Imagining networked scholarly communication: self-archiving, academic labour, and the early Internet

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This essay explores the emergence of self-archiving practices in the 1990s as a form of academic labour that is intimately tied to the popularization of the Internet. It argues that self-archiving is part of a sociotechnical imaginary of networked scholarly communication that has helped to shape understandings of digital scholarship and dissemination over the past three decades. Focusing on influential texts written by open access archivangelist Stevan Harnad in 1990 and 1994, the essay analyzes the language and discursive strategies used to promote self-archiving as form of collective scholarly exchange. Through these writings, Harnad helped to articulate scholars to the Internet as a medium of publication, with impacts still seen today in policy discussions around open access and the public good that shape relations of knowledge production under contemporary forms of capitalism.

Keywords: scholarly communication; labour; publishing; open access; imaginary

Introduction

Self-archiving practices emerged in the 1990s as a new configuration of academic labour conditioned by a context of crisis in scholarly publishing, the development of the Internet as a popular medium and associated cyber-libertarian discourses, and the development of scholar-led publishing and repository projects that sought to explore the affordances of the medium. This essay traces the emergence of self-archiving as a form of networked scholarly communication practice that articulated scholars to new ideas of the public good associated with access to the network. It argues that self-archiving is part of a sociotechnical imaginary of networked scholarly communication that gained ground in the early 1990s with the popularization of the Internet, and still shapes understandings of digital scholarship and dissemination today.

Publication is a defining feature of modern scholarship; making results public is a vital step in the research process (Connell, 2019). Knowledge is made public in several ways, providing a continuum of scholarly communication that includes everything from informal discussions to seminars to conference presentations to journal articles or monographs. This continuum is fluid, adapting over time to changing social, economic, and technological contexts. Publication via journals or monographs remains a stable system for making knowledge claims public, yet the material and temporal limitations of the publishing process have given rise to many informal practices intended to complement them. For example, the lengthy time to publication in many scientific disciplines is one of the motivating conditions for the informal circulation of preprints. This temporal lag is perceived to hinder the production of knowledge: scientists need access to research results as soon as possible to ensure the efficiency and validity of their own work. As a result, preprints are a primary mode of dissemination of preliminary research results in some fields, such as physics, where preprint papers were originally shared through mail and photocopies (Klein, 2017). By circulating preprints, scholars are able to more quickly seek the feedback or commentary of peers, a form of communication that historically tended to be informal; for a restricted audience and ephemeral in nature (Borgman, 2007). As preprint dissemination became more public with the use of online repositories, the risks and rewards of sharing pre-peer reviewed research were amplified.[1]

The term preprint varies in meaning depending on the dissemination practices of particular research communities. Although preprint sharing originated long before the Internet became a popular communication medium, it has since become closely tied to

modes of online distribution. The publisher Public Library of Science defines a preprint as "a version of a scientific manuscript posted on a public server prior to formal peer review" (Public Library of Science, n.d.). For some, the term refers to the pre-peer reviewed version of a paper shared publicly at the same time as it is submitted to a journal; for others, it could mean that a version of the paper is shared online after acceptance by a publisher, or even after publication (Larivière et al., 2014). Some have used the term e-print to refer to any form of academic paper shared electronically with peers (Larivière et al., 2014). These understandings of what constitutes a preprint are also informed by the policies of publishers and the terms of their contracts with authors; many of these policies set different terms of dissemination for "submitted", "accepted" and "published" versions of papers.[2] What is notable is the way in which understandings of preprints are intrinsically tied to their open and public dissemination, in contrast to their "print" distribution, where "print" no longer exclusively references paper but has come to stand in for the authority conveyed by the formal publication process.

The term self-archiving is commonly used to describe "a strategy used by authors to make their scholarly works available on the open web" (Northwestern University Libraries, 2020). This could include posting a document on a personal website, social media platform, or any other publicly accessible site. However, it is most often used to refer to the practice of uploading texts to a centralized repository specialized for the task of cataloguing and disseminating research either on behalf of an institution or within a particular field of study. Self-archiving can be primarily characterized as a form of 'user-generated' online distribution where authors are responsible for making work available that is in many cases published elsewhere (and not already freely accessible). This

author-led distribution strategy has come to be aligned with green open access, as opposed to gold open access in which the publisher makes materials openly accessible.[3] In open access discourses, self-archiving is recommended for all "royalty-free" literature for which the author expects no compensation (Suber, 2016). As Peter Suber (2016) has remarked, this category can be applied to a vast body of scholarly research, including both published articles and their preprints (p. 28). Despite this simple premise, the variability of self-archiving practices in relationship to publishing practices across disciplines has led to uncertainty over what texts can be self-archived and under what conditions, and outreach remains an important role for library professionals who manage repositories (Canadian Association of Research Libraries [CARL] and the Scholarly Publishing and Academic Resources Coalition [SPARC], 2008). Self-archiving in a repository structures the informal practices of sharing - by transforming the social interactions of scholars into a new infrastructural context mediated by a variety of sociotechnical processes.

