Academic Publishing and its Digital Binds: Beyond the Paywall towards Ethical Executions of Code

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Abstract

In this article we explore various constraints and potentials of academic publishing in the digital age. Advancement of digital platforms and their expansive reach amplify the underlying tensions of institutional and scholarly change. A key affordance of these platforms is that of speed: rapidly distributing the outputs of a precaritised profession and responding to pressures to publish as well as the profit motive of publishers. On the one hand, these systems make possible alternative modes of contributory content and peer-production for supporting the commons. On the other, they turn all too readily into privatising devices for contracting labour and profit in the corporate sector and, within the academy, for accentuating subtle power effects. Drawing upon platform studies and integrating insights from political philosophy and property law, our article seeks to problematise neat binaries of possession and dispossession associated with the sector. We examine in particular how co-existing and emergent socio-technical circuits—what we term digital binds—modulate the political economy of academic publishing on a number of scales. These entangled binds constrain but also indicate mechanisms for opening up new possibilities. We introduce three *ethical executions of code* towards this end: *dissuading*, *detouring*, and *disrupting*. Together, these mechanisms show how mutually beneficial boundaries can be drawn for designing otherwise: by blocking dominant systems and bargaining for fairer practices; exploring sanctioned and unsanctioned systems which offer more diverse publishing pathways; and, disrupting systemic processes and profits towards more inclusive and equitable conditions.

Keywords: digital binds, academic publishing semicommons, ethical executions of code, designing otherwise.

Introduction: Digital Binds

This article explores some of the conditions, pressures and designs of academic publishing in the digital age. We trace the ways in which publishing technologies, labour and governance have become mediated through the proliferation of technical and organisational devices: for-profit multinational corporations, government-funded institutional repositories, non-profit foundations, legal and illegal academic sharing sites, peer-to-peer production, social media, self-publishing channels, and blockchain-based alternatives to double-blind review and citation tracking.

In response to the dizzying rate of change, our introductory section poses the question: *What are the conditions of academic publishing in a digital age?* This is crucial to any consideration of the multiple roles of publishing in contemporary academia that evolve with, and through, digital technologies: "as a means of disseminating validated knowledge, as a form of symbolic capital for academic career progression, and as a profitable business enterprise" (Fyfe et al. 2017: 2). The centrality of publishing to knowledge production further intersects with an expanding field of global economic and political forces: university ranking systems, an increasingly casualised academic workforce, publishing metrics, financialisation, and the consolidation of editorial and dissemination through a handful of Western-led publishing houses and their satellite operations. Socio-technical circuits articulate these roles and forces through what we term digital binds: the digitised mechanisms connecting and shaping our communicative practices in multiple ways.

Academic knowledge production has a lengthy history that varies along disciplinary, geographic and institutional lines, with global inequalities often maintained by publishing mechanisms (Collyer 2016). This social and technological mediation forms a common thread of continuity and contingency:

> Knowledge has never circulated freely, unencumbered by institutions, technologies, traditions, and norms. The "free exchange of ideas" requires media—things, concepts, technologies, practices, institutions— that intervene and get in between. Be it the patronage systems of early modern universities, the bureaucratic systems of the German research university, or the mixed systems of contemporary universities, systems of communication and transmission are never free from mediation (Wellmon & Piper 2017).

Throughout this overarching tradition figure critical moments of transition. Key turning points in history have triggered these changes across academic publishing, as Fyfe et al. (2017) identify in the following transitions: the early

twentieth century marked the rising professionalism and prestige of academia, with the value of editorial peer review becoming more pronounced in post-war decades; during the early Cold War expansion of research, sector growth and funding transformed the focus toward generating income; in the 1960s and 1970s peer-review processes were adopted by commercial publishers; while in the 1980s, the mutually-beneficial alliance between libraries and publishers dissipated with the university funding crisis, changing this relationship markedly. In the years since, the significance of prestige has expanded as accountability demands from government and within institutions have increased. This genealogical snapshot acknowledges the centrality of mediation, while equally reminding us that macrological shifts in the political economies and technological environments also register profound reorientations in the ways knowledge is produced and disseminated. Our argument picks up upon these in the current context that is witnessing a profound expansion of digital binds within academic fields and publishing, and at the same time, a rising precariousness of the university research career. This have formed new interdependent ties, within that career, upon substitutive metrics, income and recognition.

