access journals such as *PLOSOne*, “conducting rigorous quality monitoring and attracting excellent submissions” (Eger and Scheufen 110). Some members of the scientific community have gone even further, eschewing the OA business model completely and establishing rogue networks, such as Sci-Hub, that illegally download and share, for free, copyrighted academic publications (James 1502). All these innovations represent possible solutions to the problem of the academic publishing oligopoly, and it remains to be seen which of these innovations will continue to “survive”, and which will “die” (Pinch and Bijker 411).

Stabilization and Closure

The digital paradigm shift of the 1990s did not inspire innovation among the major academic publishers; rather, they simply transferred their traditional subscription access model to the Web and continued to see their market shares and profits increase (Larivière et al. 10). As the OA movement gained popularity, partly in response to the serials crisis created by the academic publishing oligopoly, academic publishers have recognized the OA movement as a reality of digital publishing, if not as a threat to their traditional business model (Esposito). Thus, academic publishers proposed their own solution to the serials crisis: the OA business model. Publishers such as Sage and Elsevier established their own fully OA journals, or hybrid journals in which OA is granted to individual articles whose authors have paid an article publication charge (APC) (Eger and Scheufen 32). In this business model, costs of publication are shifted from the reader to the author, and to public funding bodies that can sponsor academic research and APCs. The Big Five publishers have also begun purchasing established OA journals and directories, and currently the Big Five academic publishers have now all adopted OA models to some degree. By offering OA options to researchers as the solution to the serials crisis, they have rhetorically *closed* the issue as per the SCODT framework: it is implicitly *solved* for academic publishers, because they can shift the burden of costs to readers and public funding bodies rather than authors. It is useful to remember here that, according to SCOT/SCODT, the “key point is whether the relevant social groups *see* the problem as being solved”, and *not* whether the problem has actually been solved at all (Pinch and Bijker 426-427). The OA business model does not effectively solve the serials crisis or the publishing oligopoly for any other actor in this ecosystem, but it does redefine the problem so as not to disrupt the publishing industry. The problem here is the massive profits that these publishers have been able to generate – through APCs and charging libraries exorbitant subscription fees – while still seeming to endorse the ideals behind OA. Rather than seeing the problem as one of high access costs and profits (and of course, profits are not the problem for academic

publishers) the problem is redefined as being about the cost to the user; shifting costs away from the user to authors, and therefore, to public funding bodies, *closes* the problem for the academic publishing industry and is thus the solution that they endorse.

Discussion

Rhetorical closure and redefining the problem within other relevant social groups is useful to explore as well, for it may be the case that the co-optation by academic publishers of OA as a viable solution to the serials crisis is given cover when other social groups appear to acquiesce to this solution. Arguably, university libraries have rhetorically closed the issue, implicitly, by endorsing the OA movement and promoting OA publishing among their research communities (Scott et al. 366). Many universities and research institutes worldwide have signaled their support for OA through advocacy and IT infrastructure support (368). International funding bodies and advocacy groups have taken on the cause of OA publishing through legislation such as Plan S, which requires researchers who receive public funds to publish their work in OA repositories or journals (Björk 189). This would indicate that, for some relevant social groups, the OA business model is the solution to the problem of the academic publishing oligopoly and the serials crisis. Certainly, from the point of view of academic publishers, the problem is now *closed*. Arguably, however, the only parties who are truly served by the OA business model are academic publishers, while other social groups do not substantially benefit. Despite the implicit acceptance of the OA business model by these social groups, sub-groups within each of these social groups have arisen to provide their own solutions to the academic publishing oligopoly and the serials crisis. The SCODT framework takes into consideration multi-dimensional innovation, and the solutions proposed by these other social groups within the academic publishing ecosystem, as well as the role of authors, funding agencies, universities and libraries, and the scientific community in the OA movement, is also worthy of deeper analysis through this lens.

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