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Image courtesy of Musée McCord: Fonds Bowater Paper Corporation Limited P072 © Musée McCord
Guest Editorial

Materials and Media of Infrastructure

What are the materials and media of infrastructure? It could be claimed that scholars in communication and media studies have always been infrastructuralists (Peters, 2015). Infrastructures of all kinds, including telecommunications satellites, data centres, and oil pipelines, are increasingly at the forefront of critical communication studies. Rather than remaining in the operational background that sub-tends the contemporary digital landscape, these infrastructures establish “the rules governing the space of everyday life” (Easterling, 2014, p. 11), emerging as integral “chokepoints” (Carse, Cons & Middleton, 2019) that reveal the varied materials that both constitute them and travel across them. Whether in mineral extraction or the newsprint industry, examining both the materials and media of infrastructural arrangements allows for a better understanding of the social, political, and cultural configurations they make possible. Functioning in this way as logistical media (e.g., Cowen, 2014; Peters, 2015), these visible and invisible infrastructures ultimately shape the physical movements and mediations of data and information.

As researchers, we are fortunate that, especially if studying the contemporary moment, the tangible materials of infrastructural architectures are available for analysis, starting with how they have been inscribed on the land. Infrastructure, capitalist extractivism, postcolonial space, and a damaged environment are bound together through a set of relationships that cohere in the project of settler infrastructure building. While infrastructures are invariably and most often extractive, drawing from the land in the sense of taking space and making use of materials and resources, one of the central aims of this special issue is to gesture toward how infrastructures are themselves forms of mediation that are shaped by their material constitution. The materials and media of infrastructures signal a broad set of evolving relationships between humans and the environments they colonize, and how they cohere in highly contingent and mutable entities known as “infrastructures.” This issue examines the range of infrastructure as a category, one that can contain material registers as varied as salmon farming, mineral exploration, oil extraction, papermaking, emergency test signals, and more.

There has been a growing interest in infrastructure in media studies in the past few years, whether physical, digital, or the ethereal in-between. It has been part of a broader “infrastructural turn” that has seen the objects and processes of...
infrastructures treated with increasing depth and dimensionality across many adjacent fields. On questions of land and environment, our colleagues from anthropology or Indigenous studies have focused on the temporal politics (Anand, Gupta, & Appel, 2018), detrimental environmental consequences (Hetherington, 2019), and potential infrastructures hold for Indigenous-led sovereignty (LaDuke & Cowen, 2020). Media studies is indebted to Harold Innis’ investment in the infrastructure of Canada’s complex communication systems, which he considered as part of the inherently material dimensions of our communications practices and networks (1970, 1999, 2007). While this foundational work might in part explain why Canada produces so much stellar infrastructural scholarship, the field of media studies has by no means fully mined the tangible frictions that inhere in the material make-up of infrastructures or their geographic situations.

Thanks to work by Lisa Parks (2013), John Durham Peters (2015), Nicole Starosielski (2015), Janet Walker (Starosielski & Walker, 2016), and many others (Gabrys, 2016; Jue, 2020; Parikka, 2015, and the list goes on), scholars in environmental media studies in particular have become accustomed to thinking about the political ecological dimensions of media and their infrastructures. Building from this, the articles collected in this collection make a strong case for thinking geo-graphically about infrastructures—as material practices of “Earth writing” that can be made manifest through the specificities of very sited locations. As precise geographies through which to consider the materials and media of infrastructures, they allow us to take into account the many layers—economic, political, cultural—that shape the relationship between media and site, and how these are, in turn, entangled in the current reverberations of settler colonialism. The mediation of territory, whether through digital practices of mineral staking or through Kwawaka’wakw social media communication practices in what is now known as British Columbia, is an integral dimension of this geographical treatment of infrastructures. Building on Parks’ (2009) method of media infrastructural fieldwork and Kathryn Yusoff’s (2019) scholarship around the racialization of geology, this issue seeks to put forward a broader methodological orientation toward the physical nodes of infrastructural networks and attend to the lives “on the ground” that can be woven into and across contentious settler realities, rather than abstract and disconnected technological and communication “bubbles.”

This tension is the subject of Patrick Brodie’s “Hosting Cultures: Placing the Global Data Industry,” which examines how Ireland’s makeover into “data centre country” is changing not only its physical landscape but also its cultural fabric. He uses the concept of “hosting” to think about how the internet’s infrastructure relies on ecosystems of mutually interdependent big and small tech companies leaching on “hosts,” physical places (cities, town, and regions) that are financially, environmentally, and socio-culturally transformed by these new arrivals. The ex-
traction does not merely refer to the level of the energy resources required and the outputs of major industry; a “cultural extraction” must occur to accept and host these “outsiders.”

Hannah Tollefson’s contribution also works through a particular site. Her focus is an area of British Columbia known as the Golden Triangle, which is often imagined to be particularly rich in minerals. Information about the area is recorded in Mineral Titles Online, a subsurface mineral tenure staking system that aims to facilitate integration in supply chain logistics and management. This online system that manages extractive infrastructures can be understood as part of platform capitalism. Drawing on industry journals, archival sources, and an analysis of the Mineral Titles Online interface itself, Tollefson interrogates the logistical politics of settler-colonial territorially that take shape through these infrastructural arrangements.

Shirley Roburn continues this sited work on extraction by proposing an expanded notion of “infrastructural action.” In her analysis of Kwawaka’wakw social media communications in the Broughton Archipelago, she argues that communications about fish farm occupations in the area was about more than this specific issue. Rather, by regularly referencing their sovereignty and salmon stewardship, the Kwawaka’wakw actively used social media to state infrastructural positions. In this case, then, social media are acting “infrastructurally,” doing the broader material and discursive work, as Tollefson puts it, of “staking a claim” (p. 178) on both digital and material terrains.

Roburn’s discursive work provides a provocative counterpoint to Darin Barney’s interest in infrastructure as a non-discursive politics. He begins the issue by situating infrastructural and material thought in communication and media studies, and reviewing the recent scholarship on the infrastructural “turn” across various fields. Departing from the work of scholars who consider the relationship between the technical and the political, he points in particular to renewed attention to infrastructure as a form of politics, what he explains as “the shape of politics and the arrangement of its parts, and also its determining principle” (p. 226). Infrastructure, he argues, is a non-discursive politics—one that is entangled with state and capital, and specifically extractive capitalism and settler colonialism. Barney shows us how the work of critical, postcolonial, feminist, and queer theory allows for a better understanding of the ways that infrastructure becomes a formal and material performance of politics. These reassessments are ultimately vital for rethinking the relationship between politics and infrastructure, including within the context of communication studies.

Jordan Kinder continues the work of challenging extractivist capitalism and its infrastructures with a close look at the 2017 video game Thunderbird Strike and the way it is able to mobilize its players into action. The game—a combination of Anishinaabe storytelling and the sabotaging of the Canadian tar sands—arguably
incentivizes player-activists to move their sabotage from the game to physical terrain. Kinder spurs infrastructuralists to these material zones of friction; land itself is a contentious infrastructural form seen through the lenses of Indigenous jurisdiction and the settler petrochemical imaginary.

As is so often the case, understanding the present benefits from historical perspective. The overlaps between infrastructure studies and media history that feature in Innis’ studies are implicit in research on how communities are connected across geographical space, such as with work on signals (Rikitianskaia & Balbi, 2021; Thibault, 2018), postal networks (Blevins, 2021; Pringle, 2020), or alternate computer networks (Peters, 2017; Schafer & Thierry, 2012). Though in many instances questions of colonization, the environment, and the extraction of natural resources might be only indirectly addressed, this does not mean that there is no geo-graphing. The focus is however in some of the myriad other ways that site comes into play and leaves its mark: company and patent wars, the development of standards and protocols, ammendments made to improve accessibility, et cetera. In this issue, Andy Kelleher Stuhl’s treatment of the recent reintroduction of national emergency alert systems is a good example of this kind of work. He brings our attention to the American Emergency Alert System, “the first and last medium of American emergency broadcasting” (p. 272). As a “sonic structure” for sending important and urgent messages nationwide, it builds on the infrastructures and broadcasting capabilities of radio. The Emergency Alert System offers an original example of the regulatory impacts on a form of communication that is meant for the public but is not quotidian. Stuhl makes us aware again of the ways the state communicates directly with the population in times of crisis, of the infrastructures and protocols this requires, and, in this particular case, of the interesting continuations between old and new media infrastructures, particularly as terrestrial radio experiences a resurgence.

The ground of infrastructure, the material of land, is ever-present across these locations of research. It makes manifest the vital and unpredictable ecological points of contact between infrastructure-making and sited environments. What these locations hold in common is an attempt to attend to these open-ended transformations—the mutability of the place where infrastructures and environments meet. This is not, of course, limited to the horizontal plane of land. From recent work around “Indigenous solarities” (Kinder, 2021), which have the capacity to support solidarity projects of Indigenous self-determination through solar energy, to foundational scholarship on the ocean as a contested media space, namely one constituted through sonar technologies and their mapping of its depths for capitalist and militaristic ends (Shiga, 2013), attention to the volumetric dimensions of infrastructure-making is another key attribute of the contributions to this issue (Billé, 2020). To think critically with infrastructure is to think vertically and cycli-
cally across three and four dimensions. It is to recognize the protean nature of infrastructure to largely respond to the ongoing settler-colonial project to claim property and land (Pasternak & Dafnos, 2018; Ruiz, 2021; Spice, 2018). In this way, infrastructures become akin to fluids, or capital itself, in their capacity to move across “phases” and become reified through a mixing of agents, from resource staking to property claims upheld by the settler state. Infrastructures possess both materials and media that are implicated in this process of reification—they often constitute what Winona LaDuke and Deborah Cowen (2020) characterize as “Wiindigo infrastructure” (p. 243). To unbind them and start to see what regenerative, or even “alimentary” (p. 245), potential their relationships to land hold.

Research on the histories of infrastructure, meanwhile, is also being developed in a variety of fields other than communication and media studies, including material culture studies, art history, book history, urban studies, anthropology, and film studies. What is significant here is that this scholarship can be both a fine-grained analysis of materials and one that places them within the macro contexts of infrastructures. These histories reach into the pre-modern to consider local, regional, and global routes and networks of communication and trade. Using an example close to media studies, consider the recent painstaking work of book historians who mapped the locations of all of the booksellers and printers of a particular region and time, such as Malcolm Walsby (2020) did for regional France and Etienne Posthumus (2021) produced in the form of a digital map of Amsterdam. Such projects are a mapping of the infrastructure of historical Europe’s emerging print and book culture, including the circulation of ideas and knowledge of the time. One such important material for the book would eventually be paper, with paper mills themselves a historical infrastructure reliant on natural materials—flowing water, wood, et cetera—or processed materials, such as rags. Today, materials such as glass or sand, or metals such as gold, silver, copper, and nickel join the plastics produced through the extraction of oil to help explain the material world of digital media technologies and the infrastructures they make possible. These traditions help us consider Tim Ingold’s (2007) call to study materials rather than materiality, which he considers to be a concept too theoretically unclear and abstract. Regarding one such conference session on “materiality,” he writes:

These presentations were overflowing with references to the works of currently fashionable social and cultural theorists, and expounded in a language of grotesque impenetrability on the relations between materiality and a host of other, similarly unfathomable qualities, including agency, intentionality, functionality, sociality, spatiality, semiosis, spirituality and embodiment. Not one of the presenters, however, was able to say what materiality actually means, nor did any of them even mention materials or their properties. For the most part, I have to confess, I could make neither head nor tail of what they were talking about. (p. 2)
Without making an argument against such philosophical approaches, the articles in this issue take the geographies and histories of materials as their starting point and focus.

In addition to the aforementioned contributions, the remaining three articles have a pronounced focus on material artefacts. Rachel Jekanowski digs into the archive of the Hudson’s Bay Company to reveal a corpus of “fur films” produced in the early 1920s and 1930s. She situates their creation of “settler imaginaries” as emanating out from the company’s vast infrastructural network of fur production. Her aim is to position non-theatrical films and their role in the perpetuation and consolidation of colonial infrastructure-making in the settler state of Canada. Fur and film become bound together as holding distinct but interrelated forms of material agency. The production of both, Jekanowski claims, can create a point of articulation that lays bare how they relied on the exploitation of Indigenous lands and labour in order to consolidate an understanding of white supremacy at the heart of these settler imaginaries.

Turning attention to Canada’s status as a prime papermaking settler colonial country, Aleksandra Kaminska and Rafico Ruiz offer a close reading of The Bowater Papers, a trade magazine produced by the British-owned Bowater Paper Corporation in a truncated run of four issues in the 1950s. Our goal is to understand the magazine as a lens through which to observe the broader consolidation of a post-World War II paper-driven “xylomedia” modernity. Following this, our aim is to reassert wood and paper as infrastructural materials at the heart of media studies, with particular attention to their environmental anchoring in the settler forests of Canada. Ranging across the scales of industrial paper production, from mature trees to pulp to by-products such as lignin, the article traces the development of a particular material infrastructurte of modernity.

The last article begins with a very specific artefact: a bridge in Wakefield, Québec. Through this heritage bridge, Rob Shields furthers this issue’s investigation into the temporal dimensions of infrastructure. Questions of land and territory are understood as attempts to work through the infrastructural forms of the colonial past, or in a different register, the enduring links between media old and new. Shields uses the example of a reconstructed wooden bridge to articulate four “moments” of “time infrastructures.” In doing so, he argues that infrastructures are rhythmic, that they have multiple and unequal temporal effects and modes. This helps explain infrastructure as a “super-object,” something that transcends presence “to reach forward into the future as well as back to the past” (p. 348).

As this special issue suggests, infrastructure can be articulated and studied in many ways. While its aim is not to explicitly investigate the methodologies of infrastructure studies, placed side by side, the contributions reveal the variety of research that can fall under an “infrastructural” rubric. Indeed, the methodological differences in these pieces bring to light the many epistemologies of infrastructures
past and present. The articles are nearly all geo-graphic, some are historically situated. They are bound to questions of contested territoriality; and they often address these questions through thickly described locations that help articulate precise land-based entanglements. There are instances of particular systems in specific sites (Brodie; Stuhl; Tollefson), singular artefacts (Shields), and media productions (Jekanowski; Kaminska & Ruiz; Kinder; Roburn). There is fieldwork and ethnography work, there are close readings, and activist orientations that are directly engaged with political questions and social justice (Barney). Many of these preoccupations and approaches overlap, and the goal is not to divide and classify but rather to show the range of sited possibilities offered to the field of communication and media studies. Playing off these methodological orientations, Nicole Starosielski offers an experimental and provocative means to capture this analytical diversity. Her afterword charts the ways that infrastructuralists can parse not only the varied geographies, materials, and modes of settler colonialism, but also how reading infrastructure is a practice that is ubiquitous, constant, and rooted in the creation of entanglements and relationships. To read infrastructure is to bind together and disaggregate—to examine traces left behind and also sound out the composition of material.

Finally, thank you to all of the issue contributors for working through a particularly trying time to complete their articles. Thank you also to the diligent and thoughtful reviewers for their invaluable comments. We especially thank the team at the Canadian Journal of Communication—Chris Russill, Bethany Berard, and Marilyn Bittman—for their engagement with and support for the issue, as well as their endless patience.

References


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ABSTRACT

Background: The article uses fieldwork conducted among data centre professionals in Ireland to theorize the relationship between “hosting” and local business culture at the heart of data supply chains.

Analysis: There has been a growth in data centres in Ireland since the 2007–2008 financial crisis, and technology companies have overtaken finance in the country’s business cultures and strategies. Companies and semi-state institutions use conferences, promotional materials, and knowledge dissemination events to advertise Ireland as a place to host data and business.

Conclusion and implications: This article concludes that the logics by which local culture and global business cooperate can be better understood by looking at middle managers and the facilitators of data supply chains in addition to macro-scale processes.

Keywords: media infrastructure; telecommunications policy; data centres; supply chains; Ireland

RÉSUMÉ

Contexte : Cet article se base sur un travail de terrain effectué parmi les professionnels de centres de données en Irlande afin de théoriser la relation entre « hébergement » et la culture d’entreprise locale qui est au cœur des chaînes d’approvisionnement de données.


Conclusion et implications : L’article conclut que les logiques de coopération entre la culture locale et les entreprises mondiales peuvent être mieux comprises si l’on s’attache aux gestionnaires intermédiaires et à ceux qui facilitent les chaînes d’approvisionnement de données en plus des processus à l’échelle macro.
Introduction

Early one winter morning during my fieldwork in Dublin, Ireland, I took the 151 bus to Profile Park, an enclave within a sprawling industrial region at the western edge of County Dublin. I was one of only three passengers to disembark at the entrance to Grange Castle Business Park, a partnership between the Industrial Development Authority (IDA) and South Dublin County Council. Grass mounds surround the wide access road on both sides, and from my many visits out to this area I knew that one side masks a Pfizer plant undergoing expansion and the other an unmarked Equinix data centre. Further up the road, I had previously been overwhelmed by the massive—also unmarked—Microsoft data centre campus, the core of the company’s cloud computing infrastructure in the country. Its heavily securitized gate, which more resembles a military base than an office park, displays U.S., Irish, and EU flags (see Figure 1). Farther along, among pharmaceutical manufacturing sites, empty fields, and the ruins of medieval Grange Castle, the park’s namesake, there is an Interxion data centre. It is situated on a manicured landscape butting up against the Grand Canal. This canal, now a scenic relic, used to make up an industrial corridor between Dublin and the River Shannon in the
west of Ireland. But now, if you follow the canal from Grange Castle a few kilometres into the heart of Dublin, it eventually connects with the “Silicon Docks.” These formerly industrial docklands host the headquarters of tech companies such as Facebook, Google, and Airbnb, drawn by Ireland’s 12.5 percent corporate tax rate (against an EU average of 22.5%), lax regulatory environment, and planning structures to fast-track corporate developments (see Kelly, 2014). That day, I was not walking north to Microsoft or Interxion, nor along the canal to the docks. I was making my way a few kilometres farther south, away from the city centre, to Grange Castle Business Park South, host to Google’s flagship European data centre, and to Profile Park, which uses the slogan: “Where data needs to be” (see Figure 2).

Figure 2: Profile Park, “Where data needs to be”

Source: Photo by author, 2019

This is just a snapshot of one of my many visits to “data centre country,” or the ring of industrial parks circling the city of Dublin along the M50 motorway and the bundled T50 fiber-optic cable route. Drawn by a low corporate tax rate, available infrastructure, and the “cool” natural climate, data centres in Ireland are far from a natural development (see Brodie, 2020a). This territorial formation represents the fruit of the labour of hundreds of men and women in the tech industry and their partners in the state to make the country a strategic destination for data capital, especially following crises such as the 2007–2008 financial crash and Brexit. The presence of data centres also demonstrates longer processes of financialization and now the dominance of U.S. companies and other tech multinationals in the
country. At a basic level, the growth in data centres has been driven by Ireland’s ongoing reliance on foreign direct investment (FDI), acquiescence in corporate tax evasion, and endorsement of “green capitalism,” fostering a kind of corporate hospitality, the most recent consequence of which has been the growing hegemony of U.S. technology companies. The presence and creeping dominance of companies such as Amazon Web Services (AWS) and Microsoft, among the biggest cloud and data hosting providers both nationally and globally, fundamentally alters the cultural and industrial landscape of a small country such as Ireland.

This article will develop the concept of “hosting” by articulating how various state and non-state actors in the industry leverage a particular postcolonial “structure of feeling” (see Mayer, 2020, p. 2) to paint Ireland as a welcoming place to do business. The “host” relationship, including the terms’ fraught etymology signifying a range of meanings from “enemy” to “guest,” is complex. This article will trace “hosting” in relation to economic liberalization, hospitality, and, more recently, data hosting, which engages with various historical and ongoing structures of dependency and (lack of) reciprocity. Ireland’s contemporary political economies are inseparable from the histories of the postcolonial state, which, beginning in the mid-twentieth century, began to liberalize its economy and invite FDI through organizations such as the Industrial Development Authority (IDA), which placed particular importance on U.S. multinationals. Economic development in the country has long been ideologically entangled with tourist imaginaries and their colonial legacies, which see Ireland as an infinitely malleable landscape to do business in (James, 2014; Mulhall, 2013). During the Celtic Tiger, the period of exponential economic growth in the 1990s spurred by a perfect storm of globalization, progressive de-regulation, tax incentives, and increasing political stability, the country’s economy became largely dependent on multinational businesses, as financial services and tech companies flocked to the country. In the wake of the 2007–2008 financial crisis, during which punishing debt and austerity implemented by the European “troika” (European Commission, European Central Bank, and the International Monetary Fund) compelled the government to take drastic steps toward “recovery,” the state instituted aggressive measures to draw in low-tax multinational investment (Regan, 2019, para. 4) and, as I argue, leaned into its branding as a tax-friendly enclave for extractive tech business, inviting many of the largest tech multinationals to build out the data infrastructures required to power their global operations (see also Brodie, 2020a).

This article will articulate the factors through which not only the spatial and built environment are fundamentally affected by macro-scale processes but also the very sociocultural fabric of how people live and relate to one another. Small- and medium-scale industrial actors play a constituent role in facilitating the large-scale economic and infrastructural transformations of the tech industry. While the state is crucial, the interface between industrial managers and lobbyists and
the state is where certain goals and structures are reproduced. As Asta Vonderau (2019) argues, the scalar dimensions of data centres as global infrastructure are crucial to understanding how they are developed and operate. This extends beyond understanding just how big and just how powerful these companies and their facilities are at both hard and soft levels of power and influence. The state remains a powerful presence in how these global industries operate, even if in the realm of “soft power,” a coin termed by political scientist Joseph Nye (1990) to describe how the U.S. attempted to leverage non-coercive power abroad through culture and policy. While not a particularly useful term for actual analysis, Ireland consistently ranks highly in this abstract metric, referring to cultural institutions and diplomacy, tourism, and place-branding and also traditionally harder factors such as supranational politics, economics, and society. Civil society, corporate spokespeople, and semi-state institutions are critical in this landscape, operating at a smaller scale to spread the good word of Ireland’s business environment. Treating the mid-level company managers, industry boosters, and governmental policy operators in Ireland as the foot soldiers of data centre development and operation, this article investigates some of the manifold sites and practices through which Ireland comes to “host” multinational business and data. Industry figures act as on-the-ground hosts, agents for the arrival and management of global digital commerce in a particular location. State and semi-state bodies, such as the IDA, as well as civil society organizations, such as the data centre lobby group Host in Ireland, host investors, capital, and data. During the COVID-19 pandemic, in fact, the IDA was particularly worried about capital growth because it could not physically bring investors to sites, put them up in hotels, and “sell” them on hosting their “FDI” operations in Ireland (Halpin, 2020). Martin Shanahan, the CEO of the IDA, has said that FDI is a “contact sport” (quoted in Irwin-Hunt, 2020, para. 8) requiring boots-on-the-ground visits on Irish soil. Host in Ireland, similarly, has been hosting virtual seminars responding to these ongoing issues for investors, managers, and workers in the data centre “industry.” With these and other concerns, these organizations respond in real time to new obstacles such as Brexit, General Data Protection Regulation (GDPR), energy regulations, and COVID-19. Without these men and women, the cloud, as Jennifer Holt and Patrick Vonderau (2015) put it, could never “touch the ground” (p. 75), and data would be hosted elsewhere.

Using fieldwork conducted in Ireland between June 2017 and June 2019, this article examines the transnational industry of data centre investment, development, and management in Ireland. Like many technology-based industries, data centre companies use the structural diversity of a global system that requires a dispersed chain of middle managers, subcontractors, freelancers, civil society groups, and their partners in government in order to ensure cost-efficient development, construction, and operations. Semi-state bodies and mid-level facilitators in Ireland’s data centre “industry” work in tandem to invoke and deploy a financial-
ized idea of “Irish culture” to attract tech multinational, and particularly data
centre, investment to Ireland. Adding to work that critically analyzes the social
and cultural politics of data centres (Burrell, 2020; Hogan & Vonderau, 2019;
Johnson, 2019; Maguire & Winthereik, 2019; O’Neill, 2019; Vonderau, 2019),
this article draws on methodologies from corporate ethnographies (Ho, 2009),
science and technology studies of infrastructure and industry (Parks & Starosielski, 2015),
and production cultures approaches to industry self-theorizing (Caldwell, 2008).
As Anna Tsing (2009) has influentially articulated, supply chain capitalism does
not represent a one-way process of value extraction across routes of logistical man-
gement and governance. However, this does not mean that the capital produced
does not largely filter back to and accumulate in Silicon Valley and other centres
of global capital’s gravity. Rather, the arrays of actors within the data centre indus-
try generate the conditions of ideological reproduction that ensure the dominance
of an overarching system of business development in Ireland, endorsed by the
state. Tracing the hard and soft factors of this de- and re-centralization, this article
interrogates the cultures of data centre development and the logics through which
it operates in the particular context of Ireland.

**Finance, tech multinationals, and local cultures of business**

Since the 2007–2008 financial crisis, the tech industry in Ireland, including data
centres, has exploded. While Ireland has long hosted the operations of U.S. tech-
nology companies, their power to influence matters within the Irish state has
emerged more prominently after the financial crisis. Microsoft first received plan-
ning permission to build a data centre in Ireland in 2007; AWS, the software and
data hosting wing of Amazon, opened its first “Infrastructure Region” in Ireland
the same year; Facebook set up in Dublin’s “Silicon Docks” in 2008 and built its
first data centre in 2016; and Google built its first data centre to support its
European headquarters in Dublin in 2012 and expanded into its Grange Castle fa-
cility in 2016. Overall, there are now about sixty data centres in the Dublin region,
and that number is growing. AWS has rather quietly become infrastructural to the
countries in which it operates, contracting its services out for various governments
and public organs, not to mention other enterprises (some of its biggest clients
are Netflix, Facebook, Twitter, and LinkedIn). The implications, externalities, and
even locations of these data centres are often not made public, even though public
bodies serve as clients (see Figure 3). But despite this lack of transparency, these
are infrastructures that use enormous amounts of energy and public infrastructural
resources. Many public and private sector organizations in Ireland have done re-
ports on the benefits of data centres, and yet most admit that there are not many
jobs involved and the energy demands are astronomical (Government of Ireland,
2018; IDA Ireland, 2018; Sustainable Energy Authority of Ireland, 2017). In spite
of this, Ireland continues to go all in on the data centre gamble. The *Planning and
Development Act* of 2000 was amended in 2017 to include private data centres as
strategic infrastructure, allowing them to skip local planning. A Supreme Court ruling in 2019 in favour of dodgy environmental impact assessments for a proposed Apple data centre in Athenry by An Bord Pleanála, the Irish state body in charge of spatial planning, sets further deregulatory precedent (Brodie, 2020b).

The data centre “industry,” similar to other industries, reproduces itself through an array of conferences, networking events, and knowledge dissemination activities. Civil society industry boosters such as Host in Ireland, semi-state industrial development agencies such as the IDA and Enterprise Ireland, and Irish data services companies maintain a prominent presence on this circuit, advertising Ireland as a place to do business and host cash and data. Patrick Bresnihan, a critical geographer, has argued that Ireland is a “soft power superpower,” in that despite its relatively minor status in global relations, the Irish state has managed to leverage influence via cultural goodwill and diplomacy, a robust transnational civil society, and a diverse array of semi-state organizations designed to ensure continued investment in the country’s service sector. Ireland’s promotion of itself as a data “hosting” hub, tied into its longer relationships with U.S. companies and FDI-driven strategies of growth, also relates to cultural and tourist imaginaries of Ireland as a place of welcome and hospitality (James, 2014). Ireland’s diaspora has traditionally been seen as a crucial vehicle for this “soft power” (McWilliams & Murray, 2018), but institutions such as Enterprise Ireland and the IDA—not to mention more directly cultural institutions such as Culture Ireland—are semi-state, enacting governmental remits to leverage influence abroad to generate interest and investment in Irish goods, services, and industries. Business and tourism cultures intersect in the space of Irish development, whether
through Fáilte Ireland (the Irish tourism body) initiatives such as “Meet in Ireland” (2021), designed to attract business events and tourism, or in the direct language of “hosting” put forth in reports and promotions by data centre industry bodies such as Host in Ireland and Bitpower (Reddan, 2019). Part of a longer history of Irish-U.S. relations and liberalization in the country (Grimes & White, 2005), U.S. tech companies have long been a presence in Irish culture and life (Nagle, 2015), and this is predicated on a transnational (largely transatlantic) relationship with U.S. investment.

The sociocultural elements of this reliance on big tech (and FDI more generally) in Ireland—however imagined the actual reliance is—cannot be discussed without acknowledging the structural role of financialization. After the Irish government guaranteed the banks during the 2007–2008 crisis, the country spiralled into a crippling sovereign debt crisis. Thus, in the immediate aftermath, the population distrusted financial markets and the state’s role in them (Linehan & Crowley, 2013). However, the measures instituted by the European troika forced the government to double down on neoliberal modes of economic development (O’Callaghan, Kelly, Boyle, & Kitchin, 2015), deepening financialized ways of living and doing business and leading to an environment where renewed growth has relied on mostly U.S. FDI in the tech sector. Arguably, since the financial crisis, the dominance of the tech industry in Ireland has come to the foreground as the role of finance has receded.