A brief overview of transformations and trends in the sector assists in pinpointing key tensions. Edwards et al. (2013) have described the evolving intellectual frameworks and research challenges of contemporary knowledge infrastructures —education, libraries, the publishing industry, intellectual property, global flows, and knowledge politics—and further claim "that we are living through a period of fundamental transformations that profoundly challenge our understanding of the basic process by which knowledge is created, debated, and spread" (Edwards et al. 2013: 3). In tune with this, Striphas (2010) articulated five specific trends impacting scholarly communication: i) *alienation* emerges from the imperatives of urgency and collective interests, as well as an imbalance in terms of the benefits received in return for signing over key rights; ii) *proliferation* is based upon audience segmentation and outlet expansion; iii) *consolidation* stems from the reduction of academic journal publishers and disconnect from scholarly, or learned, societies; iv) pricing of academic journals has steeply increased; and v) *digitization* offers new affordances for exchange, management and monetization.

These multi-scalar trends influence how contemporary academic publishing unfolds in often contradictory and conflicting ways. Vastly different countries and types of economies, such as those of Germany, China and Ecuador, are facing markedly similar issues in relation to the grip of proprietary publishing platforms. In Germany, a consortium of universities operating under the banner of "Project Deal", is pushing back against Elsevier publishing constraints. In China, publishing outputs are increasingly beholden to foreign commercial publishers, journals and paywalls, producing "a devastating impact on the visibility and impact of Chinese

scholarship within China" (Ren & Montgomery 2016: 397). In Ecuador, with many universities transitioning from a teaching-only to a research-and-teaching paradigm, they become increasingly preoccupied with imperatives to improve their "publication visibility" (Feyen et al. 2016).

Socio-technical circuits play a key role in articulating these trends and transformations. Such circuits manifest in many forms, but are exemplified in the mechanisms of *digital platforms*: systems and networks that collect and circulate academic papers, host data sets, measure citations and impact, and utilise semantic connections to connect academics with each other and with publications relevant to their fields. What Bratton (2016) terms "The Stack" illustrates how such digital platforms have become global infrastructures with affordances for both control and freedom, and his evocative metaphor finds ready application in the context of academic publishing. Bratton introduces the layers of The Stack (Earth, Cloud, City, Address, Interface, and User) and how they overlay an "accidental megastructure" to produce "*the machine as the state. Its agglomeration of computing machines into platform systems not only reflects, manages, and enforces forms of sovereignty; it also generates them in the first place*" (Bratton 2016: 8).

This megastructure replicates itself in smaller, nested structures at the level of academic publishing sector—a market which draws heavily upon academic labour and vested interests, and in the process exchanges, mandates and governs digital information in markedly different ways. Content hidden behind the pay-walls of proprietary publishers is rigorously tracked by download and citation, producing consolidated data that has economic value to governments, universities, departments, researchers and administrators enmeshed in a calculative logic of impact and influence. Tight bundles of for-profit journals are sold at exorbitant prices to academic libraries, while looser bundles of open-access and alternative journals eke out a living through volunteerism, university support or author fees— yet both depend upon the presence of networks, databases, protocols and social media that comprise the platform. Regardless, the academic publishing market is being significantly transformed via global innovations across infrastructure, firms, strategies, and actors (Ponte et al. 2017). While Bratton's 2016 target is the wider set of social operations that have become subject to the digital platform megastructure of "The Stack", we suggest platforms have become integral to the post-millennial knowledge landscape, with comparable if derivative controls and freedoms in relation to academic publishing. Rather than defeatism or unbridled enthusiasm, this acknowledgement needs instead to identify the ways in which we can draw the boundaries of academic publishing towards more ethical designs.

The argument of our article is developed over four sections to explore how the digital binds of academic publishing shape public and private interests, and

ways in which ethical design can produce more mutually beneficial possibilities. First, in this introductory section we highlighted the history, trends and binds informing contemporary academic publishing. Secondly, we examine the complex ways in which private and public interests are enmeshed in this sector. Thirdly, we propose a conceptual framework based on the following mechanisms: boycotting proprietary platforms and bargaining for fairer practices; building alternative platforms to bridge impasses and publish elsewhere; and bringing transformative systems for academic publishing processes and profits into being. Finally, we suggest why these acts of dissuading, detouring and disrupting are urgently needed in the sector.

Background: The Academic Publishing Semicommons

In this second section, we seek to unpack the following question: *What are the pressures associated with private and common uses in the sector?* Our article seeks to problematise binaries of knowledge possession and dispossession by examining the relationship of the "semicommons" (Smith 2000) to academic publishing. Our interest in this term is based on the recognition that a political economy strongly underpins how academic publishing is formed, as is evident from a variety of international and country perspectives (Merrett 2006; Biesta 2012; Lincoln 2012). The sector now spans a global political economy, emerging from the "private appropriation of public resources and the unrestricted commodification of information" (Pirie 2009: 57). Features of the semicommons are outlined below, alongside the ways in which these tensions, benefits and power relations apply to the academic publishing sector.