Although many scholars were communicating via networked computing throughout the 1980s and earlier, in the 1990s emerging communication technologies were shaped in profound ways by wider cultural expectations of the Internet (Streeter, 2017). Thomas Streeter (2017) argues that the flood of engagement and investment in the Internet arose out of the "structure of feeling" it produced: an "enthusiastic embrace of a romantic vision of the Internet as an agent of change" (p. 85). Scholars were not immune to this metaphorical power, and scholarly communication practices became integral to imagining the change to come. For example, the "digital library" as a metaphor for globally interconnected knowledge systems was central to the vision and rhetoric of the

US National Information Infrastructure (U.S. National Commission on Libraries and Information Science, 1994; Borgman, 2000). Sharing their texts directly via the Internet, in addition to speeding up communication, also prompted scholars to envision new forms of scholar-led online dissemination. Given the impact of escalating journal subscription fees that began in the 1980s, the slow pace of publication, and increasing research specialization, it is not surprising that for some the Internet promised a more desirable future for scholarly communication.

Constituting the self-archivist

According to Sheila Jasanoff (2015), a sociotechnical imaginary is defined by "collectively held and performed visions of desirable futures" (or of resistance against undesirable futures) that are "animated by shared understandings of forms of social life and social order attainable through, and supportive of, advances in science and technology" (p. 19). This concept draws from theories of "imagined communities" (Anderson, 1983) and "social imaginaries" (Taylor, 2004) that are widely used to analyze the role of collective imagination in the production of modern social life. The concept of a social imaginary is used to understand how individuals imagine their social existence, their place in society, and the social expectations and norms that structure their interactions. Jasanoff (2015) contributes to this literature to "position science and technology as key sites for the constitution of modern social imaginaries" (p. 10), highlighting how "through the imaginative work of varied social actors, science and technology become enmeshed in performing and producing diverse visions of the collective good" (p. 11). Sociotechnical imaginaries are produced through "the material instruments that reformers are able to accumulate" and "their uses of symbolic and

cultural resources, such as images, texts, memories, metaphors, and language itself"
(Jasanoff, 2015, p. 25). As such, this essay studies texts written in the context of 1990s
debates around electronic scholarly publishing that featured prominent advocates such as
Stevan Harnad, Paul Ginsparg, Ann Okerson, and Andrew Odlyzko.[4] These writers
centered the affordances of the Internet when imagining the future of scholarly
communication. Although the aims and perspectives of these writers differed, their
writing displays a shared set of beliefs, namely that "electronic publishing is dramatically
less expensive than paper publishing; access to electronic publications is easier and
wider; and electronic publishing can speed up scientific communication" (Kling and
McKim, 1999, p.6). These foundational arguments circulated at a time when it was not
obvious that the Internet would be widely adopted as a medium of scholarly
communication. Proponents had to bring together a variety of discourses, metaphors, and
images to demonstrate alignments between the values and functions of scholarly
communication and the affordances of the Internet. To do so they had to address
explicitly the concerns of scholars based on their actual experiences, or lack thereof, with
a seemingly chaotic 'frontier' medium. The promises of reduced cost, wider access, and
faster dissemination became landmark contentions in arguments that promoted networked
scholarly communication, and these claims were frequently brought into relief against
questions about existing mechanisms of quality control and prestige. The texts examined
here exemplify the discursive strategies used to navigate these tensions.

This essay argues that the writings and projects of these reformers worked to
articulate scholars to the Internet as a medium of scholarly exchange. In cultural studies,
the concept of articulation is used to describe the ways in which previously disparate

concepts or practices are brought together to create a new cultural or social formation. According to Stuart Hall, discourses and other social forces can be articulated under certain conditions, that is, connected to unify and legitimize a new social position and a corresponding set of subjects (Grossberg, 1986). As a conceptual lens, Hall emphasized both meanings of articulation, carrying both the "sense of language-ing, of expressing" and of forging linkages that "make a unity of two different elements" (Grossberg, 1986, p. 53). Articulation does not happen without deliberate intervention; it requires the active aggregation of symbolic, cultural, and material resources to construct a new social position. In the case of self-archiving practices, cyber-libertarian discourses intersected with beliefs about knowledge as a public good to articulate scholars to a new vision of networked scholarly communication, imagined in the figure of the self-archivist as scholarly Internet user. Paying attention to the ways in which such a subject position emerged foregrounds the political nature of how commonsense understandings are shaped, under what conditions, and through what practices (Clarke, 2015). This issue is particularly relevant to discussions of academic labour, and is in conversation with a recent and extensive literature on critical studies of academic labour, including work by Rosalind Gill, Gigi Roggero, Gary Hall, and Toby Miller. For Harney and Moten (1999), the particularities of academic work, and the social relations in this work of knowledge production, define the academic subject, which conventionally includes images of the solitary, self-possessed scholarly mind detached from market influence. To understand academic labour then means to pay attention to the contours of these defining characteristics; to "the types of work that are being undertaken, the conditions of that work…the gendering of work, the racism of work, the division of work, and so on"

(Gregory and Winn, 2016, p. 2). Accordingly, I show how the emergence of self-archiving informs contemporary ideas about academic labour.