Thus, the idea of “hosting” multinational tech companies and their infrastructures may usefully engage with structures of dependency that arose post-financial crisis. As Cian O’Callaghan, Mark Boyle, and Rob Kitchin (2014) have noted, the “institutionalization” of dependency implemented by austerity along with the official state response of collective guilt revives particular postcolonial feelings, as an external force enacted its will on the populace under the guise of economic “rescue.” In this uncertain and unsteady period, tech multinationals became infrastructural to how the state operated and imagined its economic development, as recovery plans and programs foregrounded privatization and the role of “FDI companies.” During times of renewed crisis, as Naomi Klein (2007) has influentially argued, the state and capital tend to pounce on the opportunity to implement reform programs and crystallize certain political formations. Companies established data centres in this environment, as Ireland opened its doors even wider to tech multinationals and other “inward” industries such as tourism. Ireland thus found itself host to swathes of energy-hungry data centres, with infrastructural shortages and far-off energy targets looming and no way to remove or even properly regulate them (Bresnihan & Brodie, 2020).

Thus, it is apparent how the tech industry may have benefitted from the regulatory vacuum and financialized environment of the Irish recession post-2008, activating its development by capitalizing on the neoliberal common sense of jobs
and investment in a time of austerity and lack. But this was not only a unilateral colonization by U.S. tech capital—it required the participation of Irish planning bodies, companies, and entrepreneurs, many of whom found a living through the growth of this particular tech infrastructure. Of course, the global tech industry has its own unique cultures and ideologies arising largely from the U.S. and Silicon Valley (Barbrook & Cameron, 1996; Hu, 2015), which are discrete from the finance industry (Haiven, 2014; Ho, 2009; LiPuma & Lee, 2004). But the undeniable global scale of big tech and its infrastructures point to far deeper market ideologies. As popular critics have begun to warn, the tech industry’s irresponsible business practices risk provoking yet another global financial crash (Foroohar, 2019). To counter this grand narrative of technology and markets, which drives the logics of economic development in Ireland and elsewhere, the intersection of technology with other industries along the supply chain needs to be countered with emplaced experiences of how financial investment, policy, planning, and other state and corporate mechanisms interact with communities of practice within apparently self-contained industries as well as along a wider supply chain. This emplacement refers to the ground-level spatial phenomena of data centre development as well as cultural logics that operate through specifically place-centred development strategies. Data centres represent a confluence of geopolitical, property, planning, and civil society logics and factors in how companies choose locations, gain permissions, and interact with local communities.

In Karen Ho’s (2009) research on the “institutional cultures and arrangements” of financial firms and their workers—“spokespeople for the market”—she argues that understanding bankers’ actions and “accessing investment banking ‘culture’ can give us insight into the workings of ‘the market’” (pp. 184–185). This ideological reproduction defines how certain norms come to affect a given environment, within which massively influential decisions and transactions are made within and in response to a lived market logic. Ho’s (2009) focus on ground-level—or high-rise level—phenomena allows an insight into how the larger systems work, continue, or break down. Following the work of Ho (2009) and other anthropologists such as Llerena Guiu Searle (2016), this research accounts for the work of middle managers and semi-state officials in the data centre “industry” as they, to quote Searle, “attract partners, change their behavior, and thus, construct markets,” in order to understand how they constitute “a range of capitalist practices rather than one, unitary capitalist ‘system’ and helps us to understand the contours and limits of capitalists’ power” (pp. 9–10). In short, this research tries to understand the “work that people are doing to forge routes of accumulation” (p. 9), which involves both ideological (re-)production and material practices. In environments of crisis and indebtedness, as those doing empirical studies of “financialized subjects” have articulated (Beggs, Brian, & Rafferty, 2014; Mulcahy, 2017), how people see and relate to themselves, their communities, the state, and the market responds to par-
ticular conditions of what is materially available and how to make claims on it (Gago, 2017). Whether expressed through entrepreneurialism (and other pro-business ideologies and activities) or political upheaval, industrial formations, workers, and populations are constantly relating to global processes of capital, state programs, and more emplaced conditions of availability at the same time.

Jerry Sweeney, CEO of Cork Internet Xchange, was one such entrepreneur, who usefully laid out his own idea of the data centre landscape, noting that he filled a market gap in his native Cork when he realized that having Apple’s corporate headquarters there meant infrastructure capacity was being underutilized. He argued that there is actually no “data centre industry” (see also Brodie, 2020a). Data centres are part of a wider internet ecosystem of providers, infrastructure companies, data management firms, and content producers, potted across the world in an assemblage of interests and sovereignties that was—until very recently—difficult to regulate. What appeared as an industry was, to Sweeney, made up of a wider chain of businesses, services, and solutions providers, with data centres attached to the wider industrial formations within a longer history of telecommunications (leading up to and including the internet). “It’s a supply chain,” Sweeney said. Within his own data centre building, he hosted content data, internet services infrastructure (such as content distribution networks), business cloud services, and even government data (which was locked behind further security). He detailed the several types of data centres: co-location (companies such as Equinix, Interxion, and Digital Realty); cloud computing providers (AWS, Microsoft); platform providers (Facebook, Ebay); and edge data centres (required for smart city operations [Warrington, 2018]). Outlining the tiers and types of companies in the space, he labelled data centres as the “hotels” where they all meet, hosted in the same place, demonstrating the metaphorical value of “hosting” and hospitality at the level of both data and business.

This messier part of the spectrum is where this research found the most productive articulations of industry logics. While it is easy to focus on the hegemony of “giants” such as AWS, Microsoft, Facebook, and Google, even these companies’ “hyperscale” data centres are part of a wider supply chain of data storage and circulation, security and extraction, as well as facility design, construction, and management. This less-studied “ecosystem” is populated by companies, individuals, and organizations latching on to circuits of big data and capital. They squeeze value out of different routes and links within the supply chain, whether by optimizing data storage, usage, or hosting data themselves. Some of the companies within this less-studied “ecosystem” are quite large and multinational in themselves, such as Digital Realty, Equinix, and Interxion, which are all multinational data service, co-location, and realty providers operating multiple data centres on Irish soil. Taking a closer look, this apparently coordinated system is deeply fragmented and subcontracted, and it relies on a messy array of knowledge dissemi-
nation events, networking practices, and other modes of formal and informal so-
cial formations within the industry (Lobato & Thomas, 2015). While these com-
panies own and operate server space, they also often subcontract security, software,
and maintenance. Some companies provide full-service data centre provision,
while some essentially act as real estate brokers for computing.

These more spatial logics of computing demonstrate the overlap of the data
economy with real estate and property markets, as evidenced by the metaphor of
“hotels” hosting diverse business and data operations and also by companies such
as Digital Realty (the data centre wing of multinational private equity firm GI
Partners) and Keppel Corporation (2019) (a Singapore-based multinational that
describes itself as an “ecosystem of companies” providing anything from data
centres to energy, real estate, and fibre-optic infrastructure). Looking at a data
centre and all of the infrastructural resources that go into one, the entanglement
of data and real estate comes as no surprise. Key to how spatial development, value
extraction, and data management function in Ireland is a business environment
that has long been eager to attract FDI. While this has been a development strategy
in Ireland since the late fifties, it is important to understand how the current forma-
tions of the Irish industrial landscape, from IDA to Host in Ireland, are designed
to “host” companies and their operations.

As the following sections argue, publicity heralding Ireland’s ability to “host”
tech business, which I encountered at many points across my field work and the
grey literature of Irish capitalism, claims that Ireland is somehow uniquely suited
for data centre development. This is a cultural argument going far beyond the
usual refrains: good tax rate, skilled workforce, cool climate, and friendly business
environment. Its proponents claim that it cuts across the very sociocultural fabric
of the country. This was said to me quite directly by one of my interlocutors, a
data centre engineer at Interxion, who claimed that there was something about
Irish culture that made it a good place to do business and, in particular, set up data
centre operations. This type of claim is familiar across literature on other data
centre locales—Asta Vonderau’s (2019) research on Facebook in northern Sweden
points out the Swedish state slogan about a “climate of innovation” (p. 698), and
Alix Johnson’s (2019) research describes the political, cultural, and environmental
entanglements of data centres in Iceland. This “cultural extraction” (Meade, 2017,
p. 387) is achieved through the coordination of state policy, planning, and sup-
posedly “natural” factors occurring in the country, from climate to heritage to
some kind of inherent pre-disposition to FDI (see Brodie, 2020a). But no matter
to what degree so-called “Americanization” has come to grip the island of Ireland,
and whatever the economic and cultural consequences of such intense U.S. invest-
ment, one nonetheless activates certain old essentialisms by claiming that a
formerly colonized country is actually overtly and enthusiastically suited for for-
ign incursion and influence. However, this is exactly what the state and corporate
developers do. The next section of the article analyzes how these essentialisms have crept into state and corporate promotional literature, which then feeds directly into the built and natural environment of the country with the growth of data centre operations through the everyday discourse of the industry.

“The Irish advantage” and strategic planning
In 2017, Enterprise Ireland started its “Irish Advantage” campaign. The campaign utilizes certain recognizable cultural touchstones of “Irishness,” but re-appropriates them to point to certain ways in which the Irish are more flexible, malleable, and intelligent by nature. An early press release advertised the Irish workforce thus: “The world’s most adaptable workforce means strong partnerships” (Irish Advantage, 2018, para. 1). Another such advertisement proclaims the “luck of the Irish,” which, far from being mere magical luck, extends into the very being of the Irish themselves, somehow making them excellent workers and businesspeople who are also trustworthy at personal and macroeconomic levels (Enterprise Ireland TV, 2017). This logic is being put out there by the organizations designed to attract investment to benefit the Irish economy and benefit its workforce. However, as mentioned above, data centres do not actually employ many people; they are simply infrastructural machinery for the broader operations of moving capital in and out of the country. A year later, in 2018, the Irish Advantage initiative would term 2018 “The Year of the Data Centre,” employing an all-Ireland image sandwiched between rows of server stacks (see Figure 4).

Figure 4: Screenshot from Enterprise Ireland/Irish Advantage website

Source: Hunt, 2018

As troublingly suited to the present moment as such strategic essentialisms may be, it is important to remember that this has been the modus operandi of Irish economic development in recent memory. As with another industry designed
entirely around transnational movement and FDI—tourism as the environmental and cultural conditions of Ireland are posed as somehow uniquely coalescing to provide a hospitable place for data capital. As Kevin James (2014) articulates, the earliest tourism imaginaries of Ireland (and its rural milieus in particular) were concerned with the culture of “hospitality” and how innately receptive Irish people were to foreign visitors. When Brendan O’Regan established the first duty-free and later free-trade zone in Shannon, County Clare, in the late fifties, the most prominent images circulated globally were those of Irish coffees and other commodified touchstones of Irish life for global consumers (Callanan, 2000; O’Connell & O’Carroll, 2018). But it was not only tourist dollars that O’Regan and his enthusiastic partners in the postcolonial Irish state wanted. This was seen as a way of promoting FDI—if you could get people to stop over (whether for fuel or tourism), you could sell them on keeping their money there. This template, which is of course familiar, continues in initiatives to promote business tourism and events (such as “Meet in Ireland” [2021]).

Today, tourism and FDI in Ireland exist in a tangled symbiosis of state agencies and entrepreneurial logics designed to get visitors and capital into the country at any cost. As the Irish Advantage campaign illustrates, Ireland promotes itself as somewhere that is naturally suited for these infrastructural arrangements and the capital invested in and generated by them. But with the financial crisis a conveniently distant memory to those in the global business mindset, the emerging cultural crisis of Brexit has occupied the psyche of Irish politicians, planners, and policymakers. Just a few years after the EU forced Ireland to surrender the economic reins to manage the financial crisis, leading to the environment of austerity and intensified FDI driving the current recovery, Ireland has become the EU’s greatest bargaining chip, a position that it is more than happy to wield at both state and business levels. In 2016, the IDA released a campaign of post-Brexit advertisements parroting the arguments outlined above, emphasizing the country’s devotion to the EU and FDI in general (Irish Times, 2016), while simultaneously forwarding essentialist statistics and imagery (see Figure 5): “We are 9% redhead. We are 33.3% under 25. We are a 12.5% corporate tax rate. We are 100% committed to the EU. Ready to talk about locating in Ireland? We are. You can count on it.” Besides recourses to trust and stability, the advertisement directly associates the Irish people with profit. This coupling of pro-globalist sentiment and genetic imaginaries is revealing of a particular set of cultural and governmental pathologies that (re-)emerged after the financial crisis. If the 2007–2008 crash set off a socio-cultural crisis in the country as much as an economic one (Linehan & Crowley, 2013), leading to the return of these repressed dynamics of dependence and independence, colony and post-colony, then it becomes clear that many of the pro-development logics that continue in the country centre culture as a vehicle for profit, whether in terms of an imagined business culture or the very being of the “Irish”
after globalization. Figure 5 shows how these two spheres exist in a supposedly natural and symbiotic way, where the machine of growth is powered by promotional touchstones of “Irishness.”

**Figure 5: The IDA’s association of labour force with FDI**

These types of materials and advertisements, which circulate among investors, entrepreneurs, and policymakers and are also seen in airports, on billboards, and advertised on websites, perform transnational work toward influencing decisions and organizing resources (whether business boosters, state figures, or even just basic infrastructure). Not only do they erase the spatial and lived contingencies that do not already strengthen the case for spatial and economic development Ireland and its populace, these conditions are sold as mere generators of profit for the world-making enterprises of finance, tech, and other corporate interests.

Newsletters from *Enterprise Ireland* representative Karin Angus, who operates from an Enterprise Ireland business development office in Stockholm, provide data centre-related information. These newsletters are directed explicitly to foreign investors: “If you are seeking a design, build or fit-out partner for a smart data centre project, I would be delighted to help you identify the right company from Ireland’s world-class data centre sector. Irish companies have an unequalled track
record delivering some of the largest and most sophisticated projects in Europe in recent years.” The state itself, through its semi-state arms such as IDA and Enterprise Ireland, becomes a middle manager in this complicated landscape of operations at home and abroad, requiring an array of workers and institutions to facilitate and promote the business environment. Looking at these workers and the events they organize and attend, these cultural logics are robust and influential, reproduced through face-to-face interaction and presentation as much as reports and promotional materials.

“The future and potential of Ireland’s technology sector”

Back in Dublin on the aforementioned winter day in 2019, I was on my way to attend a panel at a data centre in Profile Park owned by U.S. multinational co-location provider Digital Realty (see Figure 6), which runs data centre operations on four continents. The event was called “The Future and Potential of Ireland’s Technology Sector.” It was “exclusive,” an industry event that had gathered a superficially impressive panel, where government and industry shared the stage: John Bruton, “former Taoiseach and Prime Minister” (which are the same thing, so the press release was not written by someone from Ireland); Dr. Michael Phelan, “lead data scientist at Johnson & Johnson, as well as the winner of the Data Scientist of the Year 2018 award”; Simon McGarr, “highly-respected EU data lawyer”; and Val Walsh, “SVP Portfolio with Digital Realty.”

Figure 6: Digital Realty’s Profile Park data centre

Source: Photo by author, 2019
When I arrived, the UK- and US-based Digital Realty employees were surprised to hear I had taken a bus. None of the non-resident employees, who told me they travelled to Ireland quite often, knew that a bus went all the way out there. Passing into the data centre itself required special authorization and two layers of security. After going through the automatic gate—complete with a no-tailgating system and biometrics—an employee pointed me toward the staircase that led to the conference space. The tech-blue reception room (see Figure 7) contrasted with the grey day and green fields outside the panoramic windows. The room was purpose-built for hosting events, and the hills of south Dublin were visible out the south window, showing off the landscape for visiting clients. A full array of breakfast foods, juices, and refreshments was laid out in the room, including a full barista station. Most of the clients milling about seemed to work in the tech space, whether in data, software, or platforms, participants in ecosystems along digital supply chains that extended far beyond data centres. There was a palpable buzz around the room, and I overheard several people mention that this was their first time at a data centre, despite dealing frequently with cloud and data hosting services. A banner read “Welcome to Profile Park – Digital Realty: Powering your digital ambitions,” with an abstract, organic tangle of tubes, pipes, and wires held in place by electric roots shooting out into nothing. This was where the tech industry came to learn about the infrastructures that supported it, and all the ideological touchstones—the social, flexible environment; the organic, naturalizing metaphors; the impressive events and free stuff—were on full display.

Figure 7: The Digital Realty reception space (left), and an auditorium at the 2019 Dublin Tech Summit (right), both lit “tech-blue”

Source: Photos by author, 2019

The resources put behind data centres by state and corporate partners were apparent, both from the private sector sponsors and public sector participants, not to mention the strategic mediation of the whole event (involving a business journalist from the Irish Independent). The panel took place in a panoramic room separate from the reception space, this one filled with couches in front of a stage. In the discussion, the panelists emphasized the sheer scale of the “data” industry
in Ireland, which constituted the entire supply chain of data companies and was estimated to be worth €10 billion to the country at the time. Comparisons to industries and resources of modernity, from sea shipping to coal to oil, abounded. Industry officials heralded the proliferation of data enterprise, the boundless potential of tech, and the necessity of data centres to activate this potential and support capital growth, and addressed concerns about GDPR and data protection regulations. By these arguments, the data centre industry is strategic and necessary for Ireland to maintain its competitiveness in the modern world.

Justifications for the importance of data centres do vary slightly, depending on the more specific role someone plays in the industry. Host in Ireland founder Garry Connolly acts as a kind of mouthpiece for the Irish data centre industry, mediating between investors abroad and interested industry groups at home. In his talks and events, he engages in the myth-making required to maintain a robust common sense argument about the need for data centres in Ireland. However, in near opposition to the Digital Realty panel, Connolly said that data centres were essentially just vehicles for FDI. But he also noted that each centre was itself an automated “software factory.” This way of speaking metaphorically, and in relation to older forms of production, was typical of how industry practitioners translated their operations to non-experts—such as Sweeney’s “data hotel” idea, the comparison of data to coal and oil, or the natural metaphors of Digital Realty’s promotional imagery. Connolly referenced the World Economic Forum’s report on the “fourth industrial revolution” (Schwab, 2016), where data-driven industries and practices were forging a new worldwide industrial environment. First it was steel, then steam, then the electron, and now the “oxygen” of the industrial revolution 4.0 would be that of the cloud. The physicality of this industrial revolution lived in data centres.

Connolly reiterated that Ireland is a gateway to Europe for these global operations, acting as a threshold for American businesses to enter European markets and vice versa. In this way, he saw its potential as a pressure gauge for the tech economy, especially now that Ireland was a “data centre centre.” Companies “trust” Ireland. This was something that was reiterated to me across many of my field visits and conversations. Bruton, on the Digital Realty panel, argued that “confidence” between U.S. multinationals and Irish business culture came from diasporic links across the Atlantic, between “people who crossed the Atlantic” and those who “stayed at home,” even if those at home had not quite built the local entrepreneurial culture required for this to be a totally two-way benefit—as the Irish state and its businesses have been hospitable to multinationals while the local sector plays second fiddle. Ireland uses its indigenous creative power, American goodwill, and friendly relations with Europe to ensure its place in the global economy, even as crises such as the financial downturn and subsequent recession may have reduced faith in homegrown capabilities. Bresnihan’s idea of the “soft power superpower”
describes Ireland’s ability to occupy any promotional mould—as reflected in the above-mentioned identity-based campaigns to attract FDI and promote Irish business culture. It is no coincidence, then, that Taoiseach Leo Varadkar’s Strategic Communications Unit, the spin department of Fine Gael (the ruling party at the time of writing), came under fire as “Goebbels-territory” (Clarke & Leahy, 2018, para. 1) propaganda by opposition critics and was forced to dissolve.

Connolly’s self-conception of the industry situates data centres within older forms of investment, economic development, and industrial organization, despite their increasing modularity (short life cycle, purpose-built for obsolescence), exponential drain on public infrastructure (enormous energy demands and need for roads, cables, pipes), and automation (meaning less workers) (Irish Advantage, 2017). In spite of these obvious limitations, the data centre sector has been put forth by state-commissioned reports as a post-crisis recovery success story (IDA Ireland, 2018; see also Allen, 2019). Pro-business attitudes, policies, and planning frameworks have attracted a strategic industry generating so much investment that it should be even further deregulated to ensure its robustness, as is the case with the proposed 2017 Planning and Development Act data centre amendment (Government of Ireland, 2017). In this way, Digital Realty’s business model demonstrates an overlap of property market logics (at the heart of the 2007–2008 financial crash) and the digital economy. It is a company that builds available space, with the capacity for hosting technical equipment, which is then built out by companies renting this space. And despite having secured planning permission to build an additional facility in the lot adjacent to the one hosting the event, several of the server rooms remained completely empty when we toured them, conjuring disturbing ghosts of Ireland’s previous vacant property crisis (O’Callaghan, Boyle, & Kitchin, 2014).

What was remarkable about the Digital Realty event more broadly is the projection of how “hosting” and hospitality cut across lived and technical worlds, from the manufactured warmth of the event to the warm hum of data in the active server stacks. Not only does Digital Realty host company data but it can also host other companies’ employees, who are often in Ireland only part-time or occasionally for quality control, in offices, technical stations, and conference rooms. Whatever the case for the companies hosting there, there were reportedly less than ten staff on hand at any time in 8,000 square feet of data centre space. Compared to the level of investment and infrastructural resources required to power a data centre, and the fact that jobs are put forward as a strong argument for the data economy, this lack of workers is stark. With such obvious vacuity, policy reports praising the jobs and opportunities created by data centre development seem clearly misguided. But within the aforementioned “industry,” the dispersed network of actors have in fact generated quite a sophisticated—if dis-
tributed—ideological apparatus that facilitates the reproduction of these arguments.

**Soft power and education in corporate environs**

Events such as “The Future and Potential of Ireland’s Technology Sector,” similar to the IDA and Enterprise Ireland’s advertising, institutionalize a particular view of industry through the lens of the Irish nation-state formation. However, Digital Realty is not an Irish company (except for tax purposes), and most of the employees that day had come from offices abroad. The transnational arrangement of an industry posited as *Irish* reminds us of the concrete ways in which people, ideas, and services travel across national jurisdictions, and how the particular formations of power that are enacted and often crystallized through these travels represent the residual structures of the nation-state as the determining formation of the economy, power, and subjectivity. The “industry” is here mobilized as something that can come under the umbrella, however conveniently, of the Irish state. However, as outlined above, the data centre “industry” is dispersed, and requires knowledge mobilization to coalesce its tangled strands in order to harmonize with constantly changing state (or supranational) regulations, standards, and practices. This knowledge sharing occurs at events, conferences, and through emerging educational systems.

Sleepless, a data management company based in a shopping centre in Galway, acts as a middle agent between companies and Dublin-area data centre providers such as Equinix. They rent out a significant amount of space for their clients, all while using Microsoft cloud platforms. These small companies serve as rental agents for server space, acting as a middle agent in a supply chain of data facilitation, all the while existing in the crosshairs of increasingly stringent data protection laws in the EU (e.g., GDPR). Some of these companies and data centre providers, at least in their statements to me, are not highly concerned, despite Ireland’s traditionally lax data protection laws (Vincour, 2019). Rather, they see the GDPR as forcing a disorganized industry to standardize, which for better or worse, will prevent costly uncertainties and mistakes across companies and clients in the future. GDPR and Data Protection Compliance Officers are becoming more in-demand positions at companies and as independent contractors, and Ireland is under pressure to become a data protection hub at the state level with so many tech companies hosting their European operations there.

In a resonant case, the U.S. government demanded that Microsoft turn over emails held in its Irish data centre (Lillington, 2017), violating Irish “territorial sovereignty” but also a familiar stretching and variegation of boundaries along strategic lines for powerful government and corporate interests. Industry groups like Host in Ireland form to aid companies in adapting to the complex and changing data landscape, as an “industry-led initiative specifically developed to generate
awareness and recognition of Ireland’s benefits as an optimum location to host digital assets.” CEO Connolly himself presents on panels at industry conferences, on topics ranging from basic data centre investment to Ireland’s special benefits to the impacts of Brexit, GDPR, and, more recently, COVID-19. At the 2019 Dublin Tech Summit at the Royal Dublin Society in Ballsbridge, Dublin, there were similarly several current and former government officials and company representatives presenting on GDPR regulations, and how to get around them. Attendees were told ways in which to get around the measures put in place to ensure the (more) ethical use of consumer data and repeated throughout the conference were claims that data is the new gold, oil, or other kind of natural resource. If you did not innovate and optimize your usage of data, you would be left behind, but make sure not to get caught doing anything unsavory.

These strategies—enacted through semi-state organizations, transnational civil society, and liberal media organizations—have very particular effects, and industry conferences may be one of the most telling examples of how soft power is enacted across state and private spheres (see Johnson, 2019). Take not only the yearly Dublin Tech Summit (supported by both semi-state and private funders) and the like but also the more specifically data centre-orientated expos, trade shows, and conferences held by transnational organizations such as Datacloud across the world (with yearly events in Dublin). These companies and conferences explicitly geared toward data and tech are only part of a larger landscape of subcontractors and services, constituting both state and corporate actors, and replicating the imagery and rhetoric of these industrial initiatives more broadly. Connolly urged me to attend the 2019 National Construction Summit at Citywest Business Park, a data centre hub, to get a real sense of how the industry actually operated, demonstrating the recognition of the construction and engineering sector beyond the usual tech entrepreneurs and investors. But logics operating across Irish governmental and semi-state organizations promote as much as from private interest groups and corporate propaganda, which coalesces to further the vision of Ireland as a space ripe for capital.

Industry events are places where the industry shares information with itself, and oftentimes they are places to publicize new developments. But it is in the education sector that the data centre industry has been seeing its most significant reproduction of a specialized workforce. Programs have been established, such as the Bachelor of Engineering in Data Centre Facilities offered at the Institute of Technology Sligo, designed with input from Google, Microsoft, and Facebook, or the AWS Educate program that partners with local technical universities (often literally across the street from data centres, as in programs funded by AWS at the Institute of Technology Tallaght) to increase cloud proficiency and train a workforce of data centre engineers. The robustness of these programs is up for debate, and the job metrics have yet to be released, although it would seem doubtful that
there are enough jobs in the sector (considering the low employment per data centre operation) to merit such an educational roll-out. Regardless, the number of these programs has grown in recent years.

So while many argue that such a heavy reliance on FDI into tech services is a fragile strategy of attracting companies through pro-business planning, tax incentives, and an often enthusiastically collaborative array of companies and institutions to facilitate landing in Ireland, the reality is far more complicated than mere tethering to the US. The fact is, these big tech companies have been in Ireland for a long time, Apple since 1980 and IBM since 1956. While these relationships have been explicitly extractive, this tethering nonetheless goes both ways. Their corporate culture has permeated the social and political fabric of the country, but their particular operations are also tied into long-term contracts with Irish energy producers (see Bresnihan & Brodie, 2020), rely on the training programs and labour of many Irish institutions, and have deep knowledge and connections within the regulatory environment. These “incursions” are not somehow fully external to the Irish state, parachuting in unannounced; rather, their myriad partnerships, pushes, and negotiations with the Irish state mean that their presence has become somehow endemic to how the state operates, not to mention to how people do business there and how people learn to work in an increasingly data-driven marketplace.

Despite the pervasive naturalization of these logics, keeping track of how they directly instantiate lets us see the “operations of capital” (Mezzandra & Neilson, 2017, p. 187) as they play out, allowing us to see this as capital hitting the ground. But as this article demonstrates, this is not a unilateral process. The expertise, the training programs, and the contracts these companies have with the state tie them into a longer-term relationship. The so-called ripple effects are not only some manner of prosperity or global hopefulness but rather a pervasive logic of entrepreneurialism at the mid-level of data solutions providers, managers, semi-state organizations, construction and engineering firms, and the other actors and agencies that populate this transnational landscape, exerting their own influences and employing Irish “soft power” to leverage more.

Conclusion
At first glance, some of the information presented here may map out an industry similar to any other industry, and in many ways this is true. However, the low and mid-level managers and entrepreneurs—the on-the-ground figures of the data economy—are integral to how the field is conditioned to accept data centres as a necessary and even beneficial business venture for a particular place. Fieldwork, while a useful method for muckraking and mapping out stakeholders, cannot answer for all of the nuances of subjectivity, the messiness of politics, nor the ways in which value is extracted from an environment. Echoing Lisa Parks, Lindsay Palmer, and Daniel Grinberg’s (2017) reflections, “fieldwork coincides with an interest in understanding how material conditions, location, difference, and power
hierarchies function as part of media cultures” (p. 99, emphasis in original). While they turn their focus to a more traditional ethnographic subject, those who lack access to reliable technological infrastructure, this research tries to understand how the emplaced and cultural factors among those working as mid-level managers in wider tech supply chains—somewhere between the super-rich/ultra-powerful and the quite poor/marginalized—affect how they work within and engage with the culture of tech and data centre development. This is a study not from below, nor a view from on high, but of somewhere in the middle.

This pervasive middle operates across the diverse locales of supply chain capitalism. Yet, there tends to be a kind of top-down or ground-up dialectic to how global economic formations function. With obvious exceptions, there is still the tendency to either look at how a company such as Microsoft is planning to corner a market or unleash a new “green” strategy, and/or look at how vulnerable communities or consumers feel, relate to, or react to these top-down strategies and technologies. But this mid-level comprises the foot soldiers of the data economy, and their training programs, corporate cultures, and the everyday reproduction of these logics and knowledge has enormous implications for the global circulation of data and the extraction of value from its operations.