The term "semicommons" was originally coined by property theorist Henry E. Smith: "In what I am calling a semicommons, both common and private uses are important and impact significantly on each other" (Smith 2000: 132). This concept has since been applied to studies of information property, telecommunications and the internet (Heverly 2003; Smith, 2005; Grimmelmann, 2010). A defining feature of the semicommons is: "the explicit recognition of a dynamic relationship between the common and private uses of semicommons property, such that their coexistence maximizes wealth to an extent not possible under either a purely common or a purely private scheme" (Heverly 2003: 1132). Applied to practices of academic publishing, we suggest its formal outputs—journal articles, books, book chapters and conference proceedings—occupy comparable wealth-maximising positions for some actors, within a field similarly composed of both private and common uses.

We further propose the characterisation of an *academic publishing semicommons* to highlight the digital binds of exclusion and inclusion which could

be otherwise. Threats to the hypothetically mutual benefits of the semicommons requires attention to the multiple layers of its operation. Negative "strategic behavior" is associated with "capturing as many of the benefits of the dynamic relationship as possible, while avoiding as many of the costs as possible" (Heverly 2003: 1172), arising "out of the method by which information owners grant access to their information" (Heverly 2003: 1176). Understanding the methods and repercussions of such strategies in the academic publishing sector can help us to modulate one-sided benefits, as well as generate more inclusive and equitable designs.

Rather than an idealised state of equilibrium, the concept of semicommons is better understood in conjunction with political philosopher Georgio Agamben's term "state of exception" (2005). Agamben outlines this state as a zone of indeterminacy in which the regular law has been suspended. Such ambiguity strips away the sense of safety often associated with legal status and rights, leading to unprecedented tensions and exclusions. The dynamics of academic publishing semicommons can then be seen as an exceptional territory impinged upon by forces, strategies and threats. The term "state of exception" has been applied to urban studies (Stavrides 2013; Murray 2017) to highlight the zones which operate outside of the law. This suspension of law creates undecidability through creating new routines and habits "which are justified by administrative reasoning alone" (Stavrides 2013: 40); in addition, once erected under conditions of apparent urgency, such imposed zones often stay and become normalised – such as post-Olympic Athens or post-9/11 New York. Ominously, exclusionary spaces in the city, such as gated estates, shopping malls, resorts, and parks "represent increasingly prevalent building typologies for the urban future" (Murray 2017: 20).

We argue the rise of informatic exclusionary spaces, in the form of proprietary publishing platforms, align with Murray's (2017) analysis of contemporary spatial fragmentation, and similarly participate in "the new social logic of postpublic space is one of indifference and indistinction, that is, not necessarily one of deliberate exclusion, but a kind of selective inclusion that welcomes some but discourages others" (Murray 2017: 20). As a comparable case, and in contrast to the overuse associated with Hardin's "tragedy of the commons" metaphor, Heller and Eisenberg (1998) examined the transaction costs, diverse interests and cognitive biases within biomedical research to propose the "tragedy of the anticommons". This tragedy registers the situation of underuse where "multiple owners each have a right to exclude others for a scarce resource and no one has an effective privilege of use" (Heller & Eisenberg 1998: 698). In such cases, apparent crises of intellectual property theft are produced to justify draconian rights management systems and other exceptional states. Other semicommoning

examples in digital academic publishing include the proprietary formats used to manage digital rights of access to academic books, such as Apple's iBook (IBA) and Amazon's Kindle file formats. While opening access to scholarly content, they simultaneously limit content sharing and reuse—even copying and pasting fair-use quotes from Kindle readers is notoriously difficult. Scholarly portals, such as Academia.edu and ResearchGate, appear novel communing initiatives, but produce further commodities—data on academics and their publications— that has proprietary commercial value. The oligopoly of large academic publishers constitute the largest disseminators of open access content, but under conditions that continue to support a business model that both concentrates knowledge and contributes very little to it: owning and monetising content written by academics and subsidised by grant agencies and taxpayers (Larivière, Haustein & Mongeon 2015). Oscillating between and manipulating oppositions of public/common and private/anticommon intellectual property, semicommoning functions strategically for dominant publishers and institutions to privatise the financialisation of that property.