Among the writings of 1990s electronic publishing proponents, two texts by Stevan Harnad have been particularly influential (written in 1990 and 1994) in shaping open access (OA) discourses and practices. These texts helped to produce an imagined, alternative future for scholarly communication, but also reveal how the networking of academic labour became a contested site of value production. Over the past three decades, Harnad's reflections and writings on scholarly communication have been important in shaping the discourses and practices of open access, beginning with his work at the University of Southampton from 1994 to 2001. Since 2002 he has been a Professor of Psychology at the Université du Québec à Montréal and was the Canada Research Chair in Cognitive Sciences from 2001-2015.[5] He is not only an advocate for networked scholarly communication; he is a practitioner whose early experiments with open peer commentary and online dissemination shaped his understanding of its potential. He is the founder and editor of several electronic journals that allow open peer commentary, including *Behavioral and Brain Sciences* (1978 – 2003), published by Cambridge University Press, *Psycoloquy* (1989 - 2002), published by the American Psychological Association, and *Animal Sentience* (2016 – present). The early journals can be considered within a rich history of early electronic scholar-led projects that experimented with networked communication and publishing, contributing to a "neglected pre-history of open access" within the humanities and social sciences (Moore, 2020, p. 864). Harnad is a self-described open access "archivangelist", an active long-time advocate who has argued strongly for self-archiving as an avenue to achieve open access. Although a

central figure in histories of open access, his vision for networked scholarship is quite unique among advocates, and goes far beyond questions of access to consider the ways in which online communication might revive the "ancestral, interactive oral tradition for which human brains…were specifically adapted by evolution" (Poynder, 2007). He looked toward a revolution in scholarly communication, imagining the Internet as a medium that would transform the cognitive labour of scholarship rather than simply the distribution of its outputs.

The texts discussed below offer important insights into the constitution of self-archiving as a form of academic labour. Analyzing their language and discursive strategies helps us to understand the enabling conditions for this mode of dissemination and its corresponding social relations.

Skywriting: imagining networked scholarly communication

Imaginaries of networked scholarly communication exist in tension between the past and future, "between institutionalized realities and desires for change" (Bory, 2020, p. 3). Scholars became interested in the Internet not only because of its novel affordances for inquiry and exchange but equally by its arrival into a context of crisis in academic publishing. The 'serials crisis' that began in the mid 1980s resulted from the unique economy of scholarly publishing, in which the labour of authors, reviewers, and editors is not directly compensated by publishers, and the products of this labour are then sold back to educational institutions with ever-increasing journal subscription fees (Lehner and Ziegler, 2019). The serials crisis compounded concerns about unsustainable publishing regimes and in the 1990s fuelled debate about the role of the Internet in scholarly communication. Although ostensibly a crisis in economic terms, the serials crisis

highlights the interrelatedness of the economic and epistemic dimensions of publishing practices in a global context - driven by a perfect storm of factors including not only rising journal subscription fees, but also fluctuating exchange rates[6], stagnating library budgets, increasing magnitudes of published work due to increasing academic specialization, and the 'publish or perish' imperative faced by scholars. This crisis has never been truly resolved and has rather become a chronic condition, a permanent signifier of the brokenness of scholarly publishing, and the source of ongoing debates, lamentations, and resistance, defining the work of a generation of librarians (Cronk, 2020).

The pressures exerted by the serials crisis were central to early debates about publishing reforms in relation to the Internet. Many scholars were inspired by the growth of the Internet as a popular medium in the early 1990s to imagine new networked models of dissemination. Electronic publishing seemed to offer several avenues for reform - from reducing the overhead costs of publication by eliminating printing expenses to bypassing publishers altogether to connect authors directly with their peers and the public. Some of these ideas were shaped by vocal enthusiasts of electronic publishing who argued for the superiority of the new medium in terms of speed, cost and reach (Kling and McKim, 1999). Proponents of sociotechnical imaginaries aim to produce social reform in relation to perceived dystopian outcomes (Jasanoff, 2015). The dystopian outcomes imagined by 1990s electronic publishing advocates were grounded in crisis narratives of scholarly publishing, mostly related to concerns with speed, cost, and reach. Even today, some publisher-centric models of OA have been described by librarians as dystopic (Ghamandi, 2017). Ann Okerson (2000) described the serials crisis as a source of anxiety

for institutions of higher learning about their ability to continue providing access to research in the future. Andrew Odlyzko (1994) described the situation in his field of mathematics as a "crisis in the traditional approach to dissemination of research results" (Introduction section, para. 2) fueled by the increasing volume and specialization of literature, a situation that he argued would ultimately lead to a further crisis, "in which we cannot afford to pay for all the paper journals we need in our work" (Sources of the current crisis section, para. 6). Stevan Harnad often referred to a "Faustian bargain" at the core of the publication process in which publishers required authors to barter their copyright for publication, a relationship that he argued would ultimately lead to unnecessary costs and barriers to access (Duranceau and Harnad, 1999, p.114). The use of this literary device reflects his dissatisfaction with the status quo of publishing and some apprehension about the impact of these practices in a digital future. According to Harnad, reforming this untenable relationship would require "the help of some demonstrations, evangelism, polemics, and subversion" (Duranceau and Harnad, 1999, p.114). In the shadow of crisis narratives of scholarly publishing, Okerson, Odlyzko, Harnad, and others embraced familiar tropes of technological utopianism as well as cyber-libertarian discourses to orient scholars to the Internet in the early 1990s, imagining alternative futures for scholarly communication online.

Stevan Harnad deftly encapsulated the enthusiasm towards networked dissemination in his 1990 text "Scholarly Skywriting and the Prepublication Continuum of Scientific Inquiry". In this paper Harnad incites scholars to enter a new era of "scholarly skywriting": a mode of distribution and discussion in which both unrefereed and published papers would be publicly shared over the Internet, enabling a form of open

peer commentary intended to supplement existing models of peer scrutiny (Harnad, 1990). Harnad's case for skywriting exemplified the utopian and egalitarian mythology of the early Internet (Mosco, 2004), foregrounding the revolutionary potential of what was envisaged to be an instantaneous, interactive, global, and participatory medium. Although the term "scholarly skywriting" did not last, its tone prefigures familiar cyber-libertarian imaginaries of the cloud and infrastructural tropes about the Internet as a medium for the information society: immaterial, frictionless, and egalitarian.