The stakes of the knowledge and material conditions produced and reproduced through these logics have massive and deeply felt effects and affects. From Sweeney’s description of data centres as “hotels” to Digital Realty’s framing of tech within a specifically Irish industrial formation to Connolly’s insistence on data centres as factories—each instance articulates a particular way in which data centres could benefit not only data hosting companies but how they provided crucial services somehow beyond their metaphorical value. They employ and benefit from formations such as soft power and direct state partnership. However, as this article also argues, culture, knowledge, and subjectivity are not as formally set-in-place as state and corporate metaphors present them. Unpacking the top-down view of a global industry and where it hits the ground is crucial, and it is what this research sets out to map, analyze, and define. But sometimes this global picture is too complex, and its actors too tenuously (if impactfully) interconnected to productively map, setting them into place discursively while the relations of state and capital adapt to innovate and optimize their control and management of an increasingly turbulent set of environmental conditions through the manipulation of the social and the cultural. Understanding the logics by which these processes occur promotes a project that both understands how powerful they are in shaping productive and social forces. The stakes of speaking with executives and officials go beyond knowledge mapping. They concern the stakes of knowledge (re-)production and the spatial, political, and environmental transformations this knowledge can enact.
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Notes
1. Ireland’s “liberal” society and its influence abroad via cultural and migratory legacies contributes to this high ranking (Soft Power 30, n.d.).
2. This concept came about in a personal conversation.
3. Enterprise Ireland promotes the Irish business environment abroad, while the IDA aids and facilitates foreign direct investment in Ireland. Culture Ireland promotes Irish cultural production and funds events like festivals, talks, and conferences abroad.
4. Sustained analytical literature on this transformation is short, but see Smart MBS (2018) for a statistical analysis. See also Allen (2019).
5. Personal conversation with the author.
6. For example, the Wild Atlantic Way—a tourism campaign promoting the west of Ireland as a scenic route for tourists—also mobilizes essentialisms of the country’s fundamental “wildness” coupled with warm hospitality and deep cultural heritage. The campaign was masterminded by John Concannon, former head of Varadkar’s Strategic Communications Unit.
7. List email to personal email address.
8. Info forwarded in personal email exchange.
9. Personal conversation with the author.
10. The number of workers on-hand was overheard in murmurs by attendees and employees. The 8,000-square-feet number was taken from Digital Realty’s website. The website does not list workers besides 24/7 security staff.

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Staking a Claim: Mineral Mining, Prospecting Logics, and Settler Infrastructures

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ABSTRACT

Background: Various jurisdictions around the world have adopted online mineral staking platforms, designed to create a seamless process for acquiring mineral rights. This article considers how territory is mediated through staking practices and emerging digital prospecting procedures by tracing the implementation of Mineral Titles Online, Canada’s first web-based mineral title interface.

Analysis: The article draws on archival materials, explores legal cases, and analyzes the staking application to examine how this practice reconstructs settler colonial logics.

Conclusion and implications: The staking application operates as an infrastructure of ongoing colonial extractivism, yet is open to various forms of political intervention—as demonstrated by communities who undermine its intended use.

Keywords: infrastructure; extraction; geomatics; software; settler colonialism; Indigenous jurisdiction

RÉSUMÉ

Contexte : Diverses juridictions dans le monde ont établi des plateformes en ligne pour gérer les titres miniers; ces plateformes sont conçues de manière à faciliter la revendication d’un titre. Cet article considère les effets sur le territoire qu’ont les demandes de droits miniers et les récentes procédures en ligne pour faire ces demandes. Il le fait en examinant la mise en place de Mineral Titles Online, la première interface en ligne au Canada consacrée à la gestion de titres miniers.

Analyse : Cet article passe en revue du matériel d’archives, explore des affaires judiciaires, et analyse le processus de revendication d’un titre afin d’évaluer dans quelle mesure les plateformes pour gérer les titres reproduisent une logique de colonialisme de peuplement.

Conclusion et implications : Le processus pour déposer une demande de droits miniers perpétue un extractivisme colonial tout en restant exposé à diverses interventions politiques, tel que démontré par certaines communautés qui parviennent à miner le processus désiré.

Mots clés : infrastructure; extraction; géomatique; logiciel; colonialisme de peuplement; juridiction autochtone

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Land theft is currently driven by an unsustainable, undemocratic, and fatal rush toward mass extinction through extraction, development, and capitalist imperatives. It is further enabled by a racist erasure of Indigenous law and jurisdiction.

—Yellowhead Institute (2019a, p. 8)

Good mines are rare golden eggs which a nation must protect with great care.

—Eugène Coste (1885, p. 13)

To stake a claim is to signify a relationship of possession or to declare a right to something. Often used figuratively, the expression grew out of mid-nineteenth century gold rushes, when prospectors registered claims to a plot of land and the minerals contained within it by marking it with stakes. Prospecting is both a practice and a form of rationality, where extractive and possessive logics of colonialism fuse with projective and accumulative operations of capital. While staking a claim refers to an event, maintaining this possessive relationship takes a great deal of work (Moreton-Robinson, 2016). Colonial governments have, for hundreds of years, gone to great lengths to encourage, manage, and scale these geo-social relations through the development of various settler infrastructures (LaDuke & Cowen, 2020; Simpson, 2014; Spice 2018; Yusoff, 2018).

This article examines how settler colonial logics of possession and extraction are being reconstructed through digital infrastructures by analyzing the history of territorial mediation through mineral staking and the implementation of the first online staking system in Canada: Mineral Titles Online. This application was introduced by the provincial government of British Columbia in 2005. As a web-based registry and staking interface, it remediates earlier prospecting practices of ground staking. Integrating geoinformatics and e-commerce, it enables users to stake a claim to subsurface mineral rights remotely and at a low cost, with the click of a button. In a land rush reminiscent of the gold rushes of the nineteenth century, Mineral Titles Online received 2.5 million hits in its first week of operation. It led to a fourfold increase in total land staked from the previous year—from 1.08 million hectares in 2004 to 4.87 million hectares in 2005 (Clogg, Richie, & Lehrer, 2013).

Territorial mediation has been taking place through mineral staking procedures for hundreds of years. Since the early 2000s, across Canada and around the world, various jurisdictions have digitized these processes through online mineral tenure systems. These interfaces are designed to create a seamless experience for acquiring mineral rights. Mineral Titles Online does this through attempting to reify settler colonial constructions of space and erase Indigenous jurisdiction and with it, the contested status of land title in British Columbia, where the vast majority of land is not covered by treaty. The transition to web-based systems has
made it easier and cheaper for exploration companies to stake subsurface rights to remote lands in a centralized manner. Relying on subtending legal, regulatory, and information architectures, these computerized systems change the terms of access to land for extraction.

This article draws on industry journals, legal cases, archival sources, and an analysis of the online staking interface itself to interrogate the logistical politics of settler colonial territoriability that are taking shape through these infrastructural arrangements. Staking practices and their online interfaces are key sites for analyzing the role of logistical media in extending and intensifying the frontiers of extractive capitalism, as well as the practices and strategies mobilized by communities seeking to contest them. By bringing work on mining, settler colonialism, and critical Indigenous studies into conversation with scholarship on media, infrastructure, and software studies, this research traces how extractive settler colonial regimes, largely configured at the provincial level while appealing to global markets, are being reconstructed and maintained through online platforms. While the rise of platform capitalism has seen the concept of extraction expanded to describe the mining of data as raw material, this article considers how the materiality of what has correspondingly been termed “literal extraction” (Mezzadra & Neilson, 2017, p. 4) is being mediated by infrastructures of software-enabled property registry.

Online staking interfaces in Canada are a result of long-standing settler colonial land politics and prospecting practices. Before analyzing Mineral Titles Online, this article outlines the role of prospecting within the imaginaries and infrastructures of both settler colonialism and the mining industry. It then turns to the history of the Fraser Gold Rush to illustrate the foundational and ongoing co-constitutive relationship between mining claims and colonial assertions of sovereignty. Geographer Dawn Hoogeveen (2016) has described mineral staking practices as “everyday enactments of British sovereignty steeped in settler colonial structures” (p. 103). This article attempts to extend this argument, illustrating how everyday enactments of colonial jurisdiction are reconstructed in the design and use of Mineral Titles Online, through which assertions of Crown sovereignty and the disregard of Indigenous jurisdiction are enacted with the ordinary act of clicking a button.

Settler colonial infrastructure
Patrick Wolfe (2006) has described settler colonialism as a structure rather than an event, comprised of various violent logics and strategies that persist and transform over time. Settler colonialism, with the logic of elimination as its organizing principle, “destroys to replace” (p. 388). As a structure, settler colonialism operates through various infrastructures. These infrastructures are the material base and form that carry out and subtend settler colonial strategies and attempt to uphold their continuity through time. They also make claims on territory and seek to undermine inherent Indigenous jurisdiction. While structure, in Wolfe’s (2006)
formulation, refers to complex social formations and logics, attending to settler infrastructure involves charting material arrangements. Settler colonial infrastructures are sites where the logic of elimination takes shape through diffuse networks of power and is maintained in embedded symbolic, affective, and material ways. They are also, however, sites of discontinuity, contingency, and sabotage: often falling short of their own intended functions as well as being vulnerable to various forms of undermining.

Studies of infrastructure find their most common referents in transportation, energy, water, waste, and communications. In much of this work, infrastructure operates not only as the object of analysis but often as an analytic or method. Lisa Parks and Nicole Starosielski (2015) suggest the adoption of an “infrastructural disposition” (p. 5) in media studies, characterized by an emphasis on materiality and the relations of distribution, that attends to enabling conditions and how social reality is built and organized. Their approach is key in considering how the digital infrastructures of online staking—as a system that logs, stores, and distributes mineral rights but also classifies and manages geological information—operates. Mineral Titles Online hosts systems of classification, management, and archiving that materialize jurisdiction through providing access and rights to land. To think infrastructurally is to see how sociotechnical formations and spaces have “emerged, changed, and been layered upon one another over time” (Parks, 2015, p. 357). In this way, infrastructural analyses of power relations diverge from idealist or liberal additive theories of power that see the extension of rights, recognition, and formal equality before the law as adequate measures to address histories of dispossession, racialized oppression, and other forms of subordination. Critical Indigenous studies scholars have long articulated critiques of liberal theories of power that resonate with those now often found in infrastructure studies. Liberal theories of power as manifested in the politics of recognition have been widely criticized by critical Indigenous scholars and activists (Coulthard, 2014; Hunt, 2014; A. Simpson, 2014; L.B. Simpson, 2017). Mushkegowuk (Swampy Cree – Constance Lake) scholar Michelle Daigle (2019) argues that the politics of recognition often manifest in performances of remorse that are “severed from a larger terrain of settler colonial violence” (p. 5) and dispossession in ways that depoliticize Indigenous-settler relations. The spectacle of rights and recognition obscures the ways that power is materially sedimented in relations mediated by infrastructure. While the state posits that reconciliation through recognition can lead to a “renewed relationship” with First Nations, attending to infrastructural conditions—whether a lack of infrastructural provisions, such as drinking water and telecommunications, or the imposition of extractive infrastructures, such as mines, powerplants, or refineries—lays bare how settler colonial power is established, sedimented, normalized, and maintained.

Struggles over extractive infrastructure have been central to political struggles across Canada in recent years: from Coastal GasLink’s incursion onto Wet’suwet’en
lands and the Trans Mountain bitumen pipeline and tanker project in the West to the Ring of Fire mining developments and Muskrat Falls hydroelectric megaproject in the East. For industry and government, these projects are cast as imperative to the health of the national economy. For those engaged in struggles for energy and climate justice, they are key sites where the future of national energy systems and climate commitments are unfolding. These discourses often overshadow, however, the underlying issue that the Canadian state assumes its unilateral jurisdiction over national infrastructure on unceded lands that are, in practice, governed by multiple Indigenous jurisdictions (Cowen, 2018). Both prior to and following confederation, physical and legal infrastructures have been entwined in a circular and reinforcing relationship at the “center of violent relations of rule, materializing settler colonial jurisdiction” (Cowen, 2018, p. 17). Legal infrastructures play a key role in this colonial field of power, not only in disproportionately criminalizing and targeting Indigenous and racialized people but also in the very claim to authority on which settler law rests and enacts. That is, its claim to jurisdiction. Cowen (2018) powerfully demonstrates the foundational link between jurisdiction, settler colonialism, and infrastructure in the Canadian constitution. The confederation relied on infrastructure—specifically the transcontinental railway—to be realized, and the document that wrote it into being, the Constitution, gave the federal government jurisdiction over national infrastructure (see LaDuke & Cowen, 2020).

In order to theorize the multiple and often competing sources of legal authority, scholars have turned to the concept of jurisdiction (Dorsett & McVeigh, 2007; Mawani, 2018; Pasternak, 2017). As opposed to sovereignty, which refers to the possession of ultimate or supreme legal authority within a defined territory, jurisdiction denotes the authority to exercise legal power. Where sovereignty reinforces notions of uniformity and coherence, analyzing colonial power through the lens of jurisdiction points to the limits of legal control and the existence of multiple competing foundations of law (Mawani, 2018, p. 24). A focus on jurisdiction reveals spaces of colonialism as patchy, made up of imperfect legal geographies where full territorial control is not realized in coherent or complete ways (Pasternak, 2017). Legal scholars Shaunnagh Dorsett and Shaun McVeigh (2007) explain that “an exercise of jurisdiction is always an exercise of a technology, or an assemblage of devices, that authorizes law in a general sense” (p. 12). Infrastructures often mediate and materialize these jurisdictional claims to authority in ways that are uneven across space and open to forms of contestation. Attending to the mechanics of mineral claim staking and the interface of Mineral Titles Online, this article argues that the architecture and use of claim staking platforms functions as part of the machinery of state jurisdiction that participates in a broader strategy of capitalist extraction and the colonial dispossession of Indigenous lands.

While the focus here is on the contested nature of mineral lands and the colonial forces that bolster mining economies, it is important to note that Indigenous
nations and peoples have varied relations to mineral development. Many communities collaborate actively with the mining sector, as mineral resource development can provide an opportunity to derive economic benefit to fund essential services and infrastructures (Cameron, 2015). At issue here are the mechanisms through which settler colonial infrastructures—specifically, online mineral claim staking applications—seek to undermine Indigenous jurisdiction and consent over where, when, and under what conditions such developments take place, as well as the kinds of unsustainable and unjust relations such arrangements build into the world.

**Frontier visions and prospecting practices**

Vast infrastructures support the mining industry within and beyond the borders of Canada. There are various stages of the mining cycle: mineral exploration, mine development, extraction and closure. Online staking applications intervene in exploration, the first stage. Given the non-renewable nature of mineral deposits, constant mineral exploration is key to reproducing the conditions for mine development and extraction. For this reason, it has been referred to by the industry as “the lifeblood of mining” (Hemmera Envirochem Inc., 2016, p. 3).

Mining is increasingly governed through supply chain management. Exploration is considered the first stage in the “mineral value chain” (Zuñiga, Wuest, & Thoban, 2015). In this phase, prospectors and exploration companies seek to map the location and makeup of mineral deposits and acquire the required permitting and proprietary rights. Mineral Titles Online intervenes with respect to both steps; it mediates the licensing process and also offers users a range of geographic, mineralogical, political, and social information regarding the likelihood of developing a successful mine. Online staking applications make the exploration stage cheaper and easier for prospecting and exploration companies by consolidating communication across various governmental, corporate, and scientific bodies. Similar to online staking applications in other provinces and territories, Mineral Titles Online recodes flows of geological and political information and automates the distribution and record-keeping of mineral tenure rights.

Online staking applications perform the everyday operations of what Anna Tsing (2004) has described as the “magical vision” of frontier cultures. This speculative vision “asks participants to see a landscape that doesn’t exist, at least not yet” (p. 68) one that must be continually reproduced by erasing and dispossessing other residents’ rights, creating in their place “wild and empty spaces where discovering resources, in place of stealing them becomes possible” (p. 68). The magical vision of frontier rationality is a key operation of mineral exploration. The term prospect finds its meaning in both the notion of looking out in space and looking forward in time. Prospecting is always in part a speculative exercise. Mineral lands and underground mineral deposits do not simply exist awaiting discovery; they must be created, cleared, and rendered through techniques of rationalization and
visualization. While all natural resource economies rely on forms of mediation to gather and plot data pertaining to abundance, availability, and use, mining requires unique forms of mediation as mineral deposits are underground and entirely out of view. They require a host of technologies to render them knowable and finances to make them extractable. These technologies are not new, they are built upon longer histories of geo-social relations.

In the centuries following European arrival in the Americas, successive gold rushes swept northward, reaching what is now known as British Columbia in the 1850s (Hoogeveen, 2018). Often marked by violent clashes between incoming miners and local Indigenous communities, these events also occasioned the development and administration of colonial mining laws (Hoogeveen, 2018). During the Fraser Canyon Gold Rush of 1858, thousands of California miners flooded into the centre of Nlaka'pamux territory. Hungry for gold, the miners disregarded local laws, committed sexual violence against Nlaka'pamux women, and disrupted critical salmon fisheries by occupying shorelines and diverting rivers (Marshall, 2018, p. 150). These violent incursions were met with resistance by the Nlaka'pamux and their allies leading to what would come to be known as the Fraser Canyon War (Marshall, 2018). Concerned about the threat American miners posed to tenuous British interests in the territory, James Douglas proclaimed sovereignty for the British Crown over the region (Loo, 1994). The following year, the first formal mining legislation was enacted through the BC Gold Fields Act, 1859 (Hoogeveen, 2016).

The Act took on its material and practical form in the establishment of the Office of the Gold Commissioner, a body that was given jurisdiction to carve up lands into mining districts; distribute mineral licenses to miners and prospectors; and record, store, and manage mineral claims and information pertaining to the geology of mineral lands.

Legal mechanisms were adopted during the gold rush period that are still enshrined in law today. The BC Gold Fields Act of 1859 established a free-entry mining regime, a system that continues to be the basis of most mining regimes in Canada and in many regions across the Americas. With it, colonial administrators granted miners the right to stake mineral claims through the distribution of mining licenses, a practice that continues today. The licenses distributed were called “free miner’s certificates” (Hoogeveen, 2016, p. 96) and were appointed in the name of the Queen of England. In this respect, when the holders of these licenses staked mineral lands, they asserted British sovereignty to the subsurface.

Free-entry mining regimes reflect an extractive ideology that privileges mining as the most valued land use. Free-entry regimes typically comprise three key elements: prospectors are given the right to freely access land in which the minerals are held in public ownership; prospectors can take possession of these minerals
through the act of staking a claim; and the right to stake and possess mineral claims often leads to the ability to develop and mine the minerals discovered (Thériault, 2019). These regimes became the customary laws of the mining camps in the California Gold Rush and tended to travel with the gold rushes across North American in the nineteenth century (Barton, 1993). In the mid-nineteenth century, British colonists in the West were far from colonial centres of power and control and without an extensive colonial apparatus or infrastructure (Loo, 1994). With this tenuous hold on authority, colonial administrators had to assert their jurisdiction carefully. In the gold fields, this led them to accommodate miners’ practices and develop regulations that reflected the free-mining tradition they had brought with them from camps in California (Mills, 2018).

Free entry is a key means through which settler colonial governments continue to support mineral extraction above all other land uses. Barry Barton (1993) explains why prospectors are given such expansive rights:

One can see the free entry system as a covenant between the mining community and the government or wider community. Historically, the covenant was that the miner would be the pioneer and would open up the wilds, the untamed and forbidding wilderness. The miner would be the first agent of settlement and would push back the frontier. … The miner would seek out and develop the resources of the new lands and would create new wealth. (p. 167)

This notion reflects a particular colonial imaginary of developmental settlement: the prospector seeks valuable minerals, the miner extracts them from the land, and together they create wealth for the benefit of the “wider community.” In this imaginary, the prospector’s freedom to traverse the land is seen as imperative to their potential to develop new mines, which is understood as being in the public interest. Here, the logic of prospecting intersects with the horizons of settler invasion, belonging, and futurity. Prospecting as a means of creating wealth is tied directly to colonial expansionism, not only because the extraction of these resources requires control over the spaces where they are to be found but also because this wealth serves as the basis for new settlements. Prospectors’ freedom and their and fantasies of expanding horizons for settlement were nightmares of invasion and dispossession for others. “Geology is a mode of accumulation, on one hand, and of dispossession, on the other,” Kathryn Yusoff (2018) writes, “depending on which side of the geologic color line you end up on” (p. 3).

Another key legal mechanism through which free-entry mining is enabled is the division of surface property rights from subsurface mineral rights. This stratification was introduced in order to optimize the use and extraction of the Crown’s vertical territory (Coste, 1885). This “split-estate” principle renders the geological
stratification of land a legal matter of property by creating two distinct categories for property and its commodities: the land’s topology and the matter contained below its surface.

The development and popularization of geology dovetailed with the colonial development of what would become Canada: theories of the Earth’s stratigraphy and inner architecture naturalized notions of Western colonial extension, providing expansionists with sights on a future transcontinental nation a rationalist basis for their imperialist impulses (Zeller, 2009). The science turned rocks and mineral lands into forms of inscriptions that could be read to reveal information about subterranean geologies and their potential as sites for the extraction of mineral wealth (Braun, 2000). The circulation of geological media, in the form of specimens and maps, was essential for mobilizing capital for mining endeavours in the provinces; they allowed investors and colonial officials in metropolitan centres to reimagine and reconstruct localized sites according to their extractive potential (Braun, 2000). Bruce Braun (2000) describes this as an instance of the entanglement of financial and geological abstraction, where “the circulation of one inscription, the geological map, permitted the circulation of another, money” (p. 25).

Geology, as a method for generating knowledge about the physical world, has been deeply entangled with imperial history, capitalist accumulation, and colonial dispossession. Under the banner of the Geological Survey of Canada (GSC), which was established in 1841 and predated confederation by almost a quarter century, numerous expansive survey expeditions were undertaken. Geologists and naturalists collected specimens, drew maps and sketches, and took measurements. These practices were driven by the desire for valuable minerals and fuels that might fund and power the British North American colonies. These practices transformed landscapes into value-bearing media. At confederation, jurisdiction over land and resources was granted to the provinces. Lacking surveys of their own, provincial mining departments relied on the federal GSC’s maps, surveys, and reports. The GSC was a significant information infrastructure that brought Canadian territory and its various qualities into communication with other forms of knowledge, including births, death, population, and health, which together formed the political rationality of the time (Zeller, 2009). As one of these inventory sciences, geology was considered a necessary field for those who sought to put the nation’s resources to use in the most enterprising and efficient way possible.

Rendering this geological imaginary operational, however, relied not only on a vertical attention but also a topological one. That is, mineral lands can only function as sites of potential wealth, and the minerals contained with them as commodities, if transportation infrastructures such as roads, canals, and ports reach them and administrative procedures manage their flow. This gave rise to the space-binding infrastructural imaginary that has been central to the Canadian national project (Barney, 2017; Berland, 2009; Innis, 1999). While geology, among other Victorian-
era sciences, naturalized Canadian expansionism, the extraction of these minerals would require the transportation and communication infrastructures of rail, canal, port, and telegraph to bind spaces together and render such lands extractable.

Colonial administration and law have played a key role in the management of settler infrastructures designed to optimize conditions for extraction. A common thread that runs through colonial documents and rhetoric from the nineteenth century to the present is an insistence that the government ought to do whatever it can to promote the discovery and development of workable mineral deposits. The techniques and strategies through which colonial governments have sought to execute this imperative have changed over time. The analysis that follows seeks to draw out the role of administrative infrastructures in mediating this relationship between colonial dispossession, capitalist accumulation, and geological imaginaries and practices. A set of technical processes have reproduced, maintained, and in many ways intensified this relationship over time. These processes are the focus of the rest of this article.

Claim staking
Prior to the introduction of online staking in 2005, acquiring secure and valid mineral rights in British Columbia required prospectors to follow specific procedures for physically staking claims in the ground, among other bureaucratic measures, such as filling out paperwork and paying necessary fees. Before setting out in the field, prospectors were required to contact the gold commissioner to obtain current mineral title information for the areas they intended to explore. The gold commissioner was then required to provide maps displaying information on up-to-date mineral titles and staking regulations, forms, and tags for making the perimeter of the claim (Mineral Titles Branch, 1999). To stake their claims, prospectors inserted wooden stakes into the ground or fashioned posts using nearby rocks and trees (see Figure 1). In order to ensure a claim was valid, metal tags marked
with identifying serial numbers would be fashioned to the posts or cairns. Prospectors recorded the area using a claim form and were required to complete a sketch of the claim on a map, submitting it to any government agencies by mail or in person (Mineral Titles Branch, 1999).

During the early 2000s, the provincial mining sector underwent deregulation, among other policy measures, as a means to bolster the mining industry. Significant interventions included the formation of Geoscience BC, a privately operated but largely publicly funded and public-facing geological science organization, and the introduction of online mineral staking (Özden-Schilling, 2014). In ground-staking procedures, modes of inscription include claim sketches and plotting maps. Online staking applications shift the site of inscription to digital cells, which demarcate the bounds of mineral tenure. Using Mineral Titles Online, those registered with the Mineral Tenure Branch as free-miners can log in, open the map viewer tool, demarcate boundaries around a claim using a shape-drawing tool, and proceed to purchase subsurface mineral rights with a debit or credit card. The system keeps an up-to-date and open ledger of current and historical mineral title information, instantaneously processing transactions and registering tenure purchases. The database and mapping tools automatically update, reflecting new acquisitions once payments are confirmed.

Mineral Titles Online not only acts as an online store for subsurface mineral claims but also as an information database, with up-to-date land titles, and cadas-

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Figure 2

tral, mineralogical, political, jurisdictional, and ecological information. The site’s map viewer (see Figure 2) enables users to navigate the application, and a sidebar displays the options for selecting and overlaying various layers of spatial data, with a zoom function that allows for different scales to come into view. The first layer listed for selection is “mineral titles,” which indicates historical and current mineral, placer, and coal titles. The next selection, “other mining layers,” allows users to overlay spatially demarcated and colour-coded information indicating the likelihood of discovering new metallic or industrial mineral resources in a given area. “Crown land layers” includes data drawn from the Crown land registry database, which has been continually expanding since the Hudson’s Bay Company first began surveying in the region in the 1850s, that indicate surface ownership, subdivision, and the lease status of land parcels. The “administrative boundaries” layer offers information on boundaries that could affect the development of future mines, such as agricultural land reserves, parks, and conservancy areas. “Private land layers” indicate the location, shape, and size of land parcels and surface land classification. “Other resource layers” include wildlife management areas, ungulate winter ranges, and habitat areas for species at risk or otherwise regionally significant wildlife.

**Mineral titles online as settler colonial infrastructure**

One of the options that can be selected in Mineral Titles Online is “First Nations,” which includes the geographic boundaries of treaty and reserve lands. By only highlighting the regions that lie within a negotiated treaty or are federally carved out Indian reserves, this layer offers an exceptionally limited and colonial view of Indigenous territory on the map. The “First Nations layers” obscure the unsettled questions of sovereignty and jurisdiction across the vast majority of the map by excluding the numerous Indigenous territories that are sites of ongoing contention and claims. Furthermore, the limited vision of Indigenous jurisdiction offered by the application can be easily ignored with the click of a button, as the interface affords users the ability to select or deselect the “First Nations layers” as one of multiple abstractable options.

Across almost all of the territory that would later become British Columbia, colonial administrators blatantly ignored the issue of Indigenous title to land (Harris, 2003). As Anishinaabe/Ojibway legal scholar John Borrows (2015) explains, this not only involved the province being “created without much regard for the land’s Indigenous inhabitants … it was created in the face of First Nations active resistance” (p. 705). This illegitimate assertion of Crown sovereignty rested on the principle of *terra nullius*: the legal the legal fiction, based on racist understandings of Indigenous land-use practices, that lands were not owned prior to European settlers’ arrival. The Supreme Court of Canada recently confirmed in *Tsilhqot’in Nation v British Columbia* (2014) that “the doctrine of *terra nullius* ...
never applied in Canada” (para. 69). Despite this, Borrows (2015) explains that “Canadian law still has terra nullius written all over it” (p. 702) because despite invalidating terra nullius, the decision maintains that the Crown holds radical or underlying title to the province. This, he argues, would not be possible without terra nullius or another similar legal principle.

Borrows (2015) refers to this contradiction as a kind of “emptiness at the heart of the Court’s decision,” where “some kind of legal vacuum must be imagined in order to create the Crown’s radical title” (p. 703). For Pasternak (2017) there is a “gap” between the “state’s assertion of sovereignty over Indigenous peoples and its legal authority to exercise territorial jurisdiction over Indigenous peoples and their lands” (p. 3). In other words, there is no legal basis for assertions of Crown sovereignty (Borrows, 2015; Drake, 2015; Pasternak, 2017). Settler governments often seek to address this gap and gain certainty regarding their claims to sovereignty through various mechanisms including attempts to extinguish Indigenous title and replace their claim to authority (Pasternak, 2017, p. 5). Despite these schemes, Indigenous legal orders continue to persist and thrive (Yellowhead Institute, 2019a). This tension reflects what Pasternak (2017) describes as a “suspended space” (p. 4) between settler assertions of sovereignty and the force and vitality of Indigenous law and territorial jurisdiction. Even on its own terms, settler sovereignty does not rest on any substantive justification; it is simply assumed and asserted. This article suggests that this metaphysical lack makes the actual operation and mechanics of settler colonial jurisdiction, and in this case, how they are mediated through digital infrastructures, particularly important because these forms of mediation are indicative of the contingent nature of these claims to authority and of possible sites to undermine them.

Online staking infrastructures install an experience of seamlessness in acquiring mineral rights. In the case of Mineral Titles Online, this seamlessness relies on the aforementioned vacuum, reproducing it in the design of the interface in a way that folds Indigenous jurisdiction into the “First Nations layers.” This is not only colonial and ideological, but it also erases the legal uncertainties that exist in regard to title. As Métis scholar Karen Drake (2015) has argued, Canadian free-entry mining legislation is incompatible with Indigenous constitutional rights because it allows for mining claims to be recorded without prior consultation (p. 186). This incompatibility is encoded into online interfaces in the mechanics of staking itself, where tenure rights can be acquired unilaterally to lands subject to ongoing or potential Indigenous claims. Mineral Titles Online, similar to other online staking applications across the country, structures the claim process in such a way that creates a seamless experience for the mineral title claimant while evading the Crown’s constitutional duty to consult.