In this section we described the conditions which generate the *academic publishing semicommons*: the entanglement of private and common uses, and the strategic use of exceptions to de-mutualise the benefits of this arrangement. Digital binds intermingle across institutions, sectors, and borders to produce these co-existing private and common interests. Bratton's (2016) notion of "The Stack" again helps to illustrate how this unfolds abstractly:

> Platform sovereignty may be planned or unplanned, universal or specific, generative or reactive, technologically determined or politically guaranteed. *Platform sovereignty is automatic under some circumstances and highly contingent under others, and it may function differently in relation to different components of the platform system*. The conditionality of these is a function of how platforms relate to other political, technical, and economic institutions that also manage something (or someone) that is also organized by that platform (Bratton 2016: 51).

This has far-reaching implications for how we choose to design the future of labour, technology and governance across academic publishing. What role do —or could—university researchers, professional staff, alternative journals and platforms, plus emerging technologies play in reconfiguring the ethics and politics of digital binds? Our inquiry therefore seeks to build on studies which suggest that academic publishing requires "not less mediation but mediation of a different kind […] We need new ways of measuring, nurturing, valuing, and, ultimately, conceiving of it" (Wellmon & Piper 2017). In the following section, we highlight

how the boundaries of academic publishing could potentially be drawn with more ethical designs in mind.

Conceptual Framework: Ethical Executions of Code

Previously illustrated, the digital binds of the academic publishing semicommons constitute a dilemma for those working within the scholarly community. Extending upon this, and elaborating upon on a twinned interest in technology and ethics, the conceptual framework proposed in this section asks: *How can more ethical designs for academic publishing be drawn?* We begin by introducing the idea of *ethical executions of code*: the mechanisms of dissuading, detouring and disrupting which interrupt academic publishing platforms and practices towards more ethical designs. While the primacy of ethics is key to such designs, they are also heavily imbued with political intent: "a space that is bought into being by citizen subjects who act in ways that submit to but also at the same time go beyond and transgress the conventions of the Internet" (Ruppert 2015). In the context of the academic publishing semicommons, such designs aim to modulate unfair states of exception imposed by dominant actors through "boundary placement", a method for "abating suboptimal behavior by those with access to a resource" (Smith 2000: 162).

Design is a key feature of what we term ethical executions of code, developing ways of drawing more equitable academic publishing boundaries. The role of design is vital, as it "becomes clear that it is not only the activity of designing which is inherently ethical, but that instances of design themselves possess an inherent ethicality. Artefacts of design bring new potentialities into being as they come into existence, and actively embody and reproduce potentialities by continuing to exist" (Buwert 2017: S4466). Design includes here more than the specific plan of a technological solution, and the blueprints of a single social organization or policy. It also can intend towards features of the general architecture for an entire sector or industry, such as academic publishing as a whole. Towards this end, we aim here to offer a heuristic and vocabulary for how academics, programmers, designers, scholarly societies, and education leaders can embed more ethical designs in the sector. Three affordances of this framework are outlined below, suggesting "digital acts" (Ruppert 2015) for generating more inclusive and equitable digital binds.

Mechanism 1: Dissuading

The first mechanism— *dissuading*—seeks to unsettle the growing powers associated with an "oligopoly of academic publishers" (Petrini & Alleva, 2015; Larivère et al. 2015). It illustrates how the direction of proprietary publishers can be partially blocked and paused, so as to publicly question and debate how incentives

and mandates could be made more just. We first trace the emergence of the most dominant publishers and the ways in which they have come to commandeer the market at global and individual scales. We follow this by showing their geo-political reverberations: the ways these oligopolies are negatively impacting academic publishing across Western, Asian and Latin American regions. Then, we briefly describe the process of dissuading by way of Project Deal, the German consortium established to negotiate a fairer open-access agreement with Elsevier and other publishers. The boycott shows how academic and institutional practices can expose the interdependencies of the academic publishing semicommons: positioning us better to explore the potentiality of more ethical designs, even amid unjust structures.

How did this oligopoly come about? Tracing the emerging academic publishing industry in mid-century Britain, Buranyi (2017) follows the journey of businessman Robert Maxwell as he espied an inefficiency in the scientific publishing process. The tycoon quickly realised the easy profits that could be made from monetising and marketing science; an early example from 1955 was signing up researchers to exclusive contracts at the Geneva Conference on Peaceful Uses of Atomic Energy. By the 1960s his business model for Pergamon involved creating grand titles and inventing a multiplicity of journals that placed him well-ahead of other publishers. Amid much controversy about his private and public dealings, he sold Pergamon to Elsevier in 1991. "If Maxwell's genius was in expansion, Elsevier's was in consolidation," Burunyi remarks, highlighting the acquisition, price hikes and electronic access bundles of the 1990s. Digital affordances for scaling, through market consilidation, and bundling, through package subscriptions (Petrini & Alleva 2015) continue to escalate, and realised efficiencies have not been passed on to university customers. A study showed how five for-profit publishers were responsible for more than half of all science publishing around the world (Larivère et al. 2015).