This short text succinctly captured many of the concerns and tensions surrounding the adoption of the Internet as medium of scholarly communication, and formulated many of the founding premises of a sociotechnical imaginary of networked scholarly communication. The text's evocative, and provocative, use of language and metaphor reflects the technological utopianism characteristic of Internet discourses of the early 1990s, and specifically works to articulate scholars to these discourses. Harnad begins with a direct response to arguments made about "the electronic archive" in another article in the very same journal issue[7], arguing that the "potential role of electronic networks in scientific publication…goes far beyond providing searchable electronic archives for electronic journals" and that "on the brink of intellectual perestroika is that vast prepublication phase of scientific inquiry in which ideas and findings are discussed informally with colleagues" (Harnad, 1990, 342). His use of the term "perestroika" reinforces a vision of decentralization and openness as characteristics of networked communication and knowledge. These same characteristics deterred some scholars from moving online, and Harnad (1990) enumerates a variety of concerns[8], replying to each with "sensible answers" (p. 342). He was particularly concerned that the tone of

interaction on the Internet of the time was too chaotic and unintellectual, resulting in a "global graffiti board for trivial pursuit" that would deter scholarly adoption (Harnad, 1990, 343). Harnad acknowledged the seeming contradiction between the metaphor of cyberspace as frontier - an imagined space of freedom and free expression - and scholarly communication practices, which are dependent on stable social norms and conventions. Electronic publishing advocates in the 1990s were thus engaged with how to bring the authorizing mechanisms of scholarly communication to the Internet, without sacrificing the new modalities of access and exchange it offered. For example, even after the successful first years of the arXiv preprint repository, Ginsparg (1994) noted that the integration of refereeing processes remained an "open question" in the implementation of such systems. Harnad (1990) proposed to tackle this dilemma with a quality control framework based on existing social indicators of prestige, such as peer feedback, citation, and the hierarchy of publication formats (p. 343). This attempt to imagine a new networked mode of scholarly communication was therefore intrinsically bound to the mechanisms of prestige that defined and shaped academic labour. The tensions evident in this text prefigure many contemporary discussions about how different forms of scholarship are valued and made valuable.

Of particular note in this text is Harnad's focus on prepublication practices as the site of revolutionary potential associated with the Internet, including preprint sharing, letter writing, and other forms of informal scholarly exchange. His focus shifts discussion away from the Internet as 'digital library' metaphor towards something else – a medium of the mind; of direct exchange and validation of ideas. The attention to prepublication activity as a site of transformation brings together the social and collective aspects of

knowledge work with the productive capacity and immediacy of the Internet as a medium. The metaphor of the digital library was central to imagining the power of computing as an any time/place mechanism of storage and access (Mosco, 2004), but Harnad's vision extends beyond this metaphor to imagine minds as coextensive with digital networks and a networked revolution in scholarly communication second only to the invention of printing. He asserted that "Skywriting offers the possibility of accelerating scholarly communication to something closer to the speed of thought while adding a globally interactive dimension that makes the medium radically different from any other" (Harnad, 1990, 344).

The call for "skywriting" is one example of how metaphor and language were mobilized to introduce scholars to the Internet as a medium for scholarly communication. Kling and Lamb (1996) situate such visions of electronic publishing within a much older genre of technological utopianism, in which new technologies offer a "canvas in which to reshape social relationships so they better fit the speaker's imagination" (p. 28). These narratives tend to overlook the social conditions in which the technology operates, and to universalize experiences with technology. Looking back at the early years of the Internet and its associated hype, the ideological contours of early cyber-libertarian discourses become more clear. As Jean-Marie Chenou (2014) summarizes: "The basic premise of cyber-libertarianism is Internet exceptionalism: the Internet creates a new world and changes social relations, which renders existing regulations obsolete. Cyberspace is, by definition, a world of freedom and equality, and any intervention might threaten these characteristics" (p. 213). Harnad's invocation of skywriting draws from discourses of Internet exceptionalism, emphasizing the revolutionary nature of the medium. His text

foreshadows the writing of other scholars who advocated for electronic publishing in the 1990s, such as Ann Okerson and Andrew Odlyzko, who were convinced that the Internet would necessarily transform journal publishing and end the serials crisis. Both argued that the Internet would reduce the costs of publishing and distribution so significantly that the industry would necessarily be transformed for the better, leaving behind print publication as a niche activity. Odlyzko (1994) predicted that readers would be able to print articles at home on demand; similarly Okerson (1992) imagined paper versions of articles becoming an afterthought or by-product of the electronic medium.