As Shiri Pasternak and Tia Dafnos (2018) describe, British Columbia is “ground zero for ‘uncertainty’ regarding Indigenous land interests in Canada”
(p. 742) due to the fact that almost all of the territory was never the subject of treaty. Online staking interfaces hide the constructed and contingent nature of colonial jurisdiction behind seemingly benign, tabularized, and precise data points. They project an image of Crown sovereignty that does not reflect its uncertain nature or the ongoing vitality of Indigenous law and jurisdiction.

One of the key concerns raised by mining and environmental justice advocates in relation to online staking is that it makes it more difficult for communities to monitor staking activity in their territories (Clogg et al., 2013). Geologists and prospectors were previously perceptible as they traversed lands or flew in helicopters. Staying abreast of ongoing staking activity now, however, requires communities to monitor activity in the online application. To view staked claims, users must zoom in on the map to bring relevant claim data into view. This requires bandwidth often unavailable in northern and remote communities, many of those most affected by mining and online staking (P. Siebenmorgen, personal communication, October 19, 2019). Mineral staking applications’ “environment of expected use” (Light, Burgees & Duguay, 2018) is reflected not only in the design of the interface, but also in the presumption of access to high speed or affordable internet, despite the fact that such infrastructural conditions are often not extended to rural and remote communities (see Duarte, 2018; Ruiz, 2014).

By reflecting an aspirational yet non-existent colonial sovereignty where Indigenous jurisdiction is abstractable, Mineral Titles Online installs the economic image of the province it seeks to enact. The application reconstructs the land as available and open for business, performing precisely the kind of “magical vision” of frontier rationality described by Tsing (2004, p. 68) in software encoded form. Drawing out the application’s environment of expected use illustrates how it imagines its users and embeds specific interests within the coded space of its architecture. Wendy Hui Kyong Chun (2005) and Alexander Galloway’s (2012) work on software as ideology is also useful in this analysis. The link between software and ideology is suggestive not only of the notion that value systems are laden in socio-technical systems but points to the ways in which software installs the hierarchy of relations that it performs, interpellates users in its interface, and, in turn, compels users to perform those hierarchies by using them. What is at issue with users navigating the map viewer, abstracting layers of spatial data, and drawing forms around claims they intend to purchase is not that they believe that the land is alienable in this way but that they interact with the system as if it is. While modes of abstraction have shaped geological practices and economies for hundreds of years, the operation of the map viewer demonstrates how this dynamic operates in an intensified way with such software systems. Infrastructures, like frontiers, involve the mediation of an imagined future, with certain subjects and beneficiaries in mind. The standards, tools, formatting choices, and omissions leave an imprint on the political and economic vision of the future of the province.
Settler colonialism operates as a socio-spatial structure that many discursive regimes work to justify, sustain, and reproduce. Hegemonic discourses, such as this one, operate in ways that cloak their ideological force under infrastructures of common sense. Software is increasingly bound up with these social, spatial, scientific, and colonial practices. Mineral Titles Online performs a kind of technical transcoding in the way it presents the apparatuses of mineral staking; the histories and work of surveying land, gathering and recording mineralogical data, standardizing records, and assembling them into a database are resolved in the software interface itself. This installs a form of false objectivity, where relations between complex spatial and colonial relations become relations between icons and buttons.

**Undermining online mineral staking**

Investing in mining exploration and junior mining companies is thought of as high-risk. Mineral exploration is a speculative enterprise, and in such endeavours, profit must be imagined before it can be extracted (Tsing, 2004). The line between the kind of investment that the government seeks to attract and the kinds of speculation it considers unproductive can be a fine one. As mentioned, Mineral Titles Online saw a fourfold increase in total land staked within its first year of operation (Clogg et al., 2013). While this seems to be in keeping with the government’s intention of decreasing barriers to acquiring mineral rights, it led to an unexpected outcome in practice. In the government’s attempt to engender a more attractive investment environment, the application opened the licensing system to more speculative land acquisition practices, termed “dead-staking,” whereby speculators purchase tracts of land without any intention of developing actual mines. Instead, buyers hold the land until commodity prices make it attractive to sell the title at a profit. This speculative practice breaks the “covenant between the mining community and the government or wider community” (Barton, 1993, p. 167), as outlined earlier, whereby the miner would develop resources and “create new wealth” (Barton, 1993, p. 167). The provincial government of British Columbia, similar to others seeking to attract investment in natural resource extraction, relies on a certain level of speculation to drive investment in new mines. In this context, however, Mineral Titles Online, by acting as a medium for abstraction and financialization, created a speculative market for mineral title that undermined the application’s intended use. As explained by a representative from the BC Ministry of Energy, Mines, and Petroleum Resources, “Where the land is held by a mineral claim that is not adequately explored, the province loses the potential for finding a mine. The land is sterilized from legitimate exploration” (Pollon, 2010, para. 5).

Speculative land staking practices are not the only way that the intended use of the online staking system has been undermined. In January 2017, Bev Sellars, former chief and councillor of the Xatśūll First Nation and author, filed an application with the province to obtain a free-miner’s certificate, logged into
Mineral Titles Online, and staked and purchased the mineral rights to the one-hectare residential property of then minister of energy and mines Bill Bennett, who was a vocal advocate of the online staking system. In a process that Sellars said took less than an hour, she purchased the rights to the subsurface minerals sitting below Bennett’s home in Cranbrook for $104.89 (Hunter, 2017). The claim gives Sellars the exclusive rights to explore the area for mineable metals, “The basic fact is, I now have a right on his property and will definitely consider all my options,” (Narine, 2017, para. 8) she explained. She stated that her claim was intended to bring attention to the ease of access that Mineral Titles Online brings to mineral staking, issuing the free miner a number of rights while circumventing Indigenous consent.

Sellars is former chair and current member of the advocacy group First Nations Women Advocating Responsible Mining (FNWARM, 2014). The group’s goal is to promote environmentally and socially responsible mineral exploration and mine development processes that respect First Nations rights and participation. As the name suggests, the group’s position is not simply anti-mining. Many of their members and members’ relatives have worked for mining companies and “have learned first-hand how the promise of riches can quickly turn into destroyed lands and limited low-paying jobs for those who have, for millennia, depended on those lands” (FNWARM, 2014, p. 5). In a 2018 interview, Secwepemc and Nuxalk activist, researcher, and FNWARM coordinator Nuxmata (Jacinda Mack) explained that members of the group bring an important perspective that informs their advocacy for responsible mining and stewardship on the basis of their relations “as women on councils or in chiefs’ positions, and as mothers, grandmothers, daughters, and sisters” (2018, p. 5). Such perspectives, she explains, enable them to recognize and seek repair for the damages brought by mining, which tends to put certain gendered bodies at risk from violence, negatively impacts non-human life, and pollutes the land and water communities depend on (Mack, 2018). Kim TallBear (2016), of the Sisseton-Wahpeton Oyate and Cheyenne and Arapaho Tribes of Oklahoma, has noted the “striking women-led condition” of many current social and environmental justice movements—from Idle No More to No DAPL to Black Lives Matter. Noting importantly that neither care nor womanhood are the domains of solely “cisgendered, biologically-reproductive women,” TallBear (2016) characterizes the role and work these leaders are doing as “caretaking their peoples and others” and ensuring the well-being of “other-than-human relatives” (para. 2). To care is to look after, often involving the provision of what is necessary for life. While feminist theorists have complicated the status of care, demonstrating its ontological and political ambivalence and the ways it can be complicit in the reproduction of oppressive conditions (Murphy, 2015; Puig de la Bellacasa, 2017), the kind of
caretaking referred to here is nonetheless vital to the constitution and main-
tenance of alternative worlds and the reparative infrastructures necessary to
sustain them (Berlant, 2016; Cowen, 2017).

Alongside its immensely important Red Paper “Land Back,” the Yellowhead
Institute (2019a) released a web-based application called the Mine Sweeper Map
(Figure 3). Playfully named after the single-player puzzle computer game where
players seek to clear the board without detonating any of the hidden “mines,”
the Mine Sweeper Map is a GIS-enabled visualization tool, currently covering Québec
and Ontario, that illustrates the location and scope of mining claims and links
them to the location of First Nations’ reserve lands. The application automatically
searches provincial datasets and correspondingly updates the map when new
claims are registered, thereby keeping a publicly accessible log of up-to-date min-
eral title claims (S. Pasternak, personal communication, November 19, 2020). In
this way, the Mine Sweeper Map undermines the intended use of the provincial
online staking applications, algorithmically drawing their data to represent the
scope and scale of mining claims. In doing so, this critical mapping project inter-
venes in the profound imbalance created by the alignment of state and extractive
interests (see Wylie, 2018) in the ways that online mineral staking interfaces vis-
ualize territory and distribute critical access to knowledge regarding claims.

Figure 3: Online mining claims

Source: Yellowhead Institute (2019b), mine-sweeper map view showing mining claims and First Nations.
Under the mineral staking regimes in these provinces, mining claims and the consultations that result from them take place one by one. Extractive projects are approved on a “block-by-block” basis, yet communities and ecosystems do not operate in such fragmented ways. Land alienation, ecological fragmentation, and degradation from infrastructural projects and extractive economies are interconnected and compound over time while the aggregate of issued mining licenses to private companies alienates Indigenous land and title areas. The lack of transparency about the cumulative impacts of extractive industries is one of many mechanisms that undermine free, prior, and informed consent (Yellowhead Institute, 2019a). While multiple settler infrastructures work to leverage the scope and scale of extraction, the compounding character of ecological effects and colonial incursions are hidden from the view of affected communities, undermining their ability to make informed decisions about land use and extractive projects on their territories (Yellowhead Institute, 2019a). Thus, visualizing “the scope and scale of extraction,” as the Mine Sweeper Map does, politicizes the problem (Yellowhead Institute, 2019a, p. 30). Michi Saagig Nishnaabeg scholar, writer, and artist Leanne Betasamosake Simpson echoes this understanding in reflecting on her collaboration with Elders on a land-use mapping project for Long Lake #58 First Nation: “Laid out in a visual way, the magnitude of loss cannot be explained away, the strategic nature of colonialism cannot be ignored. The driving force of capitalism in our dispossession cannot be denied” (2017, p. 13).

Conclusion
Canada is the epicentre of the global mining industry. Not only are 75 percent of the world’s transnational mining corporations headquartered in Canada, the country is also at the centre of global mining finance (Deneault & Sacher, 2012). Canadian extractivism is by no means limited to its own territorial bounds. The extractive ideologies and practices that have taken shape throughout Canada’s settler colonial history—whether through geological and financial expertise, software design, or governance—have reach across the globe, bringing toxic environmental, cultural, and political legacies with them. Settler colonial extractivism and its infrastructures not only affect the politics of land and life in Canada but also around the world.

Settler colonial regimes are co-produced in relation to the global political economy of capitalism, and the policies and platforms that govern them are tied into international strategies of accumulation (Pasternak & Dafnos, 2018). While the discussion here is largely limited to how digital mineral staking carries forward and reconfigures settler colonial territoriality, it is important to note that this form of mineral tenure management is used across the world. The World Bank Group has actively supported the adoption of computerized cadastre systems in a number of so-called developing countries (Ortega Girones, Pugachevsky, & Walser, 2009). In
many cases, private geoinformatics companies own and operate these platforms, posing troubling questions of ownership and control. These software systems—in a similar way to infrastructural conditions such as roads, power, and telecommunications provision—are promoted as necessary technologies for rendering lands attractive for capital investment in accordance with international standards and for making a country’s resource sector competitive in the global mining sector. In this way, they have a centralizing and standardizing effect on regulatory regimes, geoinformatic representational practices, and the terms of access to land for extraction. Online staking systems are a key piece of digital infrastructure for the global mining industry, which is increasingly investing in geospatial analytics, artificial intelligence, and forms of automated labour (see Arboleda, 2020).

The notion of staking a claim is definitive of not only settler colonial logics of (dis)possession but also extractive and unsustainable relationships with land and non-human beings. The stakes of rethinking extractive relations could not be higher. Charting historical and present entanglements of settler jurisdiction and its extractive infrastructures—roads, canals, and bridges and also bureaucratic procedures, regulatory regimes, and software—reveals both the violence and ordinary quality of these fields of power. Infrastructures assert a normalizing force, often inscribing hegemonic power into sociotechnical and spatially distributed systems, where it is reproduced in everyday acts, assumptions, and forms of forgetting. The embedded nature and scale of these unsustainable and unjust relations can make imagining a future without them a daunting task. In this context, infrastructures, as sites where futurity is materially and ideologically negotiated and struggled over, demand critical, creative, and persistent attention. That is, to undermine extractive settler futurity and its radically unsustainable relation to planetary life requires contesting its infrastructures.

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Notes
1. Newfoundland and Labrador, Nova Scotia, New Brunswick, Ontario, Québec, Manitoba, Saskatchewan, and Nunavut have also introduced online mineral staking.
2. This understanding of territory is informed by Stuart Elden’s (2010) account, which conceives of it as a political technology reliant on a range of logistical and cartographic techniques—such as land surveying, navigation, and visualization—that emerged alongside political-legal relationships...
of sovereignty, jurisdiction, and authority. This conception is insightful for its insistence on the dependence of territory on various epistemological and juridical techniques.


4. The term undermine, used here to describe the unintended uses of online staking systems, is drawn from the work of art critic and curator Lucy Lippard (2014). She uses the term as the title of her book on the changing relations of land, art, and aggregate mining in New Mexico, explaining that it operates on many levels. She literally describes the pits and shafts that alter landscapes, capturing “what we are doing” to land “when greed and inequality triumph,” as well as the possibility of subversion, that is, “undermining as [a] political act” (Lippard, 2014, p. 2). Undermining as a political act operates in a similar way to sabotage. In the case of undermining the intended use of online the applications, the examples here demonstrate that subversion is open to both capitalists seeking to leverage value as well as activists such as Sellars seeking to undermine and redirect that value. The ambivalence latent in such technologies is what opens them to forms of sabotage or undermining (Barney, 2019).

Websites
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Infrastructure that Sings: Kwawaka'wakw Social Media for Wild Salmon in the Broughton Archipelago

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ABSTRACT

Background: As an exercise in decolonizing infrastructural approaches to communications, this article applies the framework of “Two-Eyed Seeing” to the example of Kwawaka'wakw social media communications related to the occupation of fish farms in the Broughton Archipelago in 2017.

Analysis: Kwawaka'wakw social media communications worked to enact a “living infrastructure,” upholding reciprocal relations with salmon and ocean waters, in support of the mutual flourishing of the waters, salmon, and people.

Conclusions and implications: Kwawaka'wakw nations and their allies drew on social media to shift communicational channels beyond mainstream media. This supported Kwawaka'wakw in building relationships with broader publics, who helped pressure government to make change.

Keywords: Indigenous critical infrastructure; Social media; Kwawaka'wakw; Orality; Living infrastructure; Indigenous legal orders

RÉSUMÉ

Contexte : Dans le but de décoloniser les perspectives infrastructurelles sur la communication, cet article emploie une approche à double perspective (« Two-Eyed Seeing ») afin d'examiner l'usage des médias sociaux fait par les Kwawaka'wakw pour communiquer sur l'occupation d'installations piscicoles dans l'archipel de Broughton en 2017.

Analyse : En communiquant par médias sociaux, les Kwawaka'wakw ont cherché à mettre en place une « infrastructure vivante » qui maintiendrait des relations de réciprocité avec les saumons et l'océan dans le but de favoriser l'épanouissement collectif du saumon, des eaux et des humains.

Conclusions et implications : Les nations Kwawaka'wakw et leurs alliés ont recouru aux médias sociaux afin de contourner les médias traditionnels. Leur approche leur a permis de rejoindre des publics plus larges qui ont aidé à mettre de la pression sur le gouvernement pour qu'il effectue des changements.

Mots clés : Infrastructure critique autochtone; Médias sociaux; Kwawaka'wakw; Oralité; Infrastructure vivante; Ordres juridiques autochtones
Introduction

This article offers a qualitative examination of social media and media communications of Kwawaka’wakw. First Nations involved in salmon farm occupations in the Broughton Archipelago, in the southwestern corner of the Great Bear Rainforest, from late August of 2017, when the first occupation began, through to the June 2018 announcement that First Nations will have active involvement in the fish farm licensing process, including the ability to refuse consent and have farms phased out.

This article does not attempt a thorough or definitive analysis of “fish farm social media” by Kwawaka'wakw First Nations. Rather, it is a preliminary effort at what practitioners of Indigenous pedagogies refer to as “Two-Eyed Seeing,” with a goal of better understanding an instance of Indigenous communications acting infrastructurally. While the “infrastructural turn” has emphasized that infrastructures are always already both natural and cultural, ethnographies of communicational infrastructures have tended to focus on hardware such as undersea cables (Johnson, 2019; Starosielski, 2015), data centres (Hogan, 2013), cellphone networks (Parks, 2015), radio and television networks (Parks, 2013), and mobile film units (Larkin, 2008). While there is a recognition that these systems are not built on a tabula rasa but rather subend a living landscape, sometimes directly overlaying Indigenous trails, trade routes, and systems of land and water stewardship (Spice, 2018), Indigenous communication systems have not received the same level of disciplinary attention for the ways that they act infrastructurally.

Through Two-Eyed Seeing, which Mi’kmaw Elder Albert Marshall explains as a decolonizing methodology that helps practitioners “To see from one eye with the strengths of Indigenous ways of knowing, and to see from the other eye with the strengths of Western ways of knowing, and to use both of these eyes together” (Marshall quoted in Peltier, 2018, p. 2), this article aims to explore the concept of Indigenous critical infrastructures as parallel to and as vital as the tacit taken-for-granted understanding of industrial hardware as the backbone of what infrastructure is.

The article begins with a discussion of methods and of Indigenous critical infrastructures. Next, it draws on a qualitative analysis of Kwawaka'wakw social media communications about salmon farms to explore how these acted infrastructurally. Following this more methodologically conventional exploration, the article switches perspectives to a second “eye.” This section takes a much longer view through generations, drawing on Indigenous worldviews in order to analyze patterns in Kwawaka'wakw communications as critical Indigenous infrastructure, of which social media expressions in the twenty-first century are but one articulation.

From this stereoscopic, Two-Eyed vision, clear patterns re-emerge over not only centuries but thousands of years: social media communications around fish farms are contiguous with a long history of Kwawaka’wakw sovereignty and legal
orders being asserted through public and semi-public performance of visual culture, song, dance, and language. These communicational patterns are made “legible” to different generations within ever-changing media assemblages and ever-shifting affordances, from pre-contact times through different iterations of Canada as a colonial and settler state. In so doing, they form part of a “critical infrastructure” supporting life in Kwawaka’wakw territories by acting to orient not only Kwawaka’wakw people but all listeners toward respectful, reciprocal relations with Kwawaka’wakw lifeworlds.

Adapting Two-Eyed Seeing to communications research

In recent decades, Two-Eyed Seeing has become a prominent decolonizing framework for collaborative research in natural sciences, and particular fisheries science, in Canada. As Andrea J. Reid, Lauren E. Eckert, John-Francis Lane, Nathan Young, Scott G. Hinch, Chris T. Darimont, Steven J. Cooke, Natalie C. Ban, and Albert Marshall (2020) describe, in common with other decolonizing frameworks, such as the Two-Row Wampum Belt, it begins from an understanding that Indigenous and mainstream knowledge systems must each be apprehended on their own terms as equally valuable knowledge forms anchored in their own ontologies and epistemologies.

This exercise is a preliminary application of the Two-Eyed Seeing framework. As Andrea Reid, Deborah MacGregor, and other Indigenous academics applying the framework to salmon and waterway management regimes make clear, to fully realize this framework requires Indigenous participation and leadership. However, as these academics also point out, the disciplinary groundwork required to realize these frameworks requires that non-Indigenous academics acknowledge and make space for Indigenous knowledge systems. In introducing this framework within a communication studies context, this article starts at a baseline level. By giving equal standing to qualitative social media analysis (a standard methodology in communication studies) of Kwawaka’wakw salmon media and to an analysis that instead frames the work done by this media in terms of Indigenous critical infrastructures, it aims to flesh out the concept of Indigenous critical infrastructures and bring it into dialogue with other infrastructural discourses within the field of communications—as a separate but equally valuable understanding of what infrastructure is. In so doing, this article strives to enact the action-oriented element of Two-Eyed Seeing as a framework that encourages knowledge co-existence and complementarity: “Knowledge transforms the holder and … the holder bears a responsibility to act on that knowledge” (Reid et al., 2020, p. 1).

The concept of Indigenous critical infrastructures helps broach how communication can act as a kind of materialization of underlying principles of Indigenous lifeworlds and legal orders. Anne Spice (2018) argues that defining infrastructure as the hardware of the settler state “leaves out … a world of relations, flows, and circulations that the settler state has attempted to destroy and supplant” (p. 49).
These circulations, too, are a type of materiality. In common with new materialism and the ontological turn, a number of Indigenous cosmologies have much broader understandings of different facets of the universe as being energetically linked, having agency, communicating/speaking, and being interrelated (Ingold, 2000; Rice, 2005). Drawing on Brian Larkin’s (2013) description of infrastructures as “the architecture for circulation” (p. 328), and Deborah Cowen’s definition of infrastructure as “the collectively constructed systems that also build and sustain human life” (quoted in Spice, 2018, p. 47), Spice (2018) argues for a more expansive understanding of infrastructure, focusing on “what underpins and enables formations of power and the material organization of everyday life in time and space” (p. 47). She cites Unist’ot’en camp spokesperson Freda Huson describing the camp and blockade as protecting the “critical infrastructure” of Wet’suwet’en territory, “the interconnected networks of human and other-than-human beings that sustain Indigenous life in mutual relation” (p. 40). Communications plays a crucial role in rejuvenating and supporting the mutual relations of this infrastructure, in which rocks, water, and other “material” entities are communicative and animate.

Social media for wild salmon

Indigenous critical infrastructures are living infrastructures. Thus, this study begins by focusing on present-day salmon media—and especially Kwawaka’wakw social media—as part of the communicational “element” of the critical infrastructure that is anchored in the role salmon plays in the lands, waters, and life of Kwawaka’wakw and other Northwest Coast Indigenous peoples.

Multiple scholars (Callison & Young, 2020; Kino-nda-niimi Collective, 2014) have noted the rise of social media as a tool for Indigenous peoples to speak back to narrative frames of mainstream media that act as an “enforcer of social orders, and in particular as tenderers of and for settler colonialism” (Callison & Young, 2020, p. 161). The rise of Facebook, Twitter, and other social media has broken the “bottleneck,” whereby a small number of mainstream outlets set the tenor for media portrayals of Indigenous communities involved in land, resource, and rights-based conflicts. In Candis Callison and Mary Lynne Young’s (2020) research, Indigenous journalists credited the Facebook Live feed as making an important difference in coverage of the Standing Rock conflict. Through social media, those involved in the conflict could share their on-the-ground reality in a forum accessible to Indigenous and non-Indigenous publics, offering not only their own narratives but opportunities for others to connect to solidarity events, contextual information, and broader networks of individuals and communities involved in struggles for Indigenous rights.

Twitter hashtags and social media networks have helped grow awareness and connect people to a number of related social movements for justice for Indigenous people, ranging from organizing around individual cases, such as the death of
Colten Boushie (#JusticeforColten), to demands for large-scale structural change, such as the Idle No More (#idlenomore) movement and movements to call attention to missing and murdered Indigenous women and girls (#MMIWG) (Callison & Young, 2020). These networks help counter “quick turnaround journalism” (Callison & Young, 2020, p. 180), not only by providing publics with fuller depictions of current events but by sharing the broader context and histories behind the particular flashpoints making the news. When certain events, actions, and disputes do not make the news at all, they also function as a “vital platform for understanding what was happening on a day-to-day basis” (Callison & Young, 2020, p. 187). As the Kino-nda-niimi Collective (2014) notes in the case of Idle No More, social media amplified “good old word of mouth and discussions in lodges and kitchen tables” (n.p.) through a richly expressive context in which articles, essays, interviews, and tweets intermingled with artworks, music, and individual stories in “personal, intimate, and dynamic ways” (n.p.).

In the case of the Broughton Archipelago, social media played a key role in a dynamic in which salmon farm occupations formed a backdrop for the dramatic public staging of a First Nations assertion of rights, culture, and legal orders with respect to salmon governance. Through social media, publics in larger population centres gained access to the experiences and perspectives of fish farm occupiers in this remote archipelago. The resulting public scrutiny led to increased pressure on governments, and ultimately to substantive change in fish farm governance within a period of months, when there had previously been little progress for decades.

**A qualitative analysis of fish farm social media: Context**

Disputes over open-net pen salmon farming in the Broughton Archipelago, a group of islands east of northern Vancouver Island, and nearby coastal areas, such as Kingcome Inlet, began long before the occupations of 2017–2018. When the farms were introduced in the nineteen seventies and eighties, local First Nations objected from the outset to their lack of involvement in regulating the farms, whose licenses are issued by the federal department of Fisheries and Oceans Canada, with the provincial government making siting decisions (Prystupa, 2018). Various issues with the farms—from infringement on Indigenous rights and title to concerns that the farms pollute the ocean and spread disease to wild salmon—were publicized through news coverage in mainstream newspapers, television shows, radio programs, and magazines; film and radio documentaries; community media, such as blogs; and through the ongoing campaign activities of environmental groups. Such campaigning includes not only social media elements but also media, policy, and community involvement components, such as supporting 35,000 streamkeepers in BC and Yukon through the Pacific Salmon Foundation’s (2020) Community Salmon Program. In recent years, the dispute has reached further audiences through a relatively new but influential form of media: founda-
tion- and subscriber-funded online magazines with a regional or national public policy or ecological focus, such as *Hakai*, *The Tyee*, and *National Observer*.

The social media “ecosystem” of communications from First Nations and their allies opposed to salmon farms overlaps with these other forms of media and contains multiple connections and cross-overs, such as that between official First Nation government communications and informal networks of circulation. This entire ecosystem grew in the wake of the salmon farm occupations; the occupations and the resulting solidarity campaigns and actions gave rise to increased traffic in existing networks and in new channels of communication. In the words of Callison and Young (2020), the “sedimentation” (p. 176) of prior journalism was ruptured. In moving beyond the structural pathways producing news stories that support existing social orders and suppress histories of injustice and colonial violence, Kwawaka’wakw social media posts helped grow new circuits for information and new narratives connecting people and communities in a “relational framework” (p. 161). These two-way communications, connections, and accountabilities shaped a different kind of public, one that was actively called on to recognize responsibilities to hold federal and provincial governments to account.

The following comments focus primarily on the qualitative observation of selected elements of this ecosystem: the Facebook page feed of the Swanson Occupation, which was mainly curated by hereditary chief Ernest Alfred of the 'Namgis, Lawit'sis, and Mamalilikala Nations and by the Maya'xala xan's Awinakola group; the Facebook page for the Musgamagw Dzawada'enuxw First Nation government’s Cleansing Our Waters initiative; and Instagram posts tagged with its associated #cleansingwaters hashtag. These were chosen as representative of the key recurrent messages and messaging forms used by Kwawaka’wakw leadership (formal and informal) that were expressed across a range of Indigenous-centred social media communications in relation to the occupations and their aftermath.

**Mediating the occupations**

From the outset, the salmon farm occupations in the Broughton Archipelago were deeply intertwined with social media and with issues of Indigenous law, rights, and title. On August 23, 2017, three days after over 300,000 farmed salmon escaped in the San Juan Islands, the Sea Shepard Society released shocking images of salmon with tumours, blisters, and swollen gills, swimming in open-net pens cloudy with fish feces at two farms in the Broughton Archipelago (Linnet, August 23, 2017). Hereditary chiefs Ernest Alfred and George Quocksister Jr. took these images. Supported by the *Martin Sheen* research vessel, they had boarded eleven fish farms in the region and lowered GoPros and other cameras attached to fishing rods into the pens. The farms are private property, but fish farm operators were reluctant to call the police on hereditary leaders present on their unceded territories.
The striking visuals, which circulated widely, further undermined already shaky public trust in government and industry narratives that disease was not a significant problem on the farms, and they stoked anger among local First Nations. The images mobilized community support for the initial occupation of the Marine Harvest Swanson Island fish farm, which began the following day and lasted 280 days. In addition to numerous solidarity visits by First Nations delegations and by dignitaries such as David Suzuki, the Swanson Occupation was supported by several shorter lived occupations spearheaded by coastal First Nations (including at Midsummer Island, Wicklow Point, Burdwood, and Port Elizabeth fish farms); by a Matriarch camp, first outside the premier’s office and later outside the office of Fisheries and Oceans Canada in greater Victoria; and by numerous solidarity campaigns and actions, ranging from protests outside government offices and courtrooms to the #GoWild4Salmon fundraising challenge, which saw people jump into frigid winter waters and post their plunge to Instagram to raise money for the occupations and related court challenges.

Social media amplified the reach of news about the occupations from the outset; a Facebook page was set up for the Swanson Occupation (n.d.) on August 26. As was the case with the footage of diseased fish, some of this media intervened in specific debates, providing new information and perspectives that influenced the news cycle. However, social media also did much more: it extended the reach of existing community networks that provided practical support to on-the-ground (and on-the-water) actions; it shared a fulsome picture of local people as not only deeply imbricated with the seascape but also as relatable, ordinary human beings existing within the everyday rhythms of their communities and not just in news headlines; it provided ‘eyes on the water’ or on land when tensions arose with police; and it continuously conveyed larger messages linking the survival of the salmon to Kwakwaka’wakw stewardship and resurgence through its displays of Kwakwaka’wakw life, visual culture, ceremony, and everyday governance.