As the global reach of academic publishers and university rankings expands, the publish-or-perish culture, initially a feature mainly of European and North American universities, leaks into the publishing circulations of other countries. In a study of young Chinese scholars, the pressure to publish in internationally indexed journals promises promotion and incentives. Yet it has also negatively impacts their personal and social lives, and in the long term dilutes the quality of research and the prospect of novel discoveries (Tian et al. 2016). Ren & Montgomery (2015) outline how a "lack of transparency in the government-controlled research and higher education system in China" (405) could begin to be addressed with the broader scrutiny, supervision and public benefits of more thoughtful open-access publishing. The authors examine two open-access publishing approaches—"government-initiated national-level

repositories and publisher-initiated OA journals" (Ren & Montgomery 2015: 395)—which could enhance reach, transparency and efficiency of academic publishing. Given the current state of the market, the first of these—push-back by the state against market mechanisms—appears much more likely to succeed.

The reverberations of academic publishing imperatives in Latin America countries such as Ecuador indicate emerging tensions in other geographic regions. Bernasconi (2016) charts the evolution of the Latin America model of higher education, currently grappling with tensions between co-governed developments of social transformation and the economically-driven standards of the knowledge landscape. In Ecuador, the multibillion dollar investment in higher education over the last decade has allocated money across scholarships, technical education, excellence, admission and accreditation, innovation and contingency plans (telesurtv 2017). The ways in which this will steer academic publishing in the country will no doubt continue to be closely examined. As Feyen et al. (2016) acknowledge, publication visibility in Ecuador contends with multifaceted issues, including: low research capacity and infrastructure; low impact and prestige of local journals; scholars studying abroad often publish in international peer-reviewed journals; and local scholars contributing to internationally-funded projects are sometimes excluded as co-authors.

Established in Germany in 2016 to establish a fairer licensing agreement with Elsevier, Springer Nature, and Wiley, the number of institutions joining Project Deal is rapidly increasing, with an increasing number of academic institutions supporting demands for fair pricing, open access to academics, and permanent access to associated scientific bodies (Kwon 2017). As of early December 2017, negotiations are still underway with the extension of contracts due to expire at the end of the month (Schiermeier 2017). An analysis of the Cost of Knowledge petition (Heyman et al. 2016) describes the dilemma of individuals signing up to a boycott, and the personal and professional pressures which can counteract such commitments. The Project Deal consortium shows how many individuals and institutions—when working together—can begin to push back against corporations reaping the profits from academic labour. With countries such as Peru and Taiwan joining the boycott against Elsevier, this double-strategy of denial and desire shows how semicommons disequilibria can begin to be recalibrated. Dissuading – through blocking routes of for-profit publishing companies—involves what we have termed an ethical execution of code by way of a two-phase mechanism: obstructing impingements from states of exception, and demanding fairer practices.

Mechanism 2: Detouring

The second mechanism—*detouring*—can be performed by alternative platforms that help to traverse the academic publishing semicommons in novel ways. We discuss three types of platforms that seek to circumvent proprietary academic publishers by connecting producers and consumers directly: open access journals; unsanctioned repositories; and agency mandates for public dissemination. Tracing the rhetoric of 'openness' across varying software and network cultures, Tkacz (2012) indicates "there is a need to look more closely at the specific projects that operate under its name—at their details, emergent relations, consistencies, modes of organising and stabilising, points of difference, and forms of exclusion and inclusion" (Tkacz 2012: 404). This can be done through thinking more carefully about how open access journals have emerged from intermingling moral and market concerns; recalibrating labour and legal norms to support academics as individuals and collectives; and better understanding the sanctioned and unsanctioned intermediaries which can forge alternate paths to seemingly ingrained states of exception.