Technology both shapes, and is shaped by, the social relations in which it operates. The narrative of the Internet as a neutral and democratic medium depended on the erasure of social relations such as gender, race and class, and at the same time it became productive in this erasure despite, for example, the contributions of Black innovators to the early Internet (McIlwain, 2019). Scholars have described in detail the ways in which the Internet produced a colourblind logic which promised the arrival of an egalitarian and postracial society (Nakamura and Chow-White, 2012) and served to deracialize American political discourse (Nakamura, 2008). Despite the central role of women in the history of computing (Abbate, 2012), the builders of the popular Internet conceived of an ungendered space, thereby reifying the technology as masculine by prescribing its producers and users as men, and women as consumers (Consalvo, 2002, 125). Technological utopianism glosses over the complexities of adapting new technologies to lived conditions of experience, often in dangerous ways, although it can also offer rival ideologies that can help to effect social change (Segal, 2005). Electronic publishing reformers envisioned a new mode of online scholarly exchange free from the

limitations imposed by the publishing industry, but did not always consider how their vision reproduced deeper structural disparities in publishing and academic labour. Their optimism about the affordances of networked communication suggested a fascination with the 'newness' of the Internet as a popular medium and attributed an intrinsic logic to the technology itself where there was none. Analyzing these writings in hindsight it is clear that the Internet did not overturn the existing social order of publishing, but rather shifted relations between human, social and technological aspects of scholarly communication infrastructure to redistribute resources and precipitate new business models, ultimately revealing how unproductive the analog/digital divide is to understanding such sociotechnical systems. E-publishing advocacy isolated the problem (and the solution) of the publishing crisis as one of medium: paper (slow, expensive) vs. electronic (fast, cheap). As Morozov (2013) reminds us, what is problematic about technological solutionism is often not the proposed solution but the very definition of the problem (p. 6). In this case, the problem was not a question of format, but tightly intertwined with the reproduction of academic labour and associated value regimes.

A subversive proposal: towards a networked sociality of scholarship

In 1994, impatient for the impending changes he had predicted, Stevan Harnad shared via the Virginia Polytechnic Institute's Electronic Journals listserv (VPIEJ-L) a text entitled "Publicly retrievable FTP archives for esoteric science and scholarship: a subversive proposal". This short text stimulated extensive online discussion, and many of the resulting discussion threads (from June 1994 to March 1995) were later compiled and thematically organized by the Association of Research Libraries (ARL) in the 1995 publication *Scholarly Journals at the Crossroads: A Subversive Proposal for Electronic*

Publishing. Harnad proposed that scholars immediately take action to make electronic versions of their unrefereed preprints available in public ftp archives.[9] The "Subversive Proposal" reiterated Harnad's focus on prepublication as a site of transformation of scholarly publishing, and suggested a direct and concrete strategy that pointed to the network as a medium for personalized dissemination. Although he did not use the term self-archiving, this text became foundational in shaping common understandings of self-archiving practices within green open access discourses. By uploading their unrefereed preprints (and/or postprints under certain conditions) to public ftp archives, authors would make their work available to a networked public comprised of anyone with an Internet connection and the correct ftp address. The proposal was radical at the time because of its call for direct action by scholars to disrupt the publishing hegemony and make a claim for their rights to digital distribution. The discussion that followed this proposal highlighted several areas of contention with respect to the communicative affordances of the new medium for scholarly exchange, including questions of cost, quality control, copyright, and responsibility.

This text constituted a new scholarly subject - the self-archivist - one that was closely tied to the sociotechnical imaginary of networked scholarly communication. The figure of the self-archivist exposes the new forms of sociality emerging with the growth of the Internet as a popular medium. It articulates scholars with cyber-libertarian discourses, producing a subject constituted by the very relations it pretends to precede. This subject is unraced and ungendered; the figure of the self-archivist draws on the normative whiteness and masculinity of both Western technoculture and academia, each with their associated myths of prestige and merit. Andre Brock (2020) argues that

conceptions of the Internet as a "rational and productive information space" depend on their association with whiteness (p. 7). This articulation of the self-archivist operated in a specific way, combining the imagined white, male frontier of cyberspace with a specific framing of academic labour and its value. In particular, the subversive proposal was only recommended for "esoteric" literature[10], a term Harnad used to refer to a category of scholarly work for which the author expects no financial compensation, only an audience of peers, or what he described as "non-trade, no-market" literature (Harnad, 1994). This framing of academic labour reinforces historical relations of power, privilege, and quality control in knowledge production.

The discursive mobilization of 'esoteric' knowledge production draws from entrenched assumptions about liberal university education and the pursuit of knowledge for its own sake, in which value is shaped by peer recognition and contribution to a public good rather than economic success. Yet this assumption is at the same time a function of the technological imaginaries it appeals to. The public access afforded by the Internet (despite the lived realities of this claim) is co-constructed with the value regimes of 'esoteric' knowledge. This is perhaps made more evident in the genealogies of open source software and free culture movements, in which the "value of creation for the sake of creation, not profit searching, has been the engine of creation of capital value in the information economy" (Banet-Weiser and Castells, 2017, p. 15). This lineage is intertwined with open access, particularly in the construction of ideas such as "openness" and its applications to science, culture, and data (Moore, 2017). The prepublication phase of scholarly communication can be considered within this rubric of creativity; as an 'esoteric' pursuit of knowledge for its own sake which accrues value through networked

interactions. The self-archivist has much in common with workers in creative and cultural industries, and foreshadows the ways in which technologies of selfhood produce a new kind of "labouring subject" in the contemporary academy; one that is "individualised, responsibilised, selfmanaging and monitoring" (Gill, 2014, p. 13). McRobbie (2016) argues that the supposed "romance" of creative work acts as a dispositif; described by Foucault as a self-monitoring and self-regulating mechanism (p. 38). Similarly, the romantic notion that scholars devote their work to the greater good has become a self-regulating expectation, particularly promoted by open access discourses (Golumbia, 2016).

'Esoteric' scholars are assumed to be primarily motivated to contribute to the collective accumulation of knowledge in their fields: "to reach the eyes and minds of peers, fellow esoteric scientists and scholars the world over, so that they can build on one another's contributions in that cumulative, collaborative enterprise called learned inquiry" (Harnad, 1994). The open exchange of ideas is generally considered an integral part of academic research, although the conditions of this exchange have been the subject of ongoing debates, disruptions and enclosures over centuries. The distinction between 'esoteric' research and marketable or patentable research prefigures one of the foundational claims of the open access movement: that earning royalties from readers inherently limits your audience, and that barring the possibility of earned income for your work you have an obligation to make it as widely accessible as possible at no cost to readers (Golumbia, 2016). In the "Subversive Proposal", cyber-libertarian discourse is instrumental to recasting the terms of this exchange in the context of the network, offering a contemporary instalment of the arguments positioning open communication in

relation to scientific progress and the public good that date back to the 16th and 17th centuries (Eamon, 1985). This furthers a normative understanding of 'esoteric' research as a category of labour that operates outside of the constraints of capitalism. In 2007 Harnad reiterated this by saying that "OA is only possible for digital content that its author *wants* to make freely accessible online", deliberately excluding other royalty producing digital content such as "books, music, videos, and software" from this obligation of openness (Poynder, 2007). This distinction has become crucial in OA discourses. Today, the categories of "royalty-free" (Suber, 2016) or "publicly funded" (Willinsky, 2006) literature are commonly invoked, emphasizing accountability within funding and institutional frameworks.

In the "Subversive Proposal" scholars are presented with a specific understanding of the public good as public access. By making their work publicly accessible via ftp they fulfill an individual responsibility to contribute to the circulation of knowledge. Based upon this articulation, scholars were called upon to break their "Faustian bargain" with publishers, whose role as mediators and arbiters of quality was no longer perceived to be relevant in a digital era (Harnad, 1994). To supplant these print-era arrangements, Harnad proposed that scholars take their work directly to the "airwaves" - to reclaim the distribution of their work via the Internet; a subversive act that many believed would lead to necessary reform of the publishing industry. In effect he proposed a new mode of prepublication exchange, one that necessitated a new form of academic labour which individualized the obligation to the public good and asserted new circuits of exchange and valorisation modelled on the network. For proponents of self-archiving the network also gestured to a new kind of collectivity; a form of distributed cognition that is a key

thematic of the sociotechnical imaginary of networked scholarly communication. The Internet has long been imagined as an enabler of collective intelligence, and Harnad's vision of skywriting as a fourth revolution in human cognition fits within a persistent continuum of thought that encompasses early net counterculture figures like Esther Dyson and John Perry Barlow, Pierre Lévy's 1994 book *Collective Intelligence* and subsequent writings, the beginning of Wikipedia in 2001, the 2005 business bestseller *The Wisdom of Crowds* by James Surowiecki, and the advent of crowdsourcing as a collective information processing practice embraced both by business and scientific interests (e.g. Amazon Mechnical Turk and Citizen Science). Proponents of self-archiving drew from these cultural currents - envisioning a new scholarly sociality oriented around the open circulation of research. As recently as 2019, the European Commission Report on the Future of scholarly publishing and scholarly communication used H. G. Wells' world brain as a metaphor to envision "an ideal state of scholarly communication" based on digitally distributed intelligence (Guédon et al., 2019, p. 24).

Paul Ginsparg, the founder of the arXiv preprint repository, sometimes evoked McLuhan's "global village" to describe the networked scientific research community (Ginsparg 1997; Ginsparg 2008). It was a metaphor that offered an easy image of collaboration and exchange but ignored the domination of the Global North over circuits of academic knowledge production, the uneven economic and social relations of higher education produced by globalization, and the role of imperialism, racism, gender and colonialism in the development and formation of disciplines and growth of institutions (Collyer, 2018; Connell, 2019; Demeter, 2019). The global village metaphor hints at the ways in which networks, knowledge, and markets would converge with the infrastructure

investments undertaken by the US government in support of the "information superhighway". In a text entitled "Infrastructure for the Global Village", Al Gore (1991) explicitly described both U.S. capitalism and representational democracy as information processing systems, operating on the same principles of distributed computing as supercomputers (p. 150). This analogy binds capitalism, democracy, and the Internet within a neoliberal logic in which markets are understood to be the most efficient information processors across all sectors (Mirowski and Plehwe, 2009, 435). The power of this computing metaphor was equally felt in higher education, and as Alan Liu (2004) argues, worked to harness knowledge work to communication technologies in service of an information economy. In this context, the self-archivist could be considered a small unit in a globalized machine, a node in the network, contributing to some larger good facilitated by information processing at scale.

Self-archiving practices helped to establish scholarship as valuable in new ways outside of, and sometimes in tension with, existing apparatuses of publication and prestige. The cognitive work associated with prepublication practices had previously occurred mostly outside the scope of disciplinary technologies of capture. Equating scholarly exchange with networked exchange, some of this cognitive work became visible, and measurable, in new ways. In the figure of the self-archivist envisioned by Harnad we see not only the preconditions for the emergence of green open access, but also a reconstitution of academic labour in relation to new discursive regimes of 'openness', in which universal public access is conflated with the 'public good' of scholarship.

Sites of struggle: mandating self-archiving

The language and metaphors evoked in the texts above gestured towards collective ambitions for knowledge exchange, but the history of self-archiving practices illustrates the limits of collectivity as a motivating factor within academic labour. Despite the attention that the "Subversive Proposal" received, Harnad later admitted that it had little practical effect on scholarly behaviour (Poynder, 2014). Outside of specific disciplines, the uptake of self-archiving overall has been limited; in 2010 it was estimated that 15-20% of scholarly literature was self-archived online (Gargouri et al., 2010). There are many reasons for this – in addition to lack of clarity about what can be self-archived and under what conditions, the benefits of this form of open access are not always clear either for authors or readers (Guédon, 2004; Poynder, 2017). In the years following the "Subversive Proposal", it became clear that individual subversive acts of self-archiving unrefereed preprints would not lead to the transformation of the publishing industry. Yet Harnad still believed that self-archiving would play an important role in providing public access to esoteric research, as a complementary and parallel practice to publishing (Harnad, 2001). This approach became synonymous with green open access, a strategy oriented around the use of interoperable institutionalized repositories. Harnad (2001) argued that institutionalized repositories were necessary to support and promote self-archiving, acknowledging that his original call for individual action had failed in part because "self-archiving in an anonymous FTP archive or a web home page would be unsearchable, unnavigable, irretrievable and hence unusable" (p. 1025). The new technological affordances of interoperability made possible by the work of the Open Archives Initiative[11] beginning in 1999 made it possible to search across institutional

repositories - centering the self-archivist as a potentially key player in the global digital library/economy.

Self-archiving was formalized as a strategy of open access in a series of meetings in the early 2000s, the first of which was convened by the Open Society Foundations in Budapest in December 2001. This meeting resulted in a declaration made public in 2002, known as the Budapest Open Access Initiative or BOAI. The original signatories included well-known academic open access advocates Stevan Harnad, Jean-Claude Guédon, and Peter Suber, as well as representatives of open access publishers such as Public Library of Science and Biomed Central, and various members of the Open Society Institute. The BOAI was the first of three such texts that have been instrumental in defining OA and shaping the policy agendas of research funding bodies. In April 2003 a meeting was convened at the Howard Hughes Medical Institute in Maryland to discuss the promotion of open access in biomedical research. This meeting resulted in the "Bethesda Statement on Open Access Publishing", signed by representatives of scientific societies, libraries, publishers, and funding bodies. In October 2003 the "Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities" was signed by representatives of German research organizations and of national and international research institutes.

All three of these defining statements use language familiar from 1990s cyber-libertarian discourse, reflecting familiar tropes of Internet exceptionalism.[12] They recommend that scholars self-archive their publicly funded work in interoperable repositories, although in practice this has evolved into a complex proposition, with many publishers exerting control over the terms of self-archiving through embargoes and

policies regarding what versions of a text can be self-archived and where. Some commercial publishers are now "successfully co-opting both forms of OA (green and gold), and doing so in ways that suit them more than the research community" (Poynder, 2017, para. 12). Open access discourses and policies have been criticized for their complicity in new forms of academic capitalism (Hagner, 2018), their support of hierarchical knowledge dissemination from the Global North (Isratii and Porter, 2018; Piron, 2018), and for furthering inequalities "encoded in science's colonial and racial infrastructure" (Chan et al., 2020, 5). Recent initiatives like the Radical Open Access Collective aim to redefine the role of OA in countering the commercialization of research and to rethink concepts such as openness and access. Open access is less a unified movement than a continuous series of struggles over the means and meaning of "openness" (Moore, 2019).

Policy documents are a rich source of insights into the framing of desirable futures, making them an important source material for understanding sociotechnical imaginaries (Jasanoff, 2015). Today, many research funding bodies are codifying the role of self-archiving in global knowledge dissemination through the application of open access mandates. The language of these mandates often relies on the same arguments made by 1990s electronic publishing reformers, formalizing a particular set of relations around academic labour and the public good. In 2015 the Canadian Minister of Science and Technology announced the new *Tri-Agency Open Access Policy on Publications*, making these relations explicit:

> Making research results as widely available and accessible as possible is an
> essential part of advancing knowledge and maximizing the impact of publicly-
> funded research for Canadians. Increased access to the results of publicly-funded

research can spur scientific discovery, enable better international collaboration and coordination of research, enhance the engagement of society and support the economy. (Industry Canada, 2015)

As part of this policy, recipients of funding from the three federal granting agencies[13] must make versions of their research articles freely available online within twelve months of publication, either via green or gold OA. Harnad (2013) published a response to the draft policy, arguing that the twelve month window was much too long, would limit the impact of OA, and hinder attempts to monitor compliance. His instincts were correct regarding compliance, as such mandates have proven complicated to enforce not only in the Canadian context but across national contexts and disciplines. In their large-scale study of compliance with open access mandates, Larivière and Sugimoto (2018) found that Canadian humanities and social sciences research funded by SSHRC had the highest rate of non-compliance with 79% of papers not available under any form of open access.

Self-archiving of publicly funded research is featured in other open access mandates and policies, including Plan S, launched in 2018 by cOAlition S, a consortium of mostly European research funding bodies (Plan S, 2021). Plan S however, prioritizes gold OA, and researchers funded by members of cOAlition S will only be able to publish in OA publications and even then only under strict conditions regarding author fees and licensing, in accordance with the principles of the 2003 Berlin Declaration. This policy mandate is controversial, and has been critiqued not only for its infringements on academic freedom but also for its narrow vision of open access and failures to address structural inequalities in global knowledge production (Johnson, 2019; Isratii and Porter, 2018).

These contemporary policy directives demonstrate the enduring reach of a 1990s sociotechnical imaginary of networked scholarly communication, attuning scholars to a conception of the public good that is now quite robustly tied to public networked access via the Internet. Self-archiving remains an important component of this imaginary, even if the framing for this practice has shifted from one of voluntary, individual action to one mandated by external forces. The texts analyzed in this essay offer insight into the discursive strategies that were used in the 1990s to articulate scholars to the Internet as a popular medium, and help us to understand their continuity with contemporary framings of self-archiving as a form of academic labour.

Conclusion

Sociotechnical imaginaries are "collective, durable, capable of being performed; yet they are also temporally situated and culturally particular" (Jasanoff, 2015, 19). This essay describes an imaginary of networked scholarly communication that emerged in a particular place and time, and its framing of desirable futures provides insight into a moment when the value regimes of academic knowledge production were brought into relief against the promise of emerging network technologies. It argues that self-archiving is an integral part of this sociotechnical imaginary, and has traced some of the enabling conditions for its emergence as a new form of academic labour beginning in the 1990s. The texts discussed here help us to understand how scholars have been articulated to a vision of a networked public good, making possible new forms of valorization of academic labour in the context of evolving digital economy. The Internet is central to this process, as imaginaries of the network are co-constructed with long-held expectations about the nature of scholarly work and its rewards. The Internet has made it possible to

facilitate, trace and record the creative, cognitive work of scholarship in new ways, but assumptions about the nature of scholarly communication have also informed the design of infrastructures for self-archiving. Romantic expectations about the motivations of scholars conflict with deteriorating academic labour conditions and the ongoing commercialization of digital publication. Despite this, the claims of 1990s electronic publishing advocates still permeate discourses around open access and innovation that shape relations of knowledge production under contemporary forms of capitalism.

Notes

1. The COVID-19 pandemic exemplifies the risks and rewards of accelerated distribution of unrefereed preprints. Dinis-Oliveira refers to a "paperdemic" of articles produced during the pandemic, of varying quality and honesty. Rapid publication was necessary to react to the real-time effects of a global pandemic, yet this acceleration also fuelled the spread of misinformation regarding COVID-19 and its treatments. Dinis-Oliveira notes that a balance is required between the "benefits of the rapid access to new scientific data and the threat of causing panic or erroneous clinical decisions based on mistakes or misconduct" (Dinis-Oliveira, 2020, p.174).

2. The Sherpa Romeo tool provides details on publisher open access policies regarding self-archiving: https://v2.sherpa.ac.uk/.

3. The first published account of the green and gold terminology is found in a 2004 paper by Harnad et al. in *Serials Review*.

4. Paul Ginsparg is a physicist and founded the arXiv preprint repository in 1991 while working at Los Alamos National Laboratory. The arXiv repository is understood to be the first public preprint repository, and is frequently heralded as the longest-running such service. Ann Shumelda Okerson is a librarian and in the early 1990s was the Director of the Office of Scientific & Academic Publishing for the Association of Research Libraries (ARL). She was the co-editor of the 1995 ARL publication *Scholarly Journals at the Crossroads: A Subversive Proposal for Electronic Publishing.* Andrew Odlyzko is a Professor of Mathematics and a founding director of the interdisciplinary Digital Technology Center at

the University of Minnesota (2001-2008). He has written extensively on communication networks and electronic publishing. Stevan Harnad's biography will be discussed at more length in the above essay.

5. This information is based on his online CV: https://www.southampton.ac.uk/~harnad/vita.html.

6. For example, to read more on the Canadian/US exchange rate and its effect on library budgets see: https://www.theglobeandmail.com/news/national/dropping-loonies-squeeze-library-budgets-as-costs-for-materials-climb/article29199280/.

7. Gardner, William. (1990). The Electronic Archive: Scientific Publishing for the 1990s. *Psychological Science* 1(6), 333-341.

8. These points of resistance are listed as follows: old ways of thinking about scientific communication and publication constrain our imaginations; lack of familiarity with the computer; the current intellectual level of discussion on electronic networks is anything but inspiring; plagiarism; copyright; academic credit and advancement; junk mail; security (Harnad 1990, 342).

9. By "public ftp archives" Harnad refers to server space that was often available to scholars via their institutions, particularly in North America. Files stored on these servers could be accessed using FTP – an acronym for "file transfer protocol".

10. There was some discomfort with the use of the term 'esoteric' due to its occult connotations (despite the dictionary definition provided by Harnad) and the effect that it might have on the public and university funding bodies (Okerson and O'Donnell, 1995). In later open access texts the term is dropped although there is still reference to research "without expectation of payment" (Budapest Open Access Initiative [BOAI], 2002).

11. The Open Archives Initiative develops standards for interoperability of web content. See: https://www.openarchives.org/.

12. All three documents make bold claims for the Internet as a medium of radical change and opportunity. The Berlin Declaration (2003) for example states that: "The Internet has fundamentally changed the practical and economic realities of distributing scientific knowledge and cultural heritage. For the first time ever, the Internet now offers the chance to constitute a global and interactive representation of human knowledge, including cultural heritage and the guarantee of worldwide access."

13. Canada's three national funding bodies are the Social Sciences and Humanities Research Council (SSHRC), Canadian Institutes for Health Research (CIHR), and the Natural Sciences and Engineering Research Council (NSERC).

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Disclosure Statement

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