Surveillance and witnessing
On October 17th, more than six weeks into the occupations, the Swanson Occupation Facebook page posted a press release describing a real time “escalation in tactical teams, equipment and police numbers” (2017d, para 4) as RCMP and the Department of Fisheries and Oceans escorted a ship contracted by Marine Harvest to refill salmon pens with juvenile fish. For several days prior, as the Viktoria Viking sailed north, it had prompted social media interventions such as an October 12th Instagram video post from Cleansing Our Waters (2017), in which a young Indigenous woman at the Midsummer Island occupation made a direct callout for people to boat in to observe and record the RCMP. This alert echoes the work of Standing Rock water protectors and Black Lives Matter protesters, who used livestreaming and real-time tweets and social media posts to allow outsiders
to witness, and through that witnessing possibly help curtail, escalations of state violence (Callison & Young, 2020).

The October 17th press release (Swanson Occupation, 2017d) illustrates how social media was mobilized by fish farm opponents to hold governments to account through public witnessing of on-the-ground realities. The release highlighted the previous week’s meeting between the premier, three cabinet ministers, and 40 Kwakwaka’wakw hereditary and elected leaders in the ‘Namgis Big House, and the contrast between this public display of dialogue, and police escorts for Marine Harvest. The social media alerts helped mobilize allies who then occupied the premier’s offices in Victoria and Vancouver.

**Connecting to the everyday**

On December 25, 2017, the Swanson Occupation (2017b) Facebook page posted a “Merry Fishmas” message thanking supporters, complete with a Christmas carol “O Holy Chinook,” a reworking of “O Holy Night.” The carol, which celebrates the return of salmon and their spawning, playfully reveals a deep connection to the ocean and its creatures—from starfish to salmon to eagles. It offers a glimpse into the everyday world of people who live in small villages on the water in the archipelago.

This message seems simple; yet the ongoing depiction of everyday life at occupation sites, as offered through social media feeds—including the playful, the mundane, and even the boring—is a marked contrast to the imagery of Indigenous blockades, occupations, and other protest actions prior to the social media era. For example, the iconic image and “principle photographic representation” (Wilkes & Kehl, 2014, p. 496) of the Oka Crisis/Siege at Kanehsatà:ke is the highly confrontational, militarized, ‘soldier vs. warrior’ image “Face to Face,” in which a masked Indigenous warrior, weapons clearly visible, towers over a young white soldier, with whom his gaze is locked. Rima Wilkes and Michael Kehl (2014) discuss the mainstream dominance and powerful affective impact of this image, and the multiple ways it conjures negative stereotypes of Indigenous people. Social media posts of everyday experiences at fish farm blockade sites provided a powerful affective counter to such mainstream images of confrontation. They showed fish farm occupiers as relatable people with particular personalities, everyday concerns, and friends and family who stopped by to visit. Yet in small ways—from the tendency to begin or end posts with Gilakas’la (a Kwak’wala welcome phrase) to the West Coast Indigenous art motifs incorporated on the banners surrounding the “home” space of Midsummer Island occupiers—social media posts of the quotidian offered a subtle reinforcement of Indigenous legal orders and of Kwakwaka’wakw culture’s continued liveliness, relevance, and connection to the land and sea. In the long days and weeks between newsworthy “events,” the posts foregrounded the ongoing nature of the occupations and of the larger structural conditions behind them continuing to go unaddressed.
The practical nature of some “everyday” posts offered opportunities for connection: call-outs for rubber boots, requests for supporters to join a meal train, and other small asks. These appeals provided a low bar for subscribers to Facebook and Instagram feeds to take a first step to connecting online or in person with those actively supporting the fish farm occupations. Such human connections, as well as simple, manageable asks, are key to joining the bottom rung of what Hahrie Han (2014) refers to as the “activist ladder” (p. 34) of engagement by which people link up with social movements.

In one colourful example of social media’s multiplier effect, Quin Molyneaux supported the Musgamagw Dzawada’enuxw Cleansing Our Waters project by plunging into a natural body of water every day in February with her friend Lauren. Each time, she posted a video to Instagram and nominated someone else to join the challenge by donating to the campaign and/or posting their own video with hashtags (beleaf media, 2018). Their challenge was part of the larger Go #Wild4Salmon challenge, which had begun on January 1, 2018. This campaign encouraged people to “dive in” to supporting the fish farm campaigns through taking a plunge, donating to Cleansing Our Waters, and challenging others to do likewise.

The Go #Wild4Salmon challenge, organized by Musgamagw Dzawada’enuxw Cleansing Our Waters, is one example of how salmon social media stressed a set of accountabilities and responsibilities that were rooted in Kwawaka’wakw lifeworlds.

framing Indigenous presence as persistent, with Indigenous people in an abiding relationship with the lands, waters, non-humans, and each other ... emphasizing resilience and resurgence in ways that set their stories and sources as navigating structures/institutions of settler colonialism; and ... being accountable within a framework of relations with the land and peoples, locating themselves and their stories within historical structures and relations and drawing on Indigenous knowledges and expertise. (Callison & Young, 2020, p. 161)

These accountabilities, which Callison and Young (2020) describe as consistently underlining Indigenous journalism, can also be understood as Indigenous legal orders. They are “an intervention into both media practices and narratives as well as settler-colonial systems and institutions” (p. 184), as they insist upon another way of seeing, being, and governing oneself and one’s actions within the dynamic set of relationships that make up the lifeworld. Increasingly, nuanced collaborative work is being done with and by coastal First Nations to bring these orders, including those related to marine stewardship, into focus (Gauvreau, Lepofsky, Rutherford, & Reid, 2017; Napoleon, Friedland, Lacas, & Harland, 2016). In reflecting and sharing Kwawaka’wakw legal orders, Kwawaka’wakw social media communication addressed not only individual and collective relationships to open-net pen salmon
farming but also broader issues of relationship between Kwawaka'wakw nations and the settler state.

**Nation to nation**

While the First Nations involved welcomed solidarity actions, donations, and shows of support, what they sought was a nation-to-nation negotiated solution that recognized Kwakwaka'wakw stewardship, governance, and rights within their traditional territories. These issues were centred in multiple ways in social media communications from the outset of the fish farm occupations. The video of the August 23, 2017 boarding of Cermaq Canada's Burdwood Farm posted to the Cleansing Our Waters Facebook page (Musgamagw Dzawada'enuxw Cleansing Our Waters, 2017) begins by showing a woman in a cedar hat in the front of a boat pulling up to Cermaq’s dock. In the first seconds of the video, when a Cermaq staffperson asks the delegation not to disembark due to it being an active jobsite, a man responds that this is his traditional territory and that the farm has “never been given rights to be here.” He is soon joined by dozens, from the elderly to youth, many wearing button blankets and vests, cedar hats, and other regalia. There is drumming and singing. Mothers holding their children say they have come to protect the waters for their children and their children’s children.

Young women, a demographic that played an important role in occupying the farms and supporting the occupations locally, are prominently featured in the video. One explains “It’s not part of who we are to allow this to happen. It’s a complete violation on Cermaq’s part, on Marine Harvest’s part, and the government of Canada’s part,” eloquently tying together her identity as a First Nations woman, the duty of stewardship she feels, and the nation-to-nation nature of the dispute with Canada over fish farm governance.

While mainstream media tended to focus on hereditary chiefs and other leaders, visual and verbal expressions of cultural resurgence by youth had greater prominence on social media. For example, a personal Facebook post from Ernest Alfred (2017) on October 21 tagged to the Swanson Occupation page acknowledges the contributions of youth—and especially young women—who had organized a classroom walkout in support of wild salmon. The page includes photos of the youth, many in regalia, and with some drumming, dancing, and singing. This emphasis on cultivating the next generation’s leadership, and stressing its role in renewal, is an important aspect of many Indigenous cultures and legal orders. Social media was a key place where Kwakwaka’wakw youth took a lead on the issue of fish farming, whether through artwork, memes and photos, vlogs, or written commentary from the occupation sites and at solidarity actions. For example, after a small group of young women, along with scientist Alexandra Morton, attempted to delay the restocking of smolts at the Port Elizabeth farm,
one youth posted a photo to Instagram of the group smiling with raised fists, making comments about finding unity and strength while facing down Marine Harvest and their RCMP escort, including an officer who made disrespectful comments (McIntyre-Smith, 2017). As Indigenous youth are profoundly underrepresented in mainstream media, the opportunity for youth, through social media, to “broadcast” their voice, define their experience, and share how they chose to express themselves as Kwakwaka'wakw, contributed to a process of cultural revitalization that went beyond insights and actions about fish farms.

Dancing, drumming, singing, speaking in Kwak'wala and other Indigenous languages, observing protocols, and wearing regalia were common features of social media posts of occupation supporters at fish farms, at protest actions, and in formal meetings with government and in court. For example, an August 30 post to the Swanson Occupation (2017c) page features Mamalilikala hereditary chiefs wearing regalia and demonstrating support by dancing on the front of their boat. When a delegation of Heiltsuk, Wet'suwet'en, Gitskan, and Haida leaders visited the occupations in November in solidarity, many wore regalia. They posed for a photo on the dock with fists raised. A short video posted by Carla Voyageur to Facebook live and shared to the Swanson Occupation (2017a) page on October 21 features drumming and singing at a solidarity action in Courtenay. It is captioned with awesome! Our people standing united. laxwegila — gaining strength and standing up for our title and rights and our beautiful environment which is our responsibility to look after. Gilakas'la Gilakas'la Gilakas'la.

Michelle Raheja (2010) uses the term “visual sovereignty” (p. 9) to describe how Indigenous filmmakers have reimagined Indigenous sovereignty and Indigenous representation through their films. Social media posts such as the one by Carla Voyageur (Swanson Occupation, 2017a) extend this practice of visual sovereignty into the social media sphere.

The designs and colours of Kwakwaka'wakw regalia are striking, beautiful, and distinctive. Whether at a formal meeting in the 'Namgis Big House between the premier, cabinet ministers, and Kwakwaka'wakw chiefs, or against a backdrop of misty islands and docks next to salmon pens, gatherings of people in formal Kwakwaka'wakw dress made for arresting images that visually conveyed the power of Kwakwaka'wakw cultures. In the staging of the encounter with government in the 'Namgis Big House, the location, regalia, and following of protocols all lent a kind of visual dominance and authority to the Kwakwaka'wakw leadership, clearly conveying nationhood and that this was a nation-to-nation meeting. While these images made the mainstream news, followers of social media feeds had a more consistent and richer exposure to elements of Kwakwaka'wakw art, song, language, governance protocols braided into communications related to the fish farm occupations.
Opening another eye: Looking back on living infrastructures

Why were elements of Kwakwaka'wakw art, song, language, and governance protocols consistently braided into communications related to the fish farm occupations? The latter part of this article shifts focus to these elements, contemplating them as constitutive communicational practices that maintain flows and balances within the fluid relations that support the salmon “infrastructure” so critical to life in the region.

Just as Indigenous scholars and their allies worked to reframe what dominant culture marginalized as “tribal traditions” as legal orders of ongoing relevance and power, so too for political change it is necessary to foreground Indigenous critical infrastructure of salmon relations as flexible, living infrastructures of presence and potency, as infrastructures that must be recognized and taken into account within infrastructural discourses and their actualization in industrial projects. The undoing of parts of industrial forestry, fishing, transportation, and energy infrastructures is necessary for salmon to thrive. Recognizing this has been key to the recovery of salmon runs on the Klamath and other rivers where dams have been removed; it also holds true for the removal of open-net salmon farms. Salmon aquaculture has grown into a roughly $800 million a year industry in British Columbia (Government of British Columbia, 2018), while wild salmon stocks have plunged by 80 percent (Shore, 2016). This can be read as an example of the invisibilization of Indigenous infrastructures being accompanied by the cannibalization of their productivity into an industrially “legible” form: the current fish farming conflict concerns how lice and disease from the open-pen salmon farms have contributed to the collapse of the wild salmon runs that provide a core food source and cultural touchstone for almost all coastal First Nations. Many of the seventeen farms in the Broughton Archipelago were licensed by the federal government, many over the objection of Kwakwaka'wakw First Nations concerned about the impact these farms would have on wild salmon (Cox, 2019; Smart, 2017).

With this in mind, using Two-Eyed Seeing, this article casts a second glance back to earlier iterations of the communicational patterns resurgent in Kwakwaka'wakw salmon farm communications and the salmon farm conflict more broadly, in order to understand these patterns “infrastructurally,” as part of a dynamic, reciprocal relationship between Kwakwaka'wakw people and salmon. In this relationship, Kwakwaka'wakw stewardship plays a key role in ensuring that salmon runs thrive.

The text first investigates song, a component of Kwawaka'wakw communicational and legal orders since time immemorial. Next, it takes up the example of the ground-breaking film In the Land of the Head Hunters (Curtis, 1914), following “moments” in the film’s more than hundred-year history, in order to examine how Kwawaka'wakw communities have mediated portrayals of Kwawaka'wakw culture and living infrastructures in nineteenth, twentieth, and twenty-first century en-
counters within mainstream media and Western imaginaries. The themes of liveness and circulation—which are vital to the oral tradition and key to understanding how repetition and rearticulation perform the broader cultural work of reasserting Kwawaka’wakw sovereignty, lifeworlds, and legal orders in new circumstances—are then brought into the present through the example of artist and hereditary chief Beau Dick, whose public sphere actions explicitly addressed Broughton Archipelago salmon farming, laying the communicational groundwork for the occupations of 2017.

**Living infrastructures I: Singing gardens**

When Indigenous salmon protectors gathered as part of the activities associated with the travelling Hexsa’am: To Be Here Always exhibit, a number of participants composed and performed a Rainbow Warrior Song, to be shared widely over social media, rather than recording meeting minutes. While this may seem illegible by Western paradigms, the parallel with meeting minutes becomes clear when song is considered as part of an animate, living Indigenous infrastructure, something not only material but a materializing force.

Steve Burgess (2019) tells the following story about Kwakwaka’wakw song:

Back in 2003 Chief Dick, also known as Kwaxsistalla from the Kawadillikall Clan of the Dzawatainuk Tribe of the Kwakwaka’wakw First Nation, was asked by geomorphologist John Harper, at the suggestion of ethnobotanist Nancy Turner, about some unusual rock formations that had been found in the Broughton Archipelago, south of Haida Gwaii. “That’s just a lokiwey,” Kwaxsistalla told them.

Then he began to sing. His song was about the lokiwey (clam garden), a traditional First Nations structure (either natural or constructed) used to facilitate clam harvests. The song he sang was not just a celebration but an explanation of how the lokiwey should be made and utilized, intended to teach succeeding generations how to go about it. It was like a Kwakwaka’wakw how-to manual set to music. (para. 3–4)

Adam Dick knew hundreds of such songs. One of the many things academic researchers have learned through his songs is that a great deal of what was thought to be “natural” in the environment was actually present because of First Nations stewardship. In the case of clam gardens, research since Dick’s revelation has revealed clam gardens from the Columbia River to Alaska, some going back 3,500 years (Pynn, 2019). This is a type of infrastructure, existing on a massive scale, that somehow went almost entirely unacknowledged by mainstream society until well into the twenty-first century. The shaping of the seascape using natural elements (such as arranging rocks), while readily apparent to the trained eye, was simply invisible to the dominant society, as were the complex stewardship systems governing how Heiltsuk, Kwawaka’wakw, and other coastal First Nations gathered
fish and seafood. The invisibility of these gardens of the sea—which include not only clam gardens but other carefully placed infrastructures of abundance, such as hemlock boughs and kelp weighted with rocks laid in the water for herring to lay their roe—had huge consequences. In a precursor to the salmon farm occupations, in 2015 Heiltsuk people occupied the central coast office of Fisheries and Oceans Canada to demand an end to further commercial herring fishery openings upon an already decimated herring stock.

Both herring and salmon conflicts developed against the backdrop of more than a century of state efforts to diminish and dismantle Kwakwaka’wakw knowledge infrastructures through the potlatch prohibitions, through the presence of residential schools in the region into the nineteen-seventies, and through the removal of communities from their territories through forced relocation, including the torching of two villages in the nineteen-sixties by Indian agents. These actions have created immense fragmentation: much of the efforts of cultural resurgence involve bringing back and building from what has survived, whether in the case of the community of Alert Bay building the U’mista Cultural Centre to repatriate an extensive collection of masks and regalia that had been confiscated at a Christmas Day potlatch in 1921, and dispersed to private collections and museums worldwide, or in the case of language revival, where learners have access to only a small number of fluent native speakers.

In this context, it is worth highlighting the brilliance of Kwakwaka’wakw song as a reproductive technology. Songs are learned and retained through multiple modalities. They are catchy, they spread easily, and a simple melody line can spark memories to come flooding back. Research suggests that people retain their musical memory even through dementia (Rio, 2009). Song is a flexible and resilient technology. At the end of the nineteenth century, a delegation led by Chief Isaac entrusted the songs of his Han people to communities further down the Yukon River, so these would survive the disruptions of the gold rush. Many of these songs have been returned to the Han singers, more than one hundred years later. Songs have even been reformed through elders living in different communities coming together who were able to share different parts to make the song whole.

Adam Dick’s lokiwey song is all that is needed to recreate new clam gardens—even without material vestiges of past ones. This is no accident. Specific environmental and historical knowledge, as well as the cultivation of an orientation towards a dynamic awareness of relationships and the need to keep these in balance, is seeded within the very words and syntax of Indigenous languages (Basso, 1996; Neuheus, 2011). Sara Child (2016), in a thesis based on decades of language revitalization work in Kwakwaka’wakw communities describes that:

Our language conveys cultural knowledge that has been passed down for generations. It contains within it the knowledge, wisdom, protocols and perspective of our people … (including) essential information of
the teachings, protocols, practices, moral and ethical principles that
guided our ancestors and will guide our youth to live their life in well-
ness and lead their people to wellness. (p. 11)

The oral culture of the Kwakwaka'wakw, like that of the Han people, has
seeded the knowledge for regeneration of its lifeworld—including the infrastruc-
tures that support it—in a multitude of places. Seeds of such knowledge infra-
structures—including song, dance, language, protocol, and ceremony—appeared,
connected, and circulated regularly in the social media ecosystem of Indigenous
opposition to fish farming in the Broughton Archipelago. Kwakwaka'wakw chan-
nelled these knowledge forms into how they expressed themselves. From the “frag-
ments” of social media postings, a remarkably consistent set of articulations
emerged of the understandings, orientations, and relationships with which
Kwakwaka'wakw had stewarded and sustained wild salmon for thousands of years.
The reach of social media helped boost the visibility and presence of these articu-
lations into the wider public sphere where debates and decisions about coastal
stewardship were taking place. As will be discussed in the next section, this work
was also about reshaping relations.

**Potlatching and witnessing from past to future**

From the earliest days of contact with film, photography and other “modern” media,
Kwakwaka'wakw people have proved exceptionally skillful in navigating new modes
of expression, including social media, to shape representations of their culture and
to claim their rights. This has proved true even in the face of confiscation of
Kwakwaka'wakw regalia and other cultural property, and overt repression of lan-
guage and ceremony. This section turns to more than a century of reinterpretations
and rearticulations of *In the Land of the Head Hunters* (Curtis, 1914) to further explore
encounters between Kwakwaka'wakw lifeworlds and the media forms of the settler
state. Through such encounters, the living infrastructures of Kwakwaka'wakw com-
municational forms inhabit any amenable space and grow understanding within
public culture, rather like wildflowers blooming between cracks in a sidewalk, their
roots aerating and breaking up soil for more seeds to take root.

After Franz Boas, who is often considered the founder of American anthropol-
ogy, made Kwakwaka'wakw peoples a primary focus of his work in the 1880s, a
steady stream of anthropologists, artists, and media makers visited Kwakwaka'wakw
communities in tandem with the early development not just of anthropology, but
also of photography, film, and wax cylinder sound recording. These intercultural en-
counters produced imaginaries and their material traces, ranging from Emily Carr’s
paintings (see for example, Baldissera, 2015) to Edward Curtis’ entire volume of
photographs devoted to the Kwakwaka'wakw in his North American Indian book
project, which shaped perceptions not only of the Kwakwaka'wakw but of “Indians”
more generally (see for example, King, 2012).
Brad Evans and Aaron Glass (2014), in discussing *In the Land of the Head Hunters*, the groundbreaking feature filmed by Edward Curtis in 1913–1914, while working closely with Kwakwaka'wakw associates, note that it is important to understand that what is represented by the film is not merely Curtis’ sensationalist exploitation of indigenous people but also a meeting of Curtis and the Kwakwaka’wakw in the shared enterprise of making a modern motion picture. *Headhunters* was one of the most ambitious in many such attempts undertaken by Kwakwaka’wakw — and by other First Nations, in other forms, across Canada and the United States — to use the emerging market for culturally inscribed goods as a form of self-preservation in a moment made precarious by colonialist expansion. (p. 7)

Curtis had embarked on producing *Head Hunters* as the Canadian state was tightening and stepping up enforcement of the potlatch ban, in place from 1885 to 1951. The choices Kwakwaka’wakw participants made in 1913–1914 around how facets of their songs, dances, and regalia were included in the film can only be understood in the context of the multiple ways Kwakwaka’wakw people challenged this ban: through open defiance, through repurposing other public events to allow for the banned practices (such as potlatch gifting), and through direct display and engagement with government officials. *Head Hunters* was the first feature film with an all-Indigenous cast, shot on location: its circulation throughout North America established a lived presence and a record of Kwakwaka’wakw dances, songs, and visual culture in the public sphere, in the most “modern” and high-profile of mediums—even as these practices were being driven underground through arrests, jail sentences, and confiscation of regalia. In the words of Andrea Sanborn, executive director of the U’mista Cultural Centre from 2002 to 2010, “I’m sure they understood what [Curtis] was trying to do … If I just think and imagine it, I would have done the same thing — flaunted some of our ceremonies in the face of the government” (quoted in Griffin, 2008, para. 20).

This record was also a “message in a bottle to future generations of people” (Griffin, 2008, para. 15). After Bill Holm brought a recently recovered, and somewhat out of order, version of the film to individual Kwakwaka’wakw communities in the late sixties, the filmic encounters with regalia, artefacts, and practices became a point of reconnection with the potlatch system, an opportunity for lived practice of language and cultural life that itself was recorded and could be a touchstone for future generations. Kwakwaka’wakw from many communities came together to record a new score for the film in Kwak’wala and featuring Kwak’wala song, in a process that sparked conversations not only with the remaining original actors and their families, but also with ancestors. Renowned filmmaker Barb Cramner (2014) describes the mixed nature of the legacy of this remade film, *In the Land of the War Canoes*: the joy of finding footage of two men throwing eul-
achon oil using huge feast spoons, which she could incorporate into her own film; the pain of remembering the wounds inflicted upon families living through an era of fear and turmoil; grief and a sense of loss tempered by pride and celebration of Kwawaka'wakw cultural continuity.

The “witnessing” function of some fish farm social media must be understood as contiguous with this longer history. Simone Browne (2015) notes the historically racialized history of surveillance as evolving out of the notion that Black slaves were property and should be prevented from escape and returned to their owners if they fled. In Kwakwaka'wakw territory, this racialized surveillance was also in effect, and also geared to supporting the dominant economic system, in this case by attempting to break the potlatch system, and destroy an economic infrastructure that shared wealth within and across communities and kinship networks. The RCMP, in acting as agents to support the activities of Marine Harvest and other fish farms, took up their historic role as agents enforcing the dominant economic order, supporting the state’s displacement and dismantling of the salmon economy on which coastal First Nations depend.

In 2008, the reworking of yet another version of Head Hunters became a site of staging of a broader intercultural dialogue that foregrounded Kwawaka'wakw presence, sovereignty, and rights, including rights to salmon. The film was launched through high-profile screenings across North America, with Seattle and Vancouver showings featuring the Gwa’wina Dancers, a present-day Kwawaka'wakw dance troupe. Their vibrant, colourful, and resonant performances introduced a rich Kwawaka'wakw cosmology of animals, birds, and supernatural and changeling beings. Dancers shared stories contextualizing the dances and their genealogy (rights to dances are passed down through families) from the time of Head Hunters through to a century later. They spoke powerfully not only about the potlatch ban but about the Kwawaka'wakw nation’s present-day struggles with government over land claim and treaty issues, and about the wild salmon crisis linked to fish farms in their territories. Interpretation of the Salmon dance, for example, made clear that the traditional stewardship roles toward salmon illustrated in the dance applied to conflicts over salmon farming, and that the past must be worked through to understand the present. As Glass (2014) articulates, Kwawaka'wakw “selectively reproduce(d) the past in order to manage relationships with non-Natives” (p. 347). 'Namgis First Nation Chief William Cranmer described the intercultural presentations and exhibitions as an explicit effort at public outreach in support of the larger project of Kwawaka'wakw resurgence, including not only language revitalization and the repatriation of cultural objects, but “reestablishment of control over resource management and cultural practice more broadly through contemporary treaties and land claims” (p. 324 Glass, 2014, p. 324).

This perspective shades another kind of meaning into “witnessing” as a First Nations practice, and particularly as a potlatch practice. Just as potlatch audiences
are expected to acknowledge and validate the family lineages and associated proprietary claims they witness, intercultural audiences are understood to have entered into a set of “protocols and expectations of obligation, exchange and ongoing relation” (Glass, 2014, p. 324) in which they will respect and uphold Kwawaka’wakw culture and sovereignty in exchange for the privilege they have been gifted of learning/partaking in Kwawaka’wakw ceremonial culture. Glass (2014) argues broadly that intercultural iterations of Kwawaka’wakw cultures of display (masks, dances, dramas, and oral histories) uphold the precepts of potlatch culture and not only extend but enact them in cross-cultural spheres, refiguring political and social relationships:

because expressive culture was deeply political in the context of the potlatch, it provided a means of maintaining a real and deeply politicized repertoire of Kwawaka’wakw self-fashioning even when presented outside of a ceremonial context under reiterative scenarios of intercultural exchange. (p. 322)

Dine/Seminole/Muscogee scholar Hulleah Tsinhnahjinnie more specifically discussed Indigenous social media, and particularly YouTube videos, as “an extension of the Northwest culture of display” (Glass, 2014, p. 355). Social media posts produced by First Nations involved in the Broughton Archipelago fish farm disputes, such as clips of hereditary chiefs dancing in regalia on their boats, also fit this pattern, consistently invoking Kwawaka’wakw visual culture, practices, and protocol.

The extension of potlatch culture—whether through film, intercultural events, or salmon social media—brings a core element of Kwawaka’wakw critical infrastructure to bear in new surroundings. Through the potlatch, Kwawaka’wakw sovereignty, laws, and social and economic reproduction are enacted and assured. As Kwawaka’wakw expressive culture, including masks, dance, drama, and oral story, have extended from Kwawaka’wakw ceremonial contexts into intercultural ones, they have seeded Kwawaka’wakw worldviews, values, and relationships to take hold and become embodied and material in new places. To consider this expressive culture as a kind of communicational infrastructure—and more specifically, one that has seeded new values about salmon and supported a change in orientation to salmon farming in the political culture of British Columbia—the final section of this article cycles forward to the legacy of Beau Dick in order to explore the genius with which Kwawaka’wakw have articulated the political power of expressive culture to salmon conflicts in the present day.

**Sparking living infrastructures**

One of the most compelling examples of Kwawaka’wakw drawing on their vivid visual culture to reshape relations comes from the life of master carver Beau Dick, a ’Namgis hereditary chief who was a major figure in Northwest Coast art. In February of 2013, as the Idle No More movement was growing across Canada, he and his supporters—including scientist Alexandra Morton, whom he had specifi-
cally invited to “be the voice of salmon” (Watershed Sentinel, 2013) and to highlight the crisis with wild salmon and fish farms—walked from the northern Vancouver Island community of Quatsino to Victoria in order to break a copper on the steps of the British Columbia Legislature. In full regalia, in front of three thousand people, Dick performed this act of public shaming, complete with singing, drumming, speeches, and the smashing of a copper shield on a rock, in order to highlight government’s broken treaties with Indigenous people (Brown, 2017; Hopkins, n.d.). Dick revived the symbolic and performative potency of this Kwakwaka’wakw governance practice, suppressed for decades, articulating it powerfully to present grievances. The profound resonance of his blows upon the copper—a drumbeat of resurgence—became evident in the outpouring of grief on social media after Dick passed away in March 2017, with many posts recalling the copper breaking in photos, hashtags, and written tributes (Brown, 2017).

In another skillful demonstration of Kwakwaka’wakw visual sovereignty and legal orders, Dick twice, in 2008 and 2012, carved complete sets of masks to be used in potlatch ceremonies and then burned. Dick described this process as the masks being given new life by going to the spirit world. He declared “What we have to do is recreate them — and that keeps them alive” (quoted in Priegert, 2014, para. 5). Glass (2014) explains that masks and regalia are regarded by Kwakwaka’wakw as “the temporary—and potentially alienable—embodiment of the hereditary rights themselves, which are the true and inalienable form of ephemeral wealth” (p. 324). The re-enactment of ancestral stories and lineage through song, dance, drama, and oral storytelling brings characters (human and non-human), stories, interactions, and rights, responsibilities, and privileges to life in an embodied way, helping to keep keep relations in the human and more-than-human worlds attended to and in proper balance. Glass (2014) explains

"There is thus an ontological and mutually corroborating relationship between material forms (masks and regalia), performance types (song, dance, and oratory), proprietary ephemerals (hereditary prerogatives), social identities (clan titles, genealogies, and dance society positions), and historical trajectories (ancient and recent paths of circulation and exchange). (p. 323)

More simply put, masks gain their value through their role in helping to materialize and perpetuate the relations that bind Kwakwaka’wakw lifeworlds.