Open access pre-dates the rise of the World Wide Web, but has exploded in popularity with the global spread of the Internet. For example, in the United States two federally funded initatives were developed in 1966, the Education Resource Information Center (ERIC) and MEDLINE (Medical Literature Analysis and Retrieval System Online); these preceded ARPANET, a network set up in 1969 by the Advanced Research Projects Agency for "sharing research without barriers" (Suber 2006). Project Gutenberg was created in 1971, based upon a 'Plain Vanilla' American Standard Code for Information Interchange (ASCII) allowing easy online accessibility; this emerged from the idea that: "the greatest value created by computers would not be computing, but would be the storage, retrieval, and searching of what was stored in our libraries" (Hart 1992). In 1991, arXiv was established, "a highly-automated electronic archive and distribution server for research articles" (arXiv.org 2017) built on a low-bandwith TeX file format enabling high quality online text publishing. The diversity of motivations and values associated with the proliferation of open access, as Moore (2017) suggests, requires greater scrutiny. The success of open access journals has more recently been questioned, due in part to the rise of grey literature, vanity publishing and the predatory practices of pay-to-publish companies eager to exploit the demands of early career academics to publish. Originally developed to replicate established commercial models of peer-review and dissemination, some open access journals have more recently instigated more radical methods of review. In a two-part critique of existing models of academic knowledge exchange, Whitworth and Friedman (2009a, 2009b) propose utilising socio-technical advances—wikis, online repositories, rating systems, filters, social bookmarks and version control

—to encourage more inclusive, granular and participatory methods for producing and distributing research. As one example, *The Journal of Peer Production* (JoPP) has since sought to implement some of these suggestions into its review process: originals, reviews and quantitative signals are published alongside final manuscripts.

Beyond the desire to loosen the shackles of the gates of knowledge production (Whitworth & Friedman 2009a), such experimentation serves wider ends. According to several members of JoPP's editorial board, making critique available publicly shifts research work closer to ideals exhibited by open source software, where "massive numbers of reviewers can address, in the case of FOSS for example, defects or 'bugs'" (O'Neil & Zacchiroli 2017). This in turn produces work— whether software, research or other forms of creative labour—that is "socially and technically valuable", and leads to a "further expansion of the commons" (O'Neil & Zacchiroli 2017). Through reputation-building, contributions to the commons can help to construct "new forms of solidarity" and communalism, coexisting with but independent from the capitalistic logic seemingly irrepressibly insurgent in today's academia (O'Neil & Zacchiroli 2017).

Notwithstanding counter-examples, and as discussed in the previous section, the majority of reputable scientific knowledge still disseminates via journals owned by the "oligopoly" comprising five major academic publishers: Reed-Elsevier, Wiley-Blackwell, Springer, Taylor & Francis and Sage Publications (Larivière, Haustein & Mongeon 2015). These generate their revenues by selling access to universities and other research institutions and, despite adopting less restrictive policies such as time-delayed "green" open access, have little commercial incentive to release their content freely. Efforts to circumvent paywalled research content have frequently floundered upon legal injunctions and threats of prosecution, most famously in the case of Aaron Swartz's systematic downloading of JSTOR's archived content.

Systematic detouring does now appear to be underway. Since 2011, the Sci-Hub website[1] has developed as the world's largest repository of pirated scholarly material. As of mid-2017, it hosts more than 64.5 million articles, and is maintained through volunteer labour and financial contributions (Sci-Hub 2017). A recent study of its scope suggest Sci-Hub contains as much as 85.2 per cent of articles published in closed access journals (Himmelstein et al. 2017)—more than five in six previously paywalled articles now being freely available. Sci-Hub's success, as "nearly all scholarly literature is available gratis to anyone with an Internet connection", provocatively points to "the subscription publishing model becoming unsustainable" (Himmelstein et al. 2017).

Significantly, the hosting arrangements of Sci-Hub to date—based in St. Petersburg, as well as replicated through encrypted torrent channels—have

made the site resilient towards take-down requests and threatened legal action. Indeed, Elsevier's civil suit and preliminary injunction against Sci-Hub produced greater publicity and traffic for the site (Himmelstein et al. 2017). Whether Sci-Hub ultimately spells the end of pay-walled content, its six-year successful operation registers a significant and sustained alternative conduit of access. Not coincidentally, that success is partly premised upon the widespread use of crypto-platforms (Tor, Bitcoin) that shield the site's operators, contributors, users and funders from sanctions. We discuss the potential expanded use of such platforms further below.

The third catalyst involves the widening role of non-academic institutions in the funding and dissemination of university research. As Butler (2017) notes, organisations such as the Gates Foundation and the Wellcome Trust now promote or mandate open access publishing of funded scientific work. While this locks out authors from access to established and highly reputable journals such as *Nature* and *Science*, the high prestige of these funding organisations acts as a significant counterweight in the general ledger of academic reputational value. Both organisations have also founded substantial open access publishing platforms of their own, with a specific drive towards promoting research in developing nations (Butler 2017). Coupled with the continued rise of *altmetrics* (Priem et al. 2010)— alternative measures of academic quality and impact—such developments mean research funded by humanitarian agencies and published through open access platforms appears a viable complementary or alternative channel for academic career development and knowledge production.

These three instruments—open access, unsanctioned repositories, and funding agency mandates—contribute to what we term a process of detouring: the manouevring of academic knowledge through alternative channels. Such ethical executions of code, we propose, offer ways of modulating seemingly rigid states of exception within the academic publishing semicommons. However, none in and of themselves yet make good on the promise of a global knowledge commons that acknowledges institutional funding and authorial contributions while permitting free or token access to its results. Open access, for instance, still leaves unmet the challenges of costing both research and its dissemination through peer review, editors and technology hosting infrastructure. That challenge remains a largely unrealised goal that requires further speculative activity, one approach to which we turn in the section below.

Mechanism 3: Disrupting

Disrupting connotes the possibility of creating digital platforms which have the potential to invert the academic publishing sector, and here we explore the disruptive possibilities of blockchain technology. Underpinning Bitcoin, a digital

cryptocurrency released in 2009, blockchains offer immutable, decentralised digital ledgers based upon "collective consensus and verification" rather than a central authority; this enables trust to "shift away from third parties and legacy institutions towards code and a community-based, open-source, peer-to-peer system of transparency and accountability" (Al-Saqaf & Seidler 2017: 2). We propose that blockchain technology can potentially transform the current socio-technical stasis of moral and market crises associated with academic publishing. This could be achieved, as traced below, by producing alternative conduits of incentives, value and exchange. Moreover, we suggest blockchain technology may offer even more ways to invert the apparent grip of states of exception through "geo-designs" (Bratton 2015) transforming knowledge sovereignty on a global scale.

The gradual maturation and adoption of blockchain technology could embed operations of a trusted ledger and repository for global knowledge sharing. Describing the evolution of blockchain from currency to smart contracts and applications, Swan (2015) highlights how this technology holds potential for an alternative technical and organizing paradigm:

> *We should think about the blockchain as another class of thing like the Internet—a comprehensive information technology with tiered technical levels and multiple classes of applications for any form of asset registry, inventory, and exchange, including every area of governance, economics, and money; hard assets (physical property, homes, cars); and intangible assets (votes, ideas, reputation, intention, health data, information, etc.). But the blockchain concept is even more; it is a new organizing paradigm for the discovery, valuation, and transfer of all quanta (discrete units) of anything, and potentially for the coordination of all human activity at a much larger scale than has been possible before (Swan 2015: vii, italicised in text).*

The affordances of blockchain are increasingly identified as ways to open up more mutually beneficial possibilities for academic publishing. For example, a blockchain-based system (such as r-coin, a ResearchCoin or ReviewCoin) where researchers obtain bitcoin currency for each review undertaken has multiple benefits: offering incentives to researchers, raising barriers to predatory publishers, and providing an "alternative publication metric" (Spearpoint 2017: 1). In view of this, blockchain has the potential to support concerns for efficiency alongside care for justice:

> Publishers provide content curation, discovery, "findability," relevancy, advocacy, validation, and status ascribing, all of which might be useful attributes for content consumers. One way to improve a centralized model with blockchain technology is by applying an economy as a mechanism for making the incentives and reward structures of the system fairer (Swan 2015: 63).

Applying blockchain to academic publishing—and the affordances of a Bitcoin address—could underpin a universal standard for publishing, cataloguing, and purchasing, thereby opening up multiple opportunities. Existing examples include: JournalCoin—a token system to underpin a "publishing microeconomy"; metacoins by Big5 publishers to run as Counterparty assets; Researchcoin to buy papers behind paywalls; and Experimental Resultscoin to incentivise experimental replication, negative results, and raw data (Swan 2015: 63-64).

This disrupting mechanism shows how the boundaries of academic publishing can be redrawn to better recognise and reward shared labour. Its tentative formulation requires acknowledging and working through both the massive technological complexity of re-equipping universities, publishers, authors, reviewers, editors and readers with usable crypto-infrastructures, and the considerable scepticism levelled at the financial speculation and political entailments seemingly embedded with the architecture of Bitcoin itself (Golumbia 2015). Without further experimentation though, institutional inertia is liable to default to existing and known arrangements with those who supply universities the products they have already bourn the risk and cost of financing—perpetuating a perverse market and an inequitable geopolitics. The "promises and pitfalls of blockchain technology" stem from how "technology creates a set of potentials that are informed by its core architecture and principles" (Saqaf & Seidler 2017: 5). This mechanism holds potential for sector transformation, but will require collaborative attention and energies towards co-designing such possibilities.

Individuals and communities from across higher education and beyond can utilise the mechanisms suggested above to unsettle some of the ingrained tensions and limits associated with the sector. The dynamics of semicommoning offers us a way to problematise perceptions of rigid property principles and linear resource use: through recognising how threats of "strategic behavior" can be potentially ameliorated via "boundary placement" (Smith 2000: 133). The value of the proposed heuristic—ethical executions of code—stems from showing how more inclusive platforms and equitable practices can reconfigure the academic publishing semicommons.

Conclusion: Designing Otherwise

Our article examined the ways in which the conditions, pressures and designs of academic publishing in the digital age can be modulated for *designing otherwise:* that is, the ethical design of digital binds as political acts in the making. In accord with this intent, the primacy of ethics central to the philosophy of Levinas offers a way of "undesigning the design" of information and communication technologies, by way of "reinvention and new judgments through and beyond existing frames of ethics and politics (Brigham & Introna 2007: 7). The ethical and political imperative of designing otherwise becomes a double force which can be applied to digital platforms and practices: the "digital acts" (Ruppert 2015) of picking away at unjust binds, along with the pursuit of more just entanglements.

The formation and entanglement of digital binds, and how they could be designed otherwise, has been the guiding motif of our argument. First, we explored how the drivers in this sector are always mediated via socio-technical binds (history, trends and infrastructures); secondly, we identified how features and strategies of the "semicommons" (Smith 2000, 2005) resonate within the academic publishing context; thirdly, our concept of ethical executions of code showed how the sector's mechanisms could be geared towards more ethical designs. The mechanism of dissuading was illustrated by way of Project Deal, the German consortium established to negotiate a fairer open-access agreement with Elsevier and other publishers. This is one example of how academics and institutions can begin to negotiate fairer practices, through blocking the hold of proprietary platforms and raising publishing inequalities to public debate. The mechanism of detouring was highlighted by way of platforms, such as commons-based journals (The Journal of Peer Production) and illegal file-sharing repositories (Sci-Hub), which inscribe alternate publishing pathways. The mechanism of disrupting focused upon the ways in which blockchain technology can potentially invert the way in which the academic publishing sector operates.

We conclude by asking: *Why are such mechanisms necessary?* The infrastructural reach of platforms to curtail and create freedoms across global, regional, city, institutional, and individual domains is markedly apparent. Both common and private interests form the academic publishing semicommons. Ethical design, or designing otherwise, needs to be a primary consideration of these entanglements and what becomes produced. We have illustrated how, in the context of academic publishing, this semicommons is activated by various digital binds which need to be redrawn, maintained, and sustained with care. As Bratton suggests:

> The care of any archive is one present moment's self-accounting toward an unknowable future—an ethics—and a database is just a particularly active kind of archive, one for which information that is drawn from the world more easily becomes an instrument for working reflexively back on it. It's unclear though if the shift from scarce, sacred texts to overabundant, instantaneously archivable information still requires the same promise of ethical completion to motivate and justify our participation and promise toward the future. We could act as if it does, until we find out (Bratton, 2015: 353).

Acts of longer term care are needed beyond the short-circuiting of knowledge and skills, as Stiegler has also suggested with the idea of "contributory publishing", pointing toward a reorientation of research economies "in the service of new scholarly and scientific societies, and of the academy as a whole" (Stiegler, 2015: 213). A range of specialists and expertise—from the university sector and beyond —need to problematise the status quo by re-directing their energies to create a semicommons which strikes a more balanced approach between public and private interests. All disciplinary fields—from biomedical and biodiversity, to social sciences, humanities and arts—must co-create the proliferation of ethical digital binds. Ultimately, this can buffer and offset the dominance of privatising and corporatising forces which exclude or detract from benefits for academics, their peers, and the public. Our conceptual framework delves into a range of existing and emerging mechanisms—dissuading, detouring, and disrupting —to articulate more inclusive and equitable designs for the future of academic publishing.

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Notes

[1]We echo Himmelstein et al.'s warning: "Readers should note that, in many jurisdictions, use of Sci-Hub may constitute copyright infringement. Users of Sci-Hub do so at their own risk. This study is not an endorsement of using Sci-Hub, and its authors and publishers accept no responsibility on be-half of readers. There is a possibility that Sci-Hub users—especially those not using privacy-enhancing services such as Tor— could have their usage history unmasked and face consequences, both legal or reputational in nature" (2017).

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