Dick’s actions in respecting cultural protocols and destroying masks worth hundreds of thousands on the art market, were a specific refutation of capitalist economics, and of ethnographic logics of collection and commodity fetishization, in favour of upholding what Shiri Pasternak and Dayna Scott (2020) describe as “relational, generative, Indigenous economies of care” (p. 207). This economy shows itself in potlatch ceremonies and gifting, but also in the multiple actions that uphold the stew-
ardship orientation of Kwakwaka’wakw relations with the lifeworld. If infrastructure is, in the words of Winona Leduc and Deborah Cowen (2020), “how sociality extends itself” (p. 264), Kwakwaka’wakw stewardship relations—which are social relations with the more-than-human-world—are acting infrastructurally, creating the (re)generative conditions that support strong salmon runs, copious herring roe laid in kelp forests, and clams burrowing in sheltered “garden” bays. When Kwakwaka’wakw posted about a subset of these relationships on social media with reference to the salmon farming conflicts, they were growing the reach of Kwakwaka’wakw economies and stewardship relations toward new audiences and actors. Richly resonant with language and cultural practices that are thousands of years old—including the incredibly vivid visual culture of Northwest Coast art—these communications foregrounded Kwakwaka’wakw lifeworlds, and the infrastructures that support them, as realities that mainstream society must be accountable to and in relation with. These communications acted infrastructurally, extending the “sociality” of Kwakwaka’wakw lifeworlds along new paths of circulation and exchange.

Conclusion
Jo-Ann Archibald’s (2008) telling of the story of Coyote’s eyes well illustrates the challenges of Two-Eyed Seeing when there is a lack of balance between two worldviews: Coyote winds up with one bulging buffalo eye, one mouse eye rolling around in its socket, and very compromised vision. This article has attempted to exercise the “lazy eye” developed through settler-colonialism, training its focus again and again on common infrastructural elements in Kwakwaka’wakw cultural and communicational practices through thousands of years, and highlighting their resonances with the work accomplished by Musgamagw Dzawada’enuxw, ’Namgis, and other Kwakwaka’wakw in social media communications surrounding the Broughton Archipelago fish farm occupations in 2017–2018.

In a scenario where a remote First Nation had little mainstream media access, social media was effective in communicating a Kwakwaka’wakw perspective, both within First Nations communities and to more distant publics. Kwakwaka’wakw drew on the affordances of social media to create and distribute their own content, offering myriad “windows” for people to experience Indigenous legal orders at work in the world. These ranged from glimpses of the daily lives of fish farm occupiers in the Broughton Archipelago to the ways that First Nations people highlighted their concerns at rallies, in the court system, and in meetings with government. By using language, protocol, and song, through wearing regalia and centering their nationhood and the nation-to-nation relationship with the Canadian state, and in multiple other large and small ways, Kwakwaka’wakw not only foregrounded the problems with salmon farms. They also highlighted both settler and Kwakwaka’wakw accountabilities to the social, cultural, and communicative systems—infrastructures—that underlie the generative Kwakwaka’wakw economy.
These accountabilities raise difficult questions. What does it mean to acknowledge a Kwakwaka’wakw right of refusal on salmon farm licenses, while continuing to turn a blind eye to questions of rights and title, and of land and water governance? Is it enough for communications scholars to focus on ending the digital divide in broadband access for First Nations, when the sacred and difficult work of stewarding Indigenous languages, dances, and songs—so core to the revitalization and regeneration of Indigenous lifeworlds—receives such a paucity of financial support and policy recognition by the Canadian state? Decolonizing infrastructural thinking requires ongoing engagement with such questions, and with the First Nations challenging governments, industries, communities, and individuals to think and act differently.

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**Notes**

1. This article focuses on anti-salmon farm media. First Nations people are not monolithic in their opposition to the farms. However, in October 2017, forty leaders from eight Kwakwaka’wakw Nations in the region formally expressed united opposition to the farms to the premier (Morton, n.d.). There is an overall consensus among Kwakwaka’wakw against the farms in the Broughton Archipelago continuing in their present form.
2. I would also like to acknowledge the work of Zoe Todd, Kyle, and other Indigenous academics who do not work within a “biological sciences” designation but engage actively with Indigenous community relations with fish.
3. Some mark the beginning of the occupation with this incident. Another accounting begins on September 9, 2017, when Ernest Alfred took up residence in a Marine Harvest work cottage on Swanson Island (Prystupa, 2018).
4. Some posts of a similar nature circulated quite widely. For example, Karissa Glendale’s (2018) short video of her confrontation with marine harvest workers had over one hundred thousand views on her Facebook page and over 1,300 shares within the Facebook platform.
5. Artist and curator Tania Willard’s discussion of this event can be viewed on YouTube (Finding Flowers, 2020) beginning at 1:35:26. A performance of the song can be seen on Instagram (Willard, 2020). The exhibit, a product of multiple artists working together in residence on Dzawada’enuxw territories in summer 2018, “centres on the 2018 BC Supreme Court case launched by the Dzawada’enuxw First Nation to extend Aboriginal title to the ocean, claiming that the province does not have the authority to grant tenures to salmon farms in the Broughton Archipelago” (Alexandra, 2019 [para. 2]).
7. I witnessed one such coming together at a tribute to Chief Isaac at a Tr’ondek Hwech’in potlatch at Moosehide in July 2006.

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Infrastructure and the Form of Politics

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ABSTRACT

Background: This article surveys recent engagement with infrastructure across several fields, with particular attention to analyses of the relationship between infrastructure, extractive capitalism, and settler colonialism.

Analysis: The article treats infrastructure as a form of non-discursive politics and examines the critical status of the concept in light of the historical and contemporary implications of infrastructure in colonialism, settler colonialism, and racial capitalism.

Conclusions and implications: The article concludes that treatments of infrastructure in recent critical feminist, queer, and Indigenous thought open new possibilities for rethinking politics, communication, and media.

Keywords: socio-technical; critical theory; technology theory; post-colonialism

RÉSUMÉ

Contexte : Cet article examine l’engagement récent en matières d’infrastructures dans plusieurs domaines, et accorde une attention particulière aux analyses des relations entre les infrastructures, le capitalisme extractif et le colonialisme-habitant.

Analyse : L’article traite l’infrastructure comme une forme de politique non-discursive et examine le statut critique du concept en relation avec des implications historique et contemporaines de l’infrastructure dans le colonialisme, le colonialisme-habitant et le capitalisme racial.

Conclusions et implications : L’article conclut que le traitement de l’infrastructure dans la pensée critique, féministe, queer et indigène récente ouvre de nouvelles possibilités pour repenser la politique, la communication et les médias.

Mots clés : socio-technique; théorie critique; théorie de la technologie; postcolonialisme

Introduction

In February 2020, the attention of the Canadian polity was transfixed—and a significant portion of the Canadian economy suspended—by disruptive occupations and demonstrations at railway lines, roads, intersections, buildings, bridges, and

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ports (Johnson, 2020). Infrastructures of personal and commercial mobility and communication became scenes of delay, postponement, friction, and disability. For many—migrants in transit, refugee claimants, folks disabled by the “normal” configuration of built and social environments—such experiences are typical, but for other Canadians, these conditions were exceptional. Supply chains were temporarily broken, their seams exposed, flows interrupted, and logistics confounded (Perreaux, Atkins, & Andrew-Gee, 2020). In this case, infrastructure was not only the medium of political conflict but also its motivation, object, and its form. The demonstrations were in solidarity with hereditary chiefs and land defenders of the Wet’suwet’en First Nation in northern British Columbia, whose encampments and checkpoints blocking the development of the Coastal GasLink pipeline on their unceded territories had been raided by police (McIntosh, 2020). The episode was the most recent in a nearly 200-year history in Canada in which infrastructures of extraction, industry, transportation, and communication have mediated the dispossession of Indigenous lands, the sundering of relations redefined as “resources,” and erasure of Indigenous legal orders and jurisdiction, as well as resistance to these injustices (Cowen, 2018; Pasternak, 2017; Spice, 2018). In this respect, Canada’s is but one chapter in a long and ongoing global story (Gómez-Barris, 2017).

This article approaches infrastructure not just as a site or object of political identification and contestation but as a form of politics. “Form,” here, means the shape of politics and the arrangement of its parts, and also its determining principle. Politics takes many forms. Parliamentary democracy, for example, shapes politics as institutionalized representation, persuasion, deliberation, and decision-making according to the determining principles of reasoned speech and majority rule. Infrastructure is another form that politics takes, a form with distinctive shapes and principles (Easterling, 2014; Edwards, 2003; Graham & Thrift, 2007; Larkin, 2013; Star 1999; Wilson, 2016). The character (and potential) of infrastructure as a form of politics has been further exposed in recent Indigenous struggles and scholarship in Canada, and also by recent work in critical, post-colonial, feminist, and queer theory. As a white, cis-gendered male settler, my aim here is to listen carefully to this work and to these voices, and to follow their lead in rethinking the relationship between politics and infrastructure in the context of communication studies.

As Liam Young (2017) observes, “Although infrastructure feels fresh, it is anything but” (p. 231). Scholars in communication and media studies have always been infrastructuralists (Peters, 2015). Harold Innis (1962) painstakingly documented the media by which the extractive economy of settler colonialism was imposed on the Indigenous inhabitants, animals, and elements of what is now known as Canada. Innis’ accounts were conspicuously bloodless, but they confirmed that, in this context, communication began with transportation; transportation meant infrastructure; and infrastructure was implicated in the organization
of temporal, spatial, and environmental relations. Generations of Innisians have since extended and enhanced the infrastructural orientation he inaugurated in Canadian communication studies (Acland & Buxton, 1999; Berland, 2009; Carey, 1989; Ruiz, 2021; Young, 2017). Subsequent and parallel attention to the materiality of media (Acland, 2006; Cubitt, 2016; Devine, 2019; Gillespie, Boczkowski, & Foot, 2014; Gitelman, 2006; Gumbrecht & Pfeiffer, 1994; Kittler, 1999; Packer & Crofts Wiley, 2012; Parikka, 2012, 2015; Stamm, 2018), networks (Barney, 2004; Castells, 1996; Martin, 1991; Mattelart, 2000; Medina, 2011; Parks, 2005; Peters, 2016; Starosielski, 2015), circulation (Boutros & Straw, 2010; Gaonkar & Povinelli, 2003; Straw, 2010), surveillance (Andrejevic, 2007; Brown, 2015; Dubrofsky & Magnet, 2015; Gates, 2011; Lyon, 2001; Magnet, 2011; Zuboff, 2019), and software, platforms, and algorithms (Benjamin, 2019; Crawford, 2021; Gillespie, 2018; McKelvey, 2018; Noble, 2018; Rossiter, 2016; Srnicek, 2016; Sterne, 2012) confirms the gravitational force that infrastructure has exerted within media and communication studies, and it continues to animate some of the most innovative work in the field (Gabrys, 2019, 2016; Mukherjee, 2020; Parks & Starosielski, 2015; Starosielski & Walker, 2016).

The aim of this article is not to reprise this extensive literature within communication studies but to consider insights into the politics of infrastructure that are emerging in other fields. In particular, this article explores what these other conversations might offer to a theory of politics in which infrastructure is not merely an object of political contestation or a medium for the transmission of political texts, speech, and images (ways of thinking about politics and infrastructure that are very familiar to media and communication studies), but is, instead, the very form of politics itself. It would be misleading to say that such a perspective has been wholly absent in the media studies literature alluded to above, but it is emerging with distinctive force in the recent infrastructural turn in other fields; these approaches might inform a renewed approach to phenomena that have otherwise been centre stage in media studies for a very long time. Recent treatments of the role of infrastructure in the history of settler colonialism in Canada and contemporary Indigenous resistance to extractive and invasive infrastructure development are reviewed, raising the question of the status of infrastructure itself as a critical category. This question is then explored in relation to recent treatments of infrastructure across a diverse range of texts in contemporary critical theory. The article concludes with a reflection on the stakes of returning infrastructure to the centre of our attention as students of politics, communication, and media.

**Do infrastructures have politics?**

The question of infrastructure appeared in political theory forty years ago in a foundational essay by Langdon Winner (1980) called “Do Artifacts Have Politics?” By “artifacts,” Winner (1980) meant to encompass technical objects and systems of human design and manufacture, broadly gathered under the sign “technology,”
with an emphasis on large-scale energy, industrial, and transportation infrastructures. The essay begins with the observation that “in controversies about technology and society, there is no idea more provocative than the notion that technical things have political qualities” (p. 121), by which he meant that “the machines, structures, and systems of modern material culture ... embody specific forms of power and authority” (p. 121). Winner (1980) thought this claim to be provocative in the context of a culture where regard for technology as essentially progressive had become hegemonic (i.e., where automobiles, rocket ships, jet airliners, and computers were not just tools but vectors of freedom and democracy). He could not have predicted the backlash that would come from scholars of science and technology, whose field of study otherwise seemed predicated on this relatively straightforward claim. At issue were the epistemological and empirical stakes of positing a strong connection between the intentions of designers and the outcomes of their designs (Elam, 1994; Joerges, 1999; Woolgar, 1991; Woolgar & Cooper, 1999; see also Winner, 1993, 1994). Subsequent work exposing the role of infrastructure in the history of colonialism appears to have settled the matter. As Akhil Gupta (2018) has written, “colonial infrastructure ... was specifically intended to bring about a particular kind of future that was ruinous for the colonized nation-state” (p. 66). The history of ports, railways, roads, canals, pipelines, dams, prisons, and other communication infrastructures in imperial and colonial settings is the history of this political intention and its execution in relatively durable material forms (Anand, Gupta, & Appel, 2018; Arboleda, 2020; Carse, 2014; Enns & Bersaglio, 2020; Gilmore, 2007; Gordillo, 2019; Harvey & Knox, 2015; Khalili, 2020; Larkin, 2008; Lowe, 2015; Mezzadra & Neilson, 2019; Mitchell, 2002; Scheller, 2014; Zien, 2017). Colonialism and white supremacy are political forms that happen as infrastructure. Given the specific history and residues to which he refers, Gupta’s (2018) conclusion that “Infrastructures are important because the future they bring about always favors one set of political actors over others. There is no such thing as politically neutral infrastructure” (p. 66) feels like a relatively modest claim.

In light of the particular history and present of settler colonialism as an infrastructural project, it is hard to imagine that Winner’s basic propositions could ever have been controversial (Byrd 2011; Day, 2016; Karuka 2019; Rifkin 2014; Wolfe 2006). The first, that “the design or arrangement of a device or system could provide a convenient means of establishing patterns of power and authority in a giving setting” (Winner, 1980, p. 134), seems to be precisely what is at issue in the longstanding struggle of the Wet’suwet’en people over extractive infrastructures being installed on their territories (Unist’ot’en Camp, 2020). It is not only a question of what these infrastructures will do in a strictly functional sense (i.e., extract and transport natural gas) but also how they will “settle the issue” (paraphrasing Winner, 1980, p. 123) of who has authority in and over that territory and what can be done with and to it (Pasternak, 2017). “Pipeline infrastructures,” Tlingit anthro-
pologist Anne Spice (2018) writes, “also carry the work of jurisdiction and the assertion of political claims to territory and resources” (p. 46). This also illustrates Winner’s (1980) second proposition that certain infrastructures “appear to require, or to be strongly compatible with, particular kinds of political relationships ... particular institutionalized patterns of power and authority” (pp. 123–134, emphasis added). In Canada, infrastructures of extraction, transportation, finance, and communication have historically been means not only of their direct purposes but also of materializing the sovereignty and jurisdiction of the Canadian state over territories and their human and non-human inhabitants (Cowen, 2018). These infrastructures have been “strongly compatible” (Winner, 1980, p.123) with specific patterns of power and authority: political relationships institutionalized in the form of the Canadian extractive state economy and settler state, including the political, legal, and policing mechanisms required to accomplish and legitimize infrastructural projects themselves (Perry, 2016).

In most cases, these forms and the relationships they institutionalize differ significantly from the Indigenous legal and social orders they have sought to supplant (Borrows, 2019). When TC Energy and the governments of British Columbia and Canada endeavour to proceed with infrastructures such as the Coastal GasLink pipeline despite the opposition of Indigenous leaders asserting jurisdiction over their territories and cite the “rule of law” as justification, for example, they are installing not only a pipeline but also an entire legal and social order, with its attendant political forms. As Sleydo’, spokesperson for Gidimt’en checkpoint that blocked access to the Coastal GasLink site on Wet’suwet’en territory, put it, “We have never ceded or surrendered our lands. This is an issue of rights and title with our sovereign nation, and the RCMP are acting as mercenaries for industry” (quoted in Smith, 2019, para. 4). In this sense, pipelines are “inherently political” (Winner, 1980, p. 128): an economy and society built on extractive infrastructures installed on unceded territories “appears to require” the political form of the settler state and its legal and coercive apparatuses, a requirement to which the Wet’suwet’en hereditary chiefs and land defenders, among others, refuse to concede (Lightfoot, 2018; Simpson, 2017).

From this perspective, oil and gas pipelines are anything but neutral. They are infrastructures of “settler colonial invasion ... that are meant to destroy Indigenous life to make way for capitalist expansion ... a system that is fundamentally at odds with the cycles and systems that make Indigenous survival possible” (Spice, 2018, pp. 41–42). Such infrastructures are not merely technologies of extraction and transportation but “a settler colonial technology of governance and expropriation in lands now claimed by Canada” (Spice, 2018, p. 41). Governance here includes the legal designation of extractive and ancillary infrastructures as “critical,” such that Indigenous claims to jurisdiction, land and water defense, and political resistance are framed as national security threats, authoriz-
ing the invasive securitization of Indigenous territories and police violence against Indigenous bodies (Pasternak & Dafnos, 2018). In their account of the politics of settler colonial infrastructure, Anishinaabe writer and economist Winona LaDuke and geographer Deborah Cowen (2020) invoke Anishinaabe legend to characterize these violent and destructive infrastructures as Wiindigo: “The transformation of ecologies of the many into systems of circulation and accumulation to serve the few is the project of settler colonial infrastructure. Infrastructure is the how of settler colonialism, and the settler colony is where the Wiindigo runs free” (p. 245). In particular, “energy infrastructures constitute the contemporary spine of the settler colonial nation” (p. 249), a category that extends well beyond pipelines to include the vast network of infrastructural systems required to move energy resources through the circuit of financing, extraction, transportation, refining, manufacture, and consumption. These infrastructures “carve up Turtle island, or North America, into preserves of settler jurisdiction, while entrenching and hardening the very means of settler economy and sociality into tangible material structures” (LaDuke & Cowen, 2020, p. 244).

This account of the politics of settler colonial infrastructure raises many issues. Among them is the question of participation in infrastructure projects by Indigenous people, companies, and communities. For example, around the same time the Wet’suwet’en blockades went up, the Government of Québec and the Cree Nation Government announced the Grande Alliance, a $4.7 billion deal to build infrastructure, including a deep sea port, hydroelectric lines, a railway, and extensive highway upgrades, to facilitate resource development in Eeyou Istchee, the Cree territory in northern Québec, including the extraction of lithium and vanadium, and possibly additional hydroelectric facilities, all presented as contributing to global renewable energy transition. Cree Grand Chief Abel Bosum described the deal as a “clear break from the past colonial and paternalistic government policies,” adding, “We are here today not to make a sacrifice or surrender. Today is not part of some concession or a difficult compromise. We are not forced to be here as part of a settlement” (Bell & Longchap, 2020 para. 4). For the Cree leadership, participation in these infrastructure projects materializes their right to economic and political self-determination on their territories, as affirmed in the James Bay Agreement of the 1970s, won after years of struggle against proposed resource development projects in which they were to play no role and derive no benefit (Carlson, 2009). In the case of the Coastal GasLink Pipeline project, TC Energy has signed Impact and Benefit Agreements (IBAs) with twenty First Nations, including the elected band councils of the Wet’suwet’en Nation. This suggests that at least some people in these communities favour the development, even as many others, including the Wet’suwet’en Nation hereditary chiefs, stand strongly opposed. Some have argued that this division is an artefact of the band council system, which was imposed by the federal Indian Act as a means of man-
aging Indigenous communities in the service of the settler colonial state, and that IBAs serve to contain Indigenous jurisdiction rather than affirm it. They are, in fact, part of the infrastructure of dispossessive extractivism, not a constraint on it (McCarty, 2019; Pasternak, 2020). Describing this dynamic in similar projects elsewhere, LaDuke and Cowen (2020) write, “In a strategy we see repeated over and over again, energy and transportation infrastructures are not simply imposed upon First Nations. Rather, in a context of profoundly constrained options forged by dispossession, Indigenous people are ‘invited’ to become project proponents and owners of Wiindigo infrastructure” (p. 253).

It is not for descendants of settlers to judge the respective strategies of the Wet’suwet’en hereditary chiefs, activists, and band councils, or the James Bay Cree. For the purposes of this article, the point is that the political matters at stake here—the imposed reproduction of settler colonial political economies, resistance to this imposition, and adaptation to its perceived benefits—all take the material form of infrastructure. It is perhaps for this reason that Spice (2018) suggests that “infrastructure” itself might be a “category that wield[s] and carr[ies] the authority (and violence) of the settler state” (p. 42). Whether as survivors of dispossession, resisters to unwanted projects, or parties to agreements that enable such projects to proceed, Indigenous people in Canada are bound to a politics of infrastructure that “obscure[s] the Indigenous relations these infrastructures attempt to replace” (p. 42). Spice’s radical claim is that infrastructure performs the material and categorical erasure of “Indigenous assemblages that sustain life” (p. 42), including grounded relations between Indigenous communities and the more-than-human constituents with which they share lands and waters. Referring to anthropologist Brian Larkin’s (2013) canonical rendering of infrastructure as the “undergirding of modern societies” (p. 328), Spice (2018) asks:

If those modern societies have settled, colonized, and attempted to eliminate existing Indigenous nations and political orders, does the word infrastructure itself denote an apparatus of domination? Here, the very act of defining infrastructures as tools of the state takes for granted the state’s ontological claims. “What one leaves out” of the definition of infrastructure is a world of relations, flows, and circulations that the settler state has attempted to destroy and supplant. (pp. 48–49, emphasis added)

This is a powerful claim, one that presents a serious challenge to any deployment of infrastructure as a critical category and to political programs that centre infrastructure as a potential site, means, or mode of practicing more just, inclusive, and environmentally responsible economic and social relations. In what follows, this article draws on a diverse range of contemporary perspectives that have theorized this potential in ways that suggest the possibility of recovering infrastructure
as a political category. The aim is to consider whether infrastructure, as a form of politics, can be detached from its ontological association with capitalist, extractive, colonial, and settler colonial modernity, such that it might open possibilities for what Spice (2018) (in conversation with Unist’o’en spokesperson Freda Huson) describes as “alternative ontological and epistemological modes of relating to assemblages that move matter and sustain life” (p. 45).

**Infrastructure (and politics) otherwise**

To engage the politics of infrastructure is not just to treat it as an object, instrument, or outcome of political intentions, programs, and relationships, it is to consider how, as Hannah Appel, Nikhil Anand, and Akhil Gupta (2018) put it, infrastructure “provides a frame to defamiliarize and rethink the political” (p. 4). As they go on to say, “attention to infrastructure unsettles long-accepted understandings of how rule is accomplished” (p. 22). Rule is just one way of doing politics, but the broader point sticks: thinking with and through infrastructure unsettles our established understandings of what politics is, what it is for, and how to do it.

In the text *To Our Friends*, the Invisible Committee (2015) makes the following observation:

What is it that appears on euro banknotes? Not human figures, not emblems of a personal sovereignty, but bridges, aqueducts and arches. … As to the truth about the present nature of power, every European has a printed exemplar of it in their pocket. It can be stated in this way: *power now resides in the infrastructures of this world.* … Anyone who means to undertake anything whatsoever against the existing world must start from there: the real power structure is the material, technological, physical organization of the world. *Government is no longer in the government* … power consists in infrastructures, in the means to make them function, to control them and build them. (pp. 83–85, emphasis in original)

This is a straightforward rendering of the claim that infrastructures are political arrangements, not just technical ones, with a corollary claim about the displacement of political power from politicians, legislatures, and parliaments and what they do, to those who make and control infrastructures and what they do. This has implications not only for the location of politics but also for its form. As they observe, “Absorbed in our language-bound conception of the public thing, of politics, we have continued debating while the real decisions were being made right before our eyes. Contemporary laws are written with steel structures and not with words” (Invisible Committee, 2015, pp. 84–85). What is to be done, they ask, with “an order that isn’t articulated in language, that is constructed step-by-step and wordlessly. An order that is embodied in the very objects of everyday life? An order whose constitution is its material constitution” (Invisible Committee, 2015, p. 86,)? The answer is direct:
In the age when power manifested itself through edicts, laws and regulations, it was vulnerable to critical attack. But there’s no criticizing a wall. … A government that arranges life through its instruments and its layouts, whose statements take the form of a street lined with traffic cones and surveilled by overhead cameras, may only invite a destruction that is wordless itself.” (Invisible Committee, 2015, p. 86, emphasis added)

There is typically a great distance between what state and industrial actors say about infrastructure (e.g., that it generates prosperity) and what they use it to represent (e.g., national identity, modernity, futurity) and what infrastructure actually does. This is the difference between what Larkin (2013) calls the “poetics of infrastructure” (p. 329) and its complex materiality. Politics attaches to infrastructure in both its poetic and its material dimensions, but it is particularly interesting to consider the potential of a politics of infrastructure understood as a politics without words. The entire Western tradition—from Aristotle to Kant to Arendt to Habermas—is predicated on the assumption that politics is an activity defined by speech. The implications of this are many. It has meant that the right to participate in political citizenship has always turned on the enforcement of prejudicial (gendered and racialized) distinctions between who is capable of speaking and who is not. It privileges certain modes of expression—speaking, arguing, persuading, representing—as ways of being political at the expense of others. This provokes many questions, including: Are modes of politics predicated on speech the only or most effective ones? What people and forms of practice does the privileging of speech exclude or depoliticize? What might be gained from an infrastructural disposition that reorients political subjectivity, agency, and practice away from representation and critique, speaking and persuading, toward unmaking and making, unbuilding and building? Away from immaterial modes of information and communication and toward material modes of informing and communicating—a politics that is not primarily dialogical but rather logistical (Cowen 2014)? A politics that has “little use for criticizing” (Invisible Committee, 2017, p. 79)?

To those who adhere to the idea that politics can only be expressed in words, the prospect of an infrastructural politics without words might appear specifically alogical and, thereby, depoliticized. After all, a great deal of the politics we normally associate with infrastructure is expressed in words—speeches, business cases, promotional materials, technical reports, expert testimony, literary texts—that speak for and about infrastructure before and after it speaks for itself (see, for example, Barry, 2013; Desbiens, 2013). Words and speech continue to harm, erase, and exclude, and critique remains an indispensable means of exposing this. And yet, strong traditions in feminist thought, subaltern and anti-colonial studies, affect theory, critical disability studies, and the history of everyday resistance have exposed rich varieties of political subjectivity and agency among those who have been silent or silenced, those who make no arguments, those who do not speak
because it is too dangerous, those who communicate otherwise and who communicate through means other than words, and those who appear not to communicate at all (Brown, 2005; Ferguson, 2003; Panagia, 2009; Pinchevski, 2011; Scott, 1985; Spivak, 1988). The subaltern cannot speak, but silenced, dispossessed, and disabled subjects act constantly in ways that take infrastructural forms (Brennan, 2017; Hamraie, 2017; Rezaei & Dowlatabadi, 2016; Simone, 2004). How might these ways of being political beyond speech inform an account of infrastructure as a material form of politics?

In her account of the role of infrastructure in post-apartheid South Africa, anthropologist Antina von Schnitzler (2018) emphasizes the particular significance of infrastructural politics in the context of decolonization, a condition that demands “a more expansive theory and vision of what it means to act politically in the post-colony and beyond” (p. 135). When an idealized public sphere of intersubjective dialogue between people who recognize each other as equals either does not pertain or is attenuated, what is required is “an account of the political that is attuned to the material, affective, counterpublic, or indeed nonpublic forms of political engagement” (p. 135). Infrastructure is one such form, “where space opens for a politics that has been foreclosed in the formal sphere of politics” (p. 135). For von Schnitzler (2018), this calls for attention to “the ways in which the political may also take shape at the registers and forms of the infrastructural … a technopolitics in which infrastructure itself becomes a modality of political action … one that in the present is for the most part no longer intelligible as ‘speech’” (pp. 135–137, emphasis in original). Her account of this mode of politics-that-is-not-speech centres on the contested imposition of and resistance to infrastructures of domestic water-metering in post-apartheid South Africa, but the implications of this formulation extend far beyond that context.

Once the hold of speech on our collective conception of being political is loosened, the way is cleared for thinking about infrastructure as a form of politics consistent with a range of orientations and practices that have typically not been considered political. These include subtractive orientations, such as refusal, withdrawal and sabotage, practices that are often coded as non-, a-, or anti-political but are generally mediated by infrastructure (Barney, 2020; Halberstam, 2013; Simpson, 2017; Truscello, 2020; Williams, 2016). They also include positive orientations and practices that are either mediated by infrastructure or take infrastructural forms, such as repair, maintenance, provisioning, care, kin-making, and planning (Benjamin, 2018; Harney & Moten, 2013; Graham & Thrift, 2007; TallBear, 2018). These practices are typically gendered and racialized, a function of the same prejudice that denies particular subjects access to politics restricted to a specific form of speech. They also have not typically been recognized as political practices and orientations but in infrastructural form they become undeniably so, especially under conditions of inoperativity, or what Michael Truscello (2020) aptly describes
as infrastructural brutalism, “the transversal ecological, political, and psychological brutality” (p. 2) of a world constructed by large-scale capitalist infrastructure that “isolates, toxifies, dispossesses, and immobilizes, contrary to the more common infrastructural tropes of connectivity and mobility” (p. 2). As Giorgio Agamben (2015) observes, under such conditions, forms of life previously confined to the oikos, the household, rush the polis and become political. What were once “merely” domestic arts—arts of the household; arts belonging to (supposedly) speechless women and slaves; arts of repair, maintenance, provisioning, care, kinship, and planning; arts of infrastructure—become political arts, arts of destituent power (Agamben, 2014). To associate them with destitution is not to diminish or despair of them but to elevate them as definitive examples of how to be political when an existing political-economic order and its infrastructures are inoperative (Puig de la Bellacasa, 2017). The arts of making and practicing infrastructure in this way might arise in response to infrastructural brutalism, absence, or failure, but their political quality exceeds mere coping. In their viability, these practices actively destitute the existing material order and the violent, poisonous, and wasteful relations installed and mediated by its infrastructures. This is what makes them political arts, not just technical ones.

Resources abound for thinking about infrastructure and politics otherwise. In Notes Toward a Performativ Theory of Assembly, Judith Butler (2015) directs our attention to the politics invoked by conditions in which prevailing infrastructures have been rendered inoperative, such that life becomes unlivable. She writes, “the demand for infrastructure is a demand for a certain kind of inhabitable ground, and its meaning and force derive precisely from that lack. This is why the demand is not for all kinds of infrastructure, since some serve the decimation of livable life” (p. 127). One thinks immediately here of Indigenous peoples in Canada, for whom the lack of certain kinds of infrastructure and the imposition of other kinds combines to deprive them of an inhabitable ground, to decimate their chances for livable lives (Senate of Canada, 2015). One also thinks of how the infrastructural politics of the Wet’suwet’en hereditary chiefs—refusing the erasure of their jurisdiction by unauthorized infrastructure projects; temporarily suspending the Canadian economy by throttling the flows mediated by key systemic infrastructures; repairing, building, and maintaining Indigenous practices and infrastructures of provisioning, stewardship, kinship, care, and governance—advance the destitution of a political economic order that has become inoperative. Their destituent power is the power of infrastructure, not dialogue, and it materializes a possible exit from the untenable relations that extractive, settler colonial capitalism otherwise imposes on them. The chiefs do not need anyone to speak for them, but their actions are good examples of what Butler (2015) might mean when she observes that “if politics is oriented towards the making and preserving of the conditions that allow for livability,” then politics is “never fully separable from questions of infrastructure” (p. 127).
For Butler (2015), thinking of infrastructure as intrinsic to politics arises from the embodied—and therefore vulnerable, exposed, dependent, and relational—character of being human, which includes vulnerability and exposure to, dependency on, and relationship with a multitude of non-human things. As she writes, “we cannot understand bodily vulnerability outside this conception of its constitutive relations to other humans, living processes, and inorganic conditions and vehicles for living” (p. 130). The vulnerability that structures our relations to these others is exposed in moments of infrastructural lack or failure, but Butler’s (2016) key insight is that the condition of being vulnerable precedes these moments and persists after them. As she puts it in a later essay, “It was not as if we were, as creatures, not vulnerable before when infrastructure was working, and then when infrastructure fails, our vulnerability comes to the fore” (p. 13). Vulnerability attaches to the relational, performative, dependent quality of being human in the world. Infrastructure is not the cause of this vulnerability but one of the names for it. According to Butler (2016), “relationality includes dependency on infrastructural conditions,” and it calls for “theorizing the human body as a certain kind of dependency on infrastructure, understood complexly as environment, social relations, and networks of support and sustenance by which the human itself proves not to be divided from the animal or from the technical world” (p. 21).

Butler is neither first nor alone in thinking about deep relationality as intrinsic to being human, nor in extending this relationality to a broad range of non-human others, including the animal, organic, inorganic, and technological others whose agency we are vulnerable to and who are vulnerable to ours. The list of thinkers following this line of thought and exploring its implications is very long (Barad, 2007; Braidotti, 2013; Haraway, 2016; Peters, 2015; Tsing, 2015). It includes, significantly, a number of Indigenous thinkers, who teach us about relational ontology as it exists across a broad and diverse range of Indigenous philosophies, cultures, and practices, both historically and contemporarily (TallBear, 2018; Todd, 2016; Watts, 2013; Whyte, 2016; see also de la Cadena, 2015; Kohn, 2013; Viveiros de Castro, 2015). It includes many thinkers who see this orientation and the ethics arising from it as crucial to the possibility of ecologically viable futures (Alaimo, 2016; Puig de la Bellacasa, 2017). Some have explored the question of whether and how these relations might be understood specifically as political relationships, a proposition complicated by customary associations of political action with reasoned speech and deliberation, and by the fact that the non-human others with whom we might otherwise have a political relationship typically do not speak (or, at least, do not speak typically) (Baker, 2020; Bennett, 2010; Connolly, 2017; Latour, 2004; Povinelli, 2016; Stengers, 2010).

This is where Butler’s (2016) intervention becomes particularly generative, in that it suggests the possibility of infrastructure as the form such a politics might take. As she describes, it is commonplace to cast vulnerability and political agency
as opposites and “to assume that vulnerability is disjoined from resistance, mobilization and other forms of deliberate and agentic politics” (p. 22). This opposition relies on an account of politics as a conversation between autonomous, self-determining, sovereign subjects that feminist thought has long since exposed to be a masculinist fantasy. Politics takes place under the sign of heteronomy, a response to the inescapable experience of being acted upon by others. It is not the expression or assertion of our autonomy—it is the mediation of our ongoing and shared vulnerability. As Butler (2016) avers, if we reject the binary between vulnerability and political agency, and understand them to be complementary rather than opposed or mutually negating, we can think about politics in new modes. These are modes in which “vulnerability is still there, but only now assuming a different form” (p. 23). Butler does not make this argument but infrastructure can itself be understood as a mode of politics under these conditions, a material response to the experience of shared vulnerability between humans and non-humans alike. Infrastructure is not only a name for this shared vulnerability but the very form that politics between and among these beings takes—with politics understood as the mediation of their mutual dependency.

In her essay “The Commons: Infrastructures for Troubling Times,” Lauren Berlant (2016) suggests that “one task for makers of critical social form is to offer not just judgment about positions and practices in the world, but terms of transition that alter the harder and softer, tighter and looser infrastructures of sociality itself” (p. 393). The political subject of infrastructure is not just the subject for whom infrastructure is an instrument of various violent and failing sovereignties, or the site for contesting them. This subject is also a maker of critical social form (not just arguments), a carrier of the destituent powers of building, repairing, caring, provisioning, planning, and kin-making. These are the powers of “non-sovereign relationality” that Berlant (2016) describes as “the foundational quality of being in common” (p. 394). Enacting these powers takes the material form of infrastructure, not speech. Infrastructure is the form that politics takes in troubling times, under conditions where existing political economies become or are rendered inoperative, a way of mediating relations between humans, and between humans and the non-speaking others they depend on and who depend on them. Under these conditions, “the question of politics becomes identical with the reinvention of infrastructures for managing the unevenness, ambivalence, violence and ordinary contingency of contemporary existence” (Berlant, 2016, p. 394, emphasis added). Infrastructures become the means, or staging ground, for “the nonreproductive making of life”—for making lives that do not simply reproduce the relations that structure the present, ad infinitum. In this sense, Berlant (2020) has recently described herself as “an infrastructuralist”: “I am interested in the build. I am interested in how we build out difference from within the world we are living in … trying to build out infrastructures for collective life that refuse the one we
are living” (n.p.). Here, infrastructure names the collective practice of literally making a difference.

A similar orientation toward infrastructure and politics is evident in Métis scholar Michelle Murphy’s (2018) stirring account of the politics of “alterlife,” the politics of anti-racist, queer, and decolonial reproductive and environmental justice:

Alterlife resides in ongoing uncertain aftermaths, continually challenged by violent infrastructures, but also holding capacities to alter and be altered—to recompose relations to land and sociality, to love and sex, to survival and persistence, to undo some forms of life and be supported by others, to become alter-wise in the aftermath of hostile conditions, to surprise. (p. 117)

The surprises of alterlife take infrastructural forms. Alterlife politics attend to “what relations should be dismantled, refused and shunned ... and which kinships, supports, structures, and beings get to have a future” (p. 110), questions whose answers invariably take the form of infrastructural dismantling and making, respectively. In particular, this politics takes the form of dismantling infrastructures that reproduce the separation of certain human bodies from others, and from lands, waters, air, and non-human beings to enable the extraction, exploitation, and exhaustion of the latter for the benefit of the former. And it takes the form of building and supporting infrastructures that materialize being otherwise, in ways that enable life chances and careful, responsible relations, instead of selectively and unequally disabling and destroying them.

This is likely what Deborah Cowen (2020) means when, in the contributor’s note for her article with Winona LaDuke, she declares that she is “deeply committed to the transformative potential of infrastructure” (p. 432). As LaDuke and Cowen (2020) write,

... despite the severity of the situation, the future is not foreclosed. We have agency, and life is magical. In Anishinaabe prophecy, this is the moment of choice, when two paths open before us ... we suggest the choosing a good path requires the revolutionary but also profoundly practical work of infrastructure. (p. 244)

Beyond Wiindigo infrastructure lies what they call “alimentary infrastructure—infrastructure that is life-giving in its design, finance and effects” (p. 245). “Infrastructure is the spine of the Wiindigo,” they write, “but it is also the essential architecture of transition to a decolonized future” (p. 246). LaDuke and Cowen (2020) highlight several examples of the practical, decolonizing work of infrastructure in contemporary Indigenous communities: the Kayenta solar project, owned and operated by the Navajo Nation, which is the largest tribally owned renewable energy plant in the United States; the Eighth Fire Solar project at White Earth reservation in Northern Minnesota, where La Duke’s own hemp manufac-
turing operation has also reached infrastructural scale; renewable energy infra-
structure projects underway in multiple Indigenous communities in Canada (see
also Kinder, 2021); agricultural and logistical infrastructures to enable food security
and medical supplies for remote Indigenous communities in Canada; “solutionary
rail” systems that run on renewable energy in the United States; and infrastruc-
tures of social, spiritual, and mental healthcare across multiple Indigenous com-
munities. Initiatives such as these are but the latest examples in a very long
historical line in which Indigenous communities, activists, and leaders have re-
responded to the infrastructural violence of settler colonialism with infrastructural
plans of their own (Coulthard, 2014).

Conclusion
This inquiry into the potential of infrastructure as a form of politics beyond words
began with Spice’s (2018) radical suggestion that the word infrastructure itself can-
not be unburdened of its historical association with (racial) capitalism and (set-
tler) colonialism, and so might foreclose other ways of being that are in resistance
or alternative to these persistent formations, including Indigenous relational on-
tologies and futures. In this case, infrastructure would be the very name of violent
dispossession, extraction, exploitation, and environmental injustice. Generously,
Spice (2018) posed this provocation in the form of a question: “Does the word in-
frastructure itself denote an apparatus of domination?” (p. 48, emphasis added),
which invites the consideration of more than one possible answer.

Based on a canvas of recent interdisciplinary attention to the politics of infras-
tructure, my own answer to this question is: sometimes. It is certainly the case that
when the word “infrastructure” is uttered by industrialists, developers, financiers,
and their representatives in the settler-colonial state, it means exactly what Spice
(2018) says it does: “the circulation of certain materials, the proliferation of certain
worlds, the reproduction of certain subjects” (p. 50), essentially, the materials,
worlds, and subjects of capitalist extraction, dispossession, and exploitation.
However, when it is invoked by others, it seems to point to something else, some-
thing akin to what Spice (2018) herself describes as “an opening in which other
possibilities can assert themselves” (p. 50). Sometimes these possibilities rest on
resisting invasive and destructive infrastructures. Sometimes they rest on dismant-
ling infrastructures that support and protect some lives and forms of life at the ex-
pense of others. Sometimes they rest on defending and protecting infrastructures
that sustain diverse lives and relations in particular settings, such as when
Wet’suwet’en land defender Freda Huson, describing the berry patches, salmon
habitats, and ursine ecologies threatened by the Coastal GasLink pipeline, says,
“that whole cycle and system is our critical infrastructure, and that’s what we’re trying
to protect, an infrastructure that we depend on” (quoted in Spice 2018, p. 41, em-
phasis in original). And, sometimes, holding open other possibilities demands
building, repairing, and maintaining infrastructures that destitute, or “fail,” to reproduce existing ways of living that are unjust or destructive and that constitute better, more just ways.

These are the modes of politics in infrastructural form. It is a form of politics whose ontology rests not on the variable currency of words spoken to justify or persuade (including the word “infrastructure” itself) but on the relative durability of embodied relations and the material arrangements by which they are mediated. As Spice (2018) writes, “The work of undoing settler colonial invasion requires blocking, resisting, and suspending the infrastructures of oil and gas and the systemic dominance of capitalism. It also requires attending to and caring for the networks of relations that make Indigenous survival possible” (p. 52). I would give the material forms taken by these networks of attention and care the name “infrastructure.” Spice (2018), perhaps, would not, but this might be beside the point. Her careful description of the specific challenges facing Indigenous communities vis-à-vis settler colonial infrastructure applies even more broadly to the work of politics under conditions of environmental and relational duress. Such conditions demand a politics that is something more than just a good argument, better representation, lively debate, and an agreement to disagree. They demand a politics oriented toward unmaking material infrastructures of inequality, exploitation, and environmental destruction, and replacing them with infrastructures that make possible more just, caring, and environmentally responsible ways of living. Communication and media studies have always attended to communication and mediation in infrastructural ways; recent work in the broader interdisciplinary field of infrastructure studies raises the stakes of this attention considerably. What are the practices of information, mediation, and communication characteristic of, or proper to, a politics beyond words that takes the form of infrastructure? The work gathered by this special edition marks an important step toward answering this question.

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Note
1. There are good reasons to be wary of a wholesale repudiation of critique. On the liabilities of this position as it manifests in some versions of posthumanism, see Dana Luciano and Mel Chen (2015).
References


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ABSTRACT

Background: Indigenous-led struggles against fossil fuel infrastructure in North America have become increasingly visible. These struggles occur on the ground as well as through cultural production that performs cultural resistance.

Analysis: This article examines Anishinaabe, Métis, and settler-Irish media theorist and artist Elizabeth LaPensée's video game Thunderbird Strike as a form of Indigenous cultural resistance to extractivism.

Conclusion and implications: Thunderbird Strike expresses the necessity of halting the expansion of extractivism by inviting players to participate in the sabotage of unjust infrastructure. In asking players to enact the very forms of generative resistance that the game articulates at a narratological level, Thunderbird Strike reveals the possibilities for video games to prefigure the transition to a decolonial, post-extractive future.

Keywords: extractivism; infrastructure; sabotage; settler colonialism; video games

RÉSUMÉ

Contexte : Les luttes menées par les groupes autochtones contre l'infrastructure des combustibles fossiles en Amérique du Nord deviennent de plus en plus visibles. Ces conflits se produisent sur les plans du territoire et de la « résistance culturelle ».

Analyse : Cet article interroge Thunderbird Strike (2017), un jeu vidéo d’Elizabeth LaPensée—anishinaabe, métisse, irlandaise-canadienne—en tant que type de résistance autochtone culturelle aux pratiques extractivistes.

Conclusion et implications : L’auteur démontre que Thunderbird Strike incite l’arrêt de l’extractivisme en invitant ses participants à saboter « l’infrastructure injuste ». En demandant aux participants de promulguer les formes de résistance générative que le jeu articule au niveau de la narratologie-même, Thunderbird Strike dévoile le potentiel des jeux vidéos de préfigurer la transition à un futur décolonial et post-extractif.

Mots clés : l’extractivisme; infrastructure; sabotage; colonialisme; jeux vidéos
Extraction is a cornerstone of capitalism, colonialism, and settler colonialism.
—Leanne Betasamosake Simpson (2017, pp. 201)

Extractivism is a nonreciprocal, dominance-based relationship with the earth, one purely of taking …. It is the reduction of life into objects for the use of others, giving them no integrity or value of their own.
—Naomi Klein (2014, pp. 169)

Introduction
The past decade has marked a relative boiling point for pipeline politics across North America that has, among other things, drawn attention to the settler colonial inertia of extractivist fossil fuel infrastructure development. In the United States, on the heels of the highly publicized 2016–2017 demonstrations at Standing Rock in North Dakota to protest the Dakota Access Pipeline, President Donald Trump revived the Keystone XL pipeline expansion through executive order (Smith & Kassam, 2017). In Canada, instrumental decisions were made regarding pipeline projects with perpetually uncertain futures, such as the conditional approval of Kinder Morgan’s Trans Mountain Expansion Project in 2016 (National Energy Board, 2016), which was followed by the federal government purchasing the project for $4.5 billion in 2018. And construction surrounding TC Energy’s natural gas pipeline project in Northern British Columbia, Coastal GasLink, has continued to encroach on unceded Wet’suwet’en territory. These episodes are only a handful of the most prominent events that have occurred over the past several years on what political anthropologist Kregg Hetherington (2019) calls “the frontlines of the Anthropocene” (p. 8), as less publicized projects move forward and smaller-scale resistance persists. Yet, these historical pressure points arguably stand out in terms of how they have amplified in the public imaginary the intersections of fossil fuel infrastructure development and continued settler colonialism.

In this context of heightened collective attention toward fossil fuel infrastructures and the broader extractivist energy regime they comprise, Anishinaabe, Métis, and settler-Irish media theorist and practitioner Elizabeth LaPensée (2017c) released a multiplatform video game called Thunderbird Strike. The game was funded in part by a grant from the Minnesota-based Arrowhead Regional Arts Council. Upon the game’s release, pipeline advocacy group Energy Builders (2017) issued a statement against it that quoted its president accusing the game of “encourage[ing] eco-terrorism” and called for Michigan State University, which housed the lab the game was developed in, “to pull the plug immediately on this taxpayer-funded political campaign” (para. 5). This press release spurred a larger media event that saw Minnesota State Senator David Osmek decry the game as “an eco-terrorist version of Angry Birds” (Minnesota Senate Republican Caucus, 2017, para. 2). In the wake of this media event, the Minnesota House of
Representatives approved a bill that, among other conditions, “would prohibit funding projects that promote domestic terrorism or criminal activities” (Turtinen, 2018, para. 3). A two-dimensional side-scroller with vivid stop-motion animations propelled by a narrative that weaves together elements of traditional Anishinaabe stories, the game invites players to embody a thunderbird flying over the Alberta tar sands eastward to the Great Lakes. Flying over these landscapes, players harness electric energy from thunderous clouds to sabotage fossil fuel infrastructure and revive or (re-) activate victims of extractivism, including animals and people, along the way. Taken together, the destruction of unjust fossil fuel infrastructures and equipment alongside the restoration of the victims of extractivism serves as a world-building, future-casting mechanism. This dyadic mechanism offers a vision for a post-extractive infrastructural future that emerges out of the ruins of settler colonial fossil fuel society—ruins that players participate in creating within Thunderbird Strike (LaPensée, 2017c).

This article engages with Thunderbird Strike (LaPensée, 2017c) to examine the role that video games and, in turn, cultural production more generally can play in resisting extractivism while working toward the realization of a more equitable, sustainable energy future by producing alternative infrastructural imaginaries. Existing critical commentary on Thunderbird Strike (LaPensée, 2017c) tends to approach its resistance to settler colonialism and expression of ecological activism in terms of how it embodies and communicates Indigenous worldviews in form and content (Madsen, 2018a, 2018b). As a point of complementary departure, this article focuses more closely on how Thunderbird Strike (LaPensée, 2017c) foregrounds struggles over infrastructure as determinant sites through which Indigenous sovereignty is expressed and conditions for a more equitable energy future are realized. Infrastructures are not passive or neutral objects that serve exclusively technological ends; they are media that shape social and ecological relations and determine possible futures. A growing body of scholarship within the field of infrastructure studies theorizes about these social and cultural dimensions of infrastructure, including the ways in which infrastructures mediate and reproduce dominant power relations (see Anand, Gupta, & Appel, 2018; Barney, 2017; Cowen, 2017, 2018; Durham Peters, 2015; Easterling, 2014; Jones, 2013; Star, 1999). As Deborah Cowen (2018) argues in relation to Canada’s infrastructural past and present, for instance, the building of infrastructure was a circuitous means to undermine Indigenous sovereignty: “Historically and in the present the construction [of] railroads and pipelines relied upon the settler states’ claims to jurisdiction, but that jurisdiction is also materialized through infrastructure” (p. 15). At the centre of energy infrastructure development in settler colonial nations are questions of land and territory that are rooted in a broader project of settler colonialism enacted through infrastructural development in a sort of self-propelling, self-fulfilling mode of settler-state legitimation.
These spatial-jurisdictional infrastructural politics that continue to undermine Indigenous sovereignty are a (if not the) focal point of Thunderbird Strike’s (LaPensée, 2017c) intervention. Indeed, Thunderbird Strike’s (LaPensée, 2017c) mechanics lay bare the necessity of disrupting business as usual to halt the expansion of what human ecologist Andreas Malm (2016) and others call the fossil economy in order to (re-) build a world otherwise. In situating LaPensée’s (2017c) Thunderbird Strike within a broader tradition of Indigenous resurgence and drawing on insights from the fields of infrastructure studies and the energy humanities, this article shows that Thunderbird Strike (LaPensée, 2017c) is a form of cultural resistance to the bounded processes of settler colonialism and extractivism (Coulthard, 2014; Simpson, 2017; Willow, 2016) that offers visions of alternative infrastructural futures rooted in assertions of Indigenous sovereignty. First, a brief analysis of Thunderbird Strike’s (LaPensée, 2017c) formal mechanics and narratological trajectory, which relies on Liam Mitchell’s (2018) “ludopolitics” and Alexander Galloway’s (2006) notion of “gamic action,” preliminarily maps out how LaPensée leverages video games as interactive media for critical and generative ends. These mechanisms of restoration and destruction are then used as guiding signifiers to elaborate on Thunderbird Strike’s (LaPensée, 2017c) expression of Indigenous resurgence and cultural resistance, and on its proposition of an expanded notion of sabotage as a necessary mode of action to move beyond extractivism. Throughout the article, Thunderbird Strike (LaPensée, 2017c) is not only treated as representative of conceptual frameworks surrounding Indigenous resurgence and the politics of sabotage but also as an active contribution to these frameworks.

Beyond consciousness-raising: The ludopolitics of Thunderbird Strike

Through a series of close readings of the mechanics, design, and narrative content of popular video games, ranging from mainstream titles to independent ones, Liam Mitchell (2018) proposes the notion of the “ludopolitical” to theorize about what video games uniquely offer as interactive media. “As an index of our assumptions about what the world is,” Mitchell (2018) writes, “videogames also suggest what the world should be. They express the desire to see it changed” (p. 1). Contained within Mitchell’s (2018) framing is an explicit recognition of the dual function of video games, both as a kind of diagnosis of the present as well as a prefigurative signal toward alternative futures. That is, they express a desire for a world otherwise. At the centre of these desires, according to Mitchell (2018), is control and, it follows, power—forms of control and power that are provided to the player through gameplay mechanics and interface relations. Following Mitchell (2018), this article looks to control as a keyword to orient Thunderbird Strike’s (LaPensée, 2017c) interventions against the machinations of settler colonialism and the fossil economy.
The foundational mechanics of *Thunderbird Strike* (LaPensée, 2017c) are based on a process of harnessing electrical energy from thunderous clouds that can then be deployed by players for two purposes: actions that garner points in the respective categories of “destruction” and “restoration.” First, electrical energy can be deployed for the destruction of industrial equipment, such as loaders, and infrastructure, such as the game’s final “boss”: an animistic pipeline in the form of a serpent whose weak points players target and attack to defeat (see Figure 1). Conversely, the thunderous energy can also be used to reanimate skeletal animals or revitalize human figures by transforming dormant figures into vibrant ones (see Figures 2 & 3). In other words, the energy can be deployed to revive and rejuvenate the victims of extractivism. Both of these processes converge to form the core mechanics of *Thunderbird Strike* (LaPensée, 2017c) and gesture to the game’s larger vision of diagnosing or critiquing the deleterious effects of the fossil economy while simultaneously highlighting the necessity for action to move beyond such an economy. In ascribing scores of equal weight to both actions (see Figure 4), the game’s structuring dyad suggests that the destruction of some elements of our current infrastructural regime is necessary for human and more-than-human beings to flourish.
Figure 3

Figure 4

A distinguishing feature of video games as a medium is their capacity for integrating participation as a primary mode of engagement. As media theorist Henry Jenkins (2006) canonically notes, however, participation has become a broader signifier of the contemporary mediascape. These participatory characteristics are seen as definitive aspects of new media and the media ecosystem they are a part of. In this conjuncture, media theorist Alexander Galloway (2006) proposes the notion of “gamic action” to name the unique aspects of video games as a medium—going beyond the expanded notion of participation or interaction that Jenkins (2006) relies on to theorize the contemporary media moment. Comparing video games to other media through the vector of action, Galloway (2006) explains: “indeed, one takes a photograph, one acts in a film. But these actions transpire before or during the fabrication of the work, a work that ultimately assumes the form of a physical object (the print)” (p. 2). “With video games,” Galloway (2006) continues, “the work itself is material action. One plays a game. And the software runs” (p. 2).

Returning to the line of questioning that inspired Mitchell’s (2018) account of the ludopolitical, how do fantasy and control factor in Thunderbird Strike (LaPensée, 2017c)? Mitchell (2018) claims that video games offer a fantasy of control that modulates the pleasure of players in a number of affective registers: “Designers craft power fantasies to satisfy players’ desires for control, but they also
make games that leave players feeling impotent, guilty, or confused—in a good way” (p. 2). This argument, which seeks to capture the broad range of affects that video games offer, does not quite suit Thunderbird Strike (LaPensée, 2017c), a game propelled by an impetus to collapse avatars of real-world structures that prop up a dominant settler colonial fossil fuel energy regime. Rather than offer a fantasy, Thunderbird Strike (LaPensée, 2017c) instead casts players as virtual land and water protectors (Madsen, 2018a), as a material possibility for action in Galloway’s (2006) sense. While there are no doubt a number of theorists that could be drawn upon here from the burgeoning field of video game studies, both Mitchell’s (2018) and Galloway’s (2006) treatments of control and action precisely illuminate the fundamental characteristics and mechanics of Thunderbird Strike (LaPensée, 2017c) that this article hones in on. The closing animated scene of the game is telling here in terms of control and action: pump jacks fade into windmills (see Figures 5 & 6), providing a speculative conclusion to the player’s actions taken throughout the game and showing how actions of destruction and restoration produce conditions for transition.

In Thunderbird Strike (LaPensée, 2017c), players can choose how to play without punishment, save for a zero score across the categories. In other words, unlike many conventional side-scrolling shooters, there are no “lives” as such, and a lack of action produces a particular outcome anticipated by LaPensée. One can move through the game world of Thunderbird Strike (LaPensée, 2017c) without doing anything beyond pressing start as the thunderbird continues to move from level to level, from right to left, until the final level, which will eventually come to a close with the pipeline-serpent self-destructing if players fail to act. Through this choice, players arguably participate in the maintenance of the fossil economy or

![Figure 5](image-url)

![Figure 6](image-url)
the continuation of business as usual. Though LaPensée tells us that “[y]ou always win” (HeARne & LaPensée, 2017, p. 32), this is not entirely accurate: inaction arguably reproduces settler colonial extractivist relations by leaving the serpent-pipeline to harm the environment beyond mitigation. Although the animistic pipeline eventually self-destructs, players are awarded zero in this particular level’s metric of scoring: a “time bonus.” The lesson on offer here is that without proactive action, this socially, economically, and ecologically deleterious business-as-usual scenario will carry on until inevitable ecological devastation is complete.

The paratextual elements hosted on the official website of Thunderbird Strike (LaPensée, 2017c) offer deeper insight into the lessons of the game—expressing how it indexes the world as it is, to use Mitchell’s (2018) parlance, and foregrounding what it should be. In these registers, the website serves as a pedagogical hub of resources for reflection and, tellingly, the prima facie mode through which video games function: action. Under the heading “Reflect,” LaPensée (2017b) elaborates on the social, ecological, political, and historical context of Thunderbird Strike through the subheadings “Thunderbirds,” “Toxins,” “Tar Sands,” “Prairies,” “Great Lakes,” and, finally, “Call to Action.” Here LaPensée (2017b) narrates the original stories that inspired the game’s narrative and its characters, including the thunderbird and the serpent, while offering pedagogical prompts to visitors for further reflection. Under “Act,” LaPensée (2017a) links to spaces where visitors can learn more about pipelines through the Honor the Earth campaign homepage, speak up against pipelines through the circulation of Métis artist and scholar Dylan Miner’s “No Pipelines on Indigenous Land” poster (see Figure 7), join ceremonial water walks led by Anishinaabe grandmothers, and participate in divestment campaigning alongside Mazaska Talks (Money Talks), an Indigenous-led international umbrella organization campaigning for banks across the globe to halt the funding of fossil fuel development.

Both of these paratextual spaces offer a vision of the activist ecosystem in which Thunderbird Strike (LaPensée, 2017c) exists, which erodes the boundary between the game world and the material one. In its larger media context, Thunderbird Strike (LaPensée, 2017c) persistently signals that the struggle against the fossil economy occurs in the imperative mood. This imperative delineation is conditioned by a recognition of the interrelationship between settler colonialism
and extractivism, as materialized through the continued inertia of fossil fuel infrastructure development. Using the mechanics of restoration and destruction as conceptual anchors, this article will elaborate on how these relations work together in terms of *Thunderbird Strike*’s (LaPensée, 2017c) expressions of Indigenous resurgence and cultural resistance on the one hand and its employment of sabotage toward “unjust infrastructure” as a mode of self-defence and self-determination on the other. Together, these two registers offer a vision for a future based on alternative infrastructural imaginaries that are simultaneously decolonial and post-extractive.

**Refusing extractivism through restoration, or, *Thunderbird Strike* as radical resurgence**

By inviting players to participate in virtual actions of place-based resistance, *Thunderbird Strike* (LaPensée, 2017c) is part of a broader tradition of Indigenous resurgence that thinkers such as Michi Saagiig Nishnaabeg theorist Leanne Betasamosake Simpson (2017) have recently theorized. A fundamental lesson from many Indigenous voices today is that the expressions of resistance that have made headlines over the past several years are not recent developments. Instead, such expressions are part of a longer tradition of perpetual resistance toward the colonial relations of settler states and embody a broader practice of refusal toward the machinations of settler colonialism on the one hand and an assertion of sovereignty on the other (Coulthard, 2014; Estes, 2019; A. Simpson, 2014; L.B. Simpson, 2017). Yet, given the ebbs and flows of coverage conducive to the conventional mediascape that, as Rob Nixon (2011) famously put it, attends more generously to spectacular events than the durational forms of “slow violence” (pp. 2–3) that define much persistent structural, social, and environmental violence, how Indigenous resistance to settler colonial actions and apparatuses enters the broader popular imaginary through media is selective. At the same time, Indigenous-led movements—including Idle No More (ongoing since 2012) and the #NoDAPL demonstrations at Standing Rock against the Dakota Access Pipeline (2016–2017)—have highlighted how a material on-the-ground struggle is waged in parallel with a kind of media struggle.

In *As We Have Always Done: Indigenous Freedom through Radical Resistance*, Leanne Betasamosake Simpson (2017) outlines a growing movement of Indigenous resurgence with shared tenets and motivations, a movement she situates under the banner of the Radical Resurgence Project. For Simpson,

> The Radical Resurgence Project simultaneously names an expansive dispossession as our primary relationship with the state, it names colonialism as the meta-system of domination, and it categorically refuses both. It refuses neoliberalism’s move to separate cultural resurgence from political resurgence and co-opt it. (p. 54)
Through this formulation, Simpson (2017) draws attention to the fundamental interconnectedness or, indeed, intersectionality of settler colonialism’s deleterious effects and consequences on Indigenous peoples as she explicitly rejects the ways in which Indigenous politics often sets up “a hierarchy of issues” that prioritizes perceived political issues such as land claims over “issues regarding children, families, sexual and gender violence, and bodies” (p. 53). Movements such as Idle No More, which was initiated by Nina Wilson, Sylvia McAdam, Jessica Gordon, and Sheelah McLean in the winter of 2012 and continues today in a number of manifestations, foregrounded intersectional issues resulting from settler colonialism and challenged Bill C-45: Jobs and Growth Act (Parliament of Canada, 2012). The bill was over 450 pages and contained changes to a number of Acts that would negatively affect long-standing treaty rights across a number of categories. Gathering under the declaration that enough is enough, Idle No More arguably acted from the recognition of “colonialism as a form of structured dispossession” (Coulthard, 2014, p. 7), and that the effects of dispossession in this way alienates Indigenous peoples from the lands they have always had a deep relationship with.

Through engagement with other contemporary Indigenous thinkers, Simpson (2017) articulates a politics of refusal and resistance tied to a long tradition of resistance, which the title of her book aptly gestures to. The resistance and refusal embodied in her theorization of recent and ongoing Indigenous resurgence is part of what Mohawk theorist Audra Simpson (2014) more broadly identifies as a politics of refusal. This refusal, she argues, conditions Mohawk identity as a people who have resisted settler colonialism and asserted sovereignty primarily through mechanisms of refusal: refusal to adopt American or Canadian citizenship as “border peoples,” refusal to base Mohawk identity through a politics of recognition with the settler state, and so on. By refusing the settler state’s impositions of identity in this way, Simpson (2014) argues that refusal operates as a way of asserting sovereignty. “Refusal,” she writes, “comes with the requirement of having one’s political sovereignty acknowledged and upheld” (p. 11).

Putting Simpson’s (2014) approach to refusal as an Indigenous mode of existence in relation to and against the settler state and Glen Coulthard’s (2014) elaboration of “grounded normativity” (p. 13) as a practice of place-based politics into conversation with each other, Leanne Betasamosake Simpson (2017) synthesizes their views to further detail the aims and methods of the Radical Resurgence Project. Refusal and grounded normativity here serve as methods through which to resist settler colonialism, a process that extractivism underwrites while simultaneously affirming sovereignty. In this way, refusal is generative. And while it is important to underscore that Coulthard (2014), Audra Simpson (2014), and Leanne Betasamosake Simpson (2017) are writing from different perspectives—Dene, Mohawk, and Mississauga Nishnaabeg, respectively—it is also important to draw parallels with these worldviews as peoples resisting the same settler colo-
nial apparatuses. Indeed, Leanne Betasamosake Simpson’s (2017) synthesis shows as much through strategies of resistance that, at their foundation, assert sovereignty and participate in Indigenous internationalism premised on solidarity among Indigenous nations.

Following Simpson’s (2017) provocations, then, we can ask how a video game puts forward a politics of grounded normativity and, indeed, if it can at all. Commenting on the instrumental role of social media in recent Indigenous movements such as Idle No More, Simpson (2017) provocatively and reservedly suggests that “grounded normativity does not structurally exist in the cyber world, because it is predicated on deep, spiritual, emotional, reciprocal, real-world relationships between living beings” (p. 221). “Dispossessed from our Indigenous material worlds, our thought systems and our practices, are we losing the ability to be makers and to solve problems?” (p. 221) she questions. Simpson’s (2017) critique here is aimed at a particular kind of tendency of network society (Castells 2009) to reproduce already existing uneven social and economic relations—what Jodi Dean (2009) calls “communicative capitalism” (p. 2). Dean’s (2009) notion underscores the tendency for communicative technologies and systems produced under capitalist conditions to reproduce those conditions in their operation by subsuming resistance to them. Simpson (2017) similarly shows how these tendencies can potentially undermine real-world Indigenous organizing by capturing efforts and syphoning them through larger capitalist and colonial sets of relations.

This emphasis on the cyber world casts a potential critique on the kinds of cyber worlds generated by Indigenous-designed video games such as Thunderbird Strike (LaPensée, 2017c). Simpson’s (2017) critique is leveraged against social media more generally as a connective yet, ultimately, alienating media infrastructure, rather than a critique of digital cultural production more generally. However, a latent scepticism of the virtual undergirding her argument hedges the possibility of the virtual or digital meaningfully impacting the material world. She describes this reliance on digital technologies for movement building in terms of alienation more fully:

I wonder if this creates further alienation from oneself, from Indigenous thought and practices, and from the Indigenous material world. I wonder if this is a digital dispossession from ourselves because it further removes us from grounded normativity. The [i]nternet is the ultimate Cartesian expression of mind and mind only. There are no bodies on the Internet. There is no land. (p. 221)

In other words, Simpson (2017) sees the contradictions at play in the mobilization of capitalist media technologies and infrastructures and, more broadly, the virtual as in some ways determining and delimiting the possibilities for their role in emancipatory, decolonial projects.
LaPensée, however, is keenly aware of these contradictions, which her game both embodies and is situated within, particularly in relation to extractivism at both the conceptual and material levels, as well as in terms of the limitations of media and cultural production alone to effectively make change. In a 2017 interview with Joanna Hearne, LaPensée describes making *Thunderbird Strike*, showing concern “that people will probably call it an activist game” (Hearne & LaPensée, 2017, p. 33). In anchoring the conversation to the ways that the game functions as a form of activism, LaPensée reveals a kind of hesitation in framing it as “direct action” (Hearne & LaPensée, 2017, p. 33). Hearne challenges this hesitation by emphasizing that games such as *Thunderbird Strike* “support consciousness raising, when you learn to destroy something and then you learn to be gentle with something” (Hearne & LaPensée, 2017, p. 33). Here, LaPensée meditates on the relationship between dynamics and how they are bound to the broader material contexts in which they are produced and circulated, pointing out that although *Thunderbird Strike* takes aim at the settler colonial enterprise of extractivism, its own existence in such a media ecosystem is also entirely ironic because of the mining that’s happening for the materials that are used to make the iPhone that we’re playing the game on. I mean, at some point, unless there is such a shift that people really are genuinely looking at other ways of making technology, there will always be some way in which there is harm being done. (Hearne & LaPensée, 2017, p. 33)

She concludes her line of thought by suggesting that work can still be done using these technologies “with hope for a better future and laying pathways for changes, because the ways that iPhones are made are deplorable. Eventually there has to be a transition to other ways” (Hearne & LaPensée, 2017, p. 33).

These observations provide important insights about the form and content of *Thunderbird Strike* (LaPensée, 2017c). LaPensée’s attention to the extractivist materiality of mobile communicative technologies in her interview with Hearne (Hearne & Lapensée, 2017) recognizes that *Thunderbird Strike* has an uncomfortable relationship to the media through which it is experienced. LaPensée implicitly builds on recent developments in media studies that ask us to attune our critical senses to the material conditions under which media are produced as part of our methodological and critical practices (e.g., Cubbitt, 2017). She articulates this problematic not simply as a constraint but as a site of potentially productive tension. This uneasy relationship recognizes how this material-spatial and political-economic reality negotiates the layers of mediation that the game as media exists within, shapes, and influences. Indeed, it is precisely within this space of discomfort and alienation between the cultural and political aims of *Thunderbird Strike* (LaPensée, 2017c) and the material-ecological realities under which it was created.
and is circulated that the possibility for intervention through alternative infrastructural imaginaries is revealed.

_Thunderbird Strike_ (LaPensée, 2017c) is ultimately part of a growing body of Indigenous video games that “portray Indigenous storytelling, teachings and ways of knowing for their own people and the wider world” (LaPensée, 2017d, para. 5). LaPensée (2017d) points out in a survey of contemporary Indigenous video games that mainstream video games often “misrepresent or appropriate from Indigenous communities by falling back on stereotypes or including cultural content without involving Indigenous people in the development process” (para. 1). These kinds of tensions underwrite the context in which _Thunderbird Strike_ (LaPensée, 2017c) was produced, as it emerged from a question LaPensée asked herself: “If a game told our stories about extraction instead, what would it look like?” (Kinder & LaPensée, 2019, p. 201). Her more recent game, _When Rivers Were Trails_ (LaPensée, 2019), directly challenges how these settler colonial relations are reproduced in video games by playing with the form of _The Oregon Trail_, a popular 1970s educational game that mythologizes settler history, in a way that foregrounds sovereignty in its production process and in its content. In an article that explores the interventions of _When Rivers Were Trails_, LaPensée (2020) cites examples, including _Never Alone_ (Kisima Ingitchuna) (E-Line Media, 2014) and _Terra Nova_ (Longboat, 2019), as evidence of the growing number of “[v]ideo games with self-determined representations” (p. 4). Video games, she argues, “offer opportunities for self-determined expressions conveying Indigenous heritage in dynamic ways” (LaPensée, 2020, p. 1). They also resist dominant settler imaginaries through the production of worlds that complicate Simpson’s (2017) skepticism of the virtual. In other words, video games can serve as a medium to do restorative work at multiple levels—from political economy that collaboratively centres Indigenous artists, writers, and designers to modes of play that make these expressions of self-determination available to a larger Indigenous and non-Indigenous audience in engaging ways.

Experientially offering alternative infrastructural imaginaries is the primary mode through which _Thunderbird Strike_ (LaPensée, 2017c) expresses cultural resistance to settler imaginaries and foregrounds self-determination. Cultural resistance refers to resistance that mobilizes cultural production for activist ends that operate alongside material resistance. Although cultural and material resistance are not separate, separating them in this way establishes a conceptual space to reflect on the role of media and cultural production in mediating political possibility beyond mere echoes of on-the-ground movement—they are part of these movements. Others have framed the interventions that _Thunderbird Strike_ (LaPensée, 2017c) makes at the level of culture as “aesthetic activism” (Madsen, 2018b). For Deborah Lea Madsen (2018b), _Thunderbird Strike_ furthers the mission of water protection by compelling players to perform the Anishinaabe principle of
Gidakiiminaan. She quotes the Seven Generations Education Institute definition of Gidakiiminaan as “the experience of knowing and understanding the relationships that exist throughout Creation, and understanding your own role and responsibility in this relationship” (p. 11).

Madsen’s (2018b) view of Thunderbird Strike as aesthetic activism describes the ways in which players are oriented toward a particular form of action founded on Anishinaabe principles and worldviews. Though Madsen (2018b) does not engage this lineage, the concept of aesthetic activism used in these ways is tied to Dean Rader’s (2011) employment of the concept, linking to a longer political aesthetic tradition of Indigenous art, literature, and film. This is a productive starting point to address the ways infrastructure is presented as the site on which such activism is concentrated, but it must be explored with LaPensée’s hesitance in framing the game as activism in mind. However, despite this hesitance, the ludopolitical dimensions of possibility propelled by gamic action are further articulated in terms of how people appear in the game as a kind of avatar or stand-in for players themselves in activist contexts. They appear both as already activated, carrying signs as if marching in a demonstration—which players can draw energy from—or they appear as dormant beings that require restoration to become activated. If an equitable energy transition away from fossil fuels and extractivist energy regimes more generally requires both material forms of resistance as well as cultural ones (Kinder, 2016), then Thunderbird Strike (LaPensée, 2017c) contributes to this future through aesthetic means. What Thunderbird Strike (LaPensée, 2017c) offers players is a virtual experience in sparking a transition from a position that centres Indigenous voices and expresses the incompatibility of extractivist infrastructures and just energy futures.

Unjust infrastructures and an expanded notion of sabotage, or, destroying extractivism

Building on recent scholarship that examines the cultural and material tendencies of infrastructure along with an engagement of perspectives on sabotage in the era of fossil fuels, this section more closely maps the infrastructural terrain upon which Thunderbird Strike (LaPensée, 2017c) intervenes. Offering an account of the relationship between infrastructure, settler colonialism, and the politics of sabotage, Thunderbird Strike (LaPensée, 2017c) is situated in the contemporary moment under what Jeff Diamanti and Mark Simpson (2017) describe as “the shadow of fossil capital” (p. 3), a shadow cast over the totality of social and ecological relations in the geologic epoch we inhabit, which some call the Anthropocene. In providing an exposition of the tension between just and unjust infrastructures and the forms of sabotage from below and from above that emerge from the shadows of fossil capital, this section develops an approach to the modes of resistance that Thunderbird Strike (LaPensée, 2017c) invites its players to participate in through gamic action.
If we follow insights in the energy humanities that understand energy and infrastructure as a social relation (Huber, 2013; Malm, 2016), possibilities for working toward a more just energy future through infrastructure are brought into view. These possibilities emerge from the recognition that certain energy sources and infrastructures have inherent or immanent material properties and historical-cultural tendencies that, together, form their possibilities or, as design theorist Keller Easterling (2014) identifies in Extrastatecraft: The Power of Infrastructure Space, their “dispositions” (p. 21). In his article “Building More Just Energy Infrastructure: Lessons from the Past,” energy historian Christopher F. Jones (2013) makes a case for focusing on the cultural politics of infrastructure in the approaching energy transition as a social transition—that is, a focus on infrastructural disposition. “If we are to understand the social dimensions of energy transitions,” Jones (2013) writes, “we must understand the social dimensions of energy infrastructures” (p. 158). Understanding infrastructures in these ways reveals that the material tendencies of particular transport infrastructures have fuelled and continue to fuel inequality. Citing coal canals, oil pipelines, and electricity transmission vis-à-vis the grid, Jones (2013) underscores how infrastructural networks of energy transmission in America—particularly those tied to an ever-intensifying fossil fuel energy regime—deepened the economic divide between rural and urban residents and simultaneously inflicted immense damage to ecosystems. As Jones (2013) argues, these infrastructures “were not simply mechanisms for moving power; they were weapons used in highly competitive industries to squelch and increase financial power of particular parties” (p. 160, emphasis added). These infrastructures resulted in the concentration of wealth generated by an uneven distribution of the costs and benefits of the fossil economy, with peoples and environments on the peripheries of the sites of production bearing a heavier burden.

Relatively absent in Jones’ (2013) thorough discussion of the social dimensions of energy infrastructure is a long history of structural inequity that these infrastructures propel—that is, a structural inequity experienced through the impacts of resource extraction, production, and circulation in North America tied to persistent legacies of settler colonialism. Certainly, Jones’ (2013) aim is not to comprehensively map the social and ecological impacts of energy infrastructure in American history, which would necessitate an engagement with these legacies. Instead, he provides an account of their material tendencies and the political and economic contexts through which these infrastructures emerged in order to underscore the determining role that energy transportation infrastructures play in locking in past energy transitions. But in outlining the ways in which rural and urban communities unevenly experience the costs and benefits of the extraction and transportation of coal, for instance, he shows a keen awareness of the disparate spatial politics and consequences of infrastructural development. Cowen’s (2018) assertion, recounted in the opening pages of this article, regarding the ways
in which infrastructure jurisdictionally functions in settler colonial states precisely pins down what is arguably overlooked in Jones’s (2013) account.

Thunderbird Strike (LaPensée, 2017c) asks its players to disrupt such infrastructural inequity with their sights set on a more equitable future. And the mode through which this disruption occurs in Thunderbird Strike (LaPensée, 2017c) is sabotage. It is tempting to view this sabotage as a kind of metaphor that sidesteps the literal definition of sabotage, that is, “to ruin, destroy, or disable deliberately and maliciously (frequently by indirect means)” (Oxford English Dictionary, n.d.). The material reality of the unevenly distributed social and ecological costs and benefits of the fossil economy, however, demands drastic action, and Thunderbird Strike (LaPensée, 2017c) asks its players to experientially meditate on the necessity of sabotage in the age of fossil capital. Eve Tuck and K. Wayne Yang (2012) have provocatively declared that “Decolonization is not metaphor” with an eye to “remind[ing] readers what is unsettling about decolonization” (p. 1). Following this move to unsettle, Thunderbird Strike (LaPensée, 2017c) lays bare the reality that halting the fossil economy is not achievable through metaphor. As Indigenous land and water protectors across North America and, indeed, across the planet continue to emphasize in their resistance to settler colonial projects, for communities on the front lines, the stakes of carrying on with business as usual are life and death. Achille Mbembe’s (2003) notion of “necropolitics,” which describes the “subjugation of life to the power of death” (p. 39) that occurs primarily at the hands of states and institutions, clarifies the stakes here. In the context of extractivism and infrastructure, these stakes of life and death are produced through what T.J. Demos (2018) calls the necropolitics of extraction and Michael Truscello (2020) sees as embodied in hyper-industrial infrastructural dispositions.

Despite Jones’ (2013) blind spot in his tracing of the spatial politics of certain energy transportation infrastructures and their necropolitical undercurrents, the question of justice that animates his account deserves attention. His discussion of how particular energy infrastructures, such as fossil fuel infrastructure, tend to deepen existing material and cultural inequalities is motivated by a desire to diagnose the past and present with an eye cast to a more socially and ecologically just future. Jones (2013) views such futures as emerging from a set of regulations, legislations, and principles oriented toward criteria that fulfill a kind of distributive justice. To expand on Jones’ (2013) impulses beyond these criteria, “unjust energy infrastructures” are a conceptual way of attending to the persistence of infrastructural injustice. Notions of justice underwrite much of the defining critical vocabularies of numerous contemporary movements that demand a more equitable future from intersectional axes, including those related to environment (see Schlosberg, 2013; Walker, 2009), energy (see Guruswamy, 2010; Pellegrini-Masini, Pirni, & Maran, 2019; Sovacool, Burke, Baker, Kotikalaapudi, & Wlokas, 2017), and climate (see Schlosberg & Collins, 2014). In these contexts, justice mobilizes not only a lim-
ited juridical process mediated and enacted through the state but a broader critical intellectual tradition of the concept that invokes equity more generally.

According to Jones (2013), just energy infrastructures are those that can adequately reconcile the inequalities that are often produced through the fissure between sites of production and consumption. To bring this reconciliation into being in future energy systems, Jones (2013) suggests that while corporations are entitled to profits, “we should use regulatory structures like rate caps and common carrier status to ensure that these technologies do not encourage consolidation and control” (p. 161). In this formulation, any form of energy infrastructure—whether oil pipelines, megadams, or wind farms—can hypothetically become more just through a series of policies, decisions, and mechanisms that fit certain criteria of justice.

But if unjust energy infrastructures cannot become just either through intervention or distribution mechanisms outside of capitalism’s base impulses, and they continue to deepen social and ecological inequity at local and global scales despite progressive regulatory mechanisms within the context of a profit-driven market economy, what is to be done? In Carbon Democracy, economic historian Timothy Mitchell (2011) has compellingly argued that the oil pipeline emerged as a transportation infrastructure in part as a way of further automating the fossil economy, in turn weakening the autonomy that coal workers once held and expressed through actions such as blockading railways. In other words, in Britain’s era of coal, workers mobilized the material tendencies of coal’s distribution to shut down its flow and halt the operations of business as usual as a means to achieve more democratic political and economic arrangements.

Sabotage proves to be more than a concentrated disruption of the dominant order; sometimes, it is a characteristic of the dominant order. Tapping into the semantic ambivalence of the notion of sabotage—a notion that tends in the popular imaginary to be associated with fringe acts of violence to property motivated by perceived extremism—Mitchell (2011) identifies the ways in which the capitalist classes that comprise the oil industry participated in their own form of sabotage through their control of the flows of oil to maximize profit. Mitchell (2011) follows Émile Pouget, whose translated 1909 pamphlet Le Sabotage helped to popularize the word “sabotage” in English, by recounting Pouget’s conclusion “that the capitalist class were perhaps the real saboteurs” (p. 39). Sabotage represents a mode of struggle across infrastructural terrains, leveraged from above and below as a way to achieve desired outcomes. This expanded concept of sabotage, as Darin Barney (2019) argues, offers lessons in sparking an energy transition. Relying on Paolo Virno’s account of the possibilities of political action today, Barney (2019) ultimately suggests that sabotage may be a necessary mode of engagement through which to break out of the confines of petroculture, a term that describes the deep interrelationship between modernity and the production and consumption of oil (Wilson, Carlson, & Szeman, 2017).
Sabotage enters the picture here, then, as a tactic that not only names destructive processes associated with violence but also as a mode of struggle adequate to break the impasse fortified by the fossil economy and its extractivist settler colonial inertia. Barney (2019) describes infrastructural sabotage as a form of mediation: “If infrastructure is the medium of sabotage then sabotage itself is a practice of mediation” (p. 221). In this way, the struggles over energy and infrastructural futures that form a key site of intervention for Thunderbird Strike (LaPensée, 2017c) can be understood through this wager of sabotage against sabotage. Engaging a similar critical tradition as Mitchell (2011) and Barney (2019), Diamanti and Simpson (2017) offer five theses that further shed light on questions of energy transition and responsibility in the age of impasse. Their second thesis is instructive here as it demonstrates how capitalist implementations of energetic dispositions across its history are a kind of “serially sabotaging force” (p. 6), while their third outlines the ways in which “sabotage from below” functions as “the material practice of counter-disposition” (p. 7). Counter-disposition here describes orientations and relations that disrupt dominant modes of infrastructural and energetic disposition—those modes that are at once extractivist, capitalist, and settler colonial.

Such an expanded understanding of sabotage suggests reframing it as a necessary mode of resistance to unjust infrastructures and in the generation of alternative infrastructural relations. This is how Thunderbird Strike (LaPensée, 2017c) asks its players to practice counter-disposition through destruction and restoration: first, through sabotage as self-defence rather than “eco-terrorism”—the defence of present and future generations (human and non-human) against the necropolitical tendencies of the fossil fuel energy regime—and then as a way of generating and maintaining forms of living otherwise, of living beyond extractivism. Importantly, such infrastructural sabotage stems from a longer tradition of expressions of Indigenous sovereignty in Canada that target so-called “critical infrastructure,” particularly through blockades, in order to disrupt the circulation of capital (Pasternak & Dafnos, 2017). In February 2020, for example, railway blockades were erected across Tyendinaga Mohawk Territory and elsewhere in Canada. This blocking of passenger and cargo rail was in solidarity with the Wet’suwet’en, whose permanent encampment on their traditional territory was raided by the RCMP. The RCMP were enforcing a B.C. Supreme Court injunction related to the Coastal GasLink natural gas pipeline project, which crosses unceded Wet’suwet’en territory (Snyder, 2020). So, while this article has so far primarily relied on non-Indigenous perspectives to articulate the notion of unjust infrastructures and the politics of sabotage, there is a deep historical relationship between sabotage and the modes of Indigenous resurgence that coalesce to inform the ludopolitical dimensions of Thunderbird Strike (LaPensée, 2017c).

The conceptual framing of unjust energy infrastructures situated in relation to this expanded notion of sabotage provides a vocabulary for describing how
Thunderbird Strike (LaPensée, 2017c) games extractivism. As a specific kind of media whose communicative affordances include world building through participation and action—that is, its ludopolitical possibilities expressed through “gamic action”—video games provide an avenue through which to speculate on the role that cultural production can play in curating and activating broader sensibilities. Through these dynamics, LaPensée’s (2017c) Thunderbird Strike articulates a specific kind of resistance grounded in an understanding of the intersections of the fossil economy’s drive to expand and the settler colonial dynamics that underpin this drive. Fossil fuel infrastructures and the extractive energy regime they comprise are incontrovertibly unjust. If sabotage is an effective strategy through which to move beyond fossil fuel society, then to what degree is sabotage necessary for the maintenance of good relations in the face of the “serial sabotage” that underwrites the twin forces of the fossil economy and settler colonialism? Visions of a smooth transition that rely on the building of new fossil fuel infrastructures—including claims from the Government of Canada (2019) that “every dollar the federal government earns from [the Trans Mountain Expansion pipeline] will be invested in Canada’s clean energy transition” (para. 1)—are premised on the maintenance and reproduction of settler colonial extractivism. Thunderbird Strike (LaPensée, 2017c) shows us that there is nothing smooth about the fossil economy, and that its disruption is necessary to build to a socially and ecologically just future.

Conclusion: Indigenous world building and our infrastructural future

LaPensée’s oeuvre of transmedia works, which includes animation such as Returning (LaPensée, 2015), comics such as Copper Heart (LaPensée, 2015), visual art (LaPensée, 2016), and video games, are commonly viewed as part of the emergent tradition of Indigenous Futurisms. Indigenous Futurisms is a genre of cultural production by Indigenous artists and writers that mobilizes speculative and science fiction modes of future-casting to think through the possibilities of Indigenous futures against colonial narratives whose futures depend on the extinction of Indigenous peoples (Dillon, 2012, 2016). In this way, Indigenous Futurisms challenge the animating fantasy of a future without Indigenous peoples at the core of settler colonialism by envisioning an Indigenous future, a future made certain through the long histories of resistance that thinkers such as Simpson (2017) and Nick Estes (2019) detail. Some of LaPensée’s works sit more comfortably in this genre than others, particularly the work that is set in speculative futures. Yet, despite its setting in the petrocultural present, Thunderbird Strike (LaPensée, 2017c) contains traces of these speculative undercurrents.

What, then, does Thunderbird Strike (LaPensée, 2017c) offer in terms of visions for the future? The continued encroachment of fossil fuel infrastructure on Indigenous lands for over a century is part of a broader legacy of colonial violence.
From the construction of open-pit strip mines to the ever-increasing tailings ponds storing the toxic by-products of extractive processes, refashioning landscapes and ecosystems in these ways to suit the fossil economy means continually reproducing relations of dispossession. These are precisely the types of relations that fossil fuel infrastructures mediate: extractivist relations based on non-reciprocity (Klein, 2014) that form a through-line between colonialism, settler colonialism, and capitalism (Simpson, 2017). Intervening in the production and reproduction of these relations through gamic action, Thunderbird Strike (LaPensée, 2017c) offers a post-extractive rejoinder to our possible infrastructural futures. She asks her players to consider the relationship between settler colonialism and infrastructural development and to act on it, offering an alternative infrastructural imaginary that is relational rather than technological or instrumental, that is grounded in a refusal of the necropolitical forces of the fossil economy.

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ABSTRACT

Background: The Emergency Alert System (EAS) is an emergency broadcasting infrastructure that originated in American radio and serves as the basis for systems in newer media and in Canada. Its design of self-propagating acoustic signals anticipates a nation-scale catastrophe but also subordinates smaller crises.

Analysis: Adopting theory from infrastructural media studies, this article examines the reasoning and functionality evident in regulatory proceedings, broadcaster and media researcher assessments, and the sonic structure of test and warning signals.

Conclusion and implications: A machinic approach to addressing media publics took shape in the acoustic operations of the EAS. Tied to a deregulatory drive that has eroded radio’s emergency function, the EAS produces a suspended temporality that must be understood as a combined effect of the infrastructure, its content, and its context.

Keywords: Broadcasting; broadcasting policy; disaster and emergency communications; radio

RÉSUMÉ

Contexte : L’Emergency Alert System (EAS) est un système de radiodiffusion d’urgence qui a pris naissance dans la radio américaine et qui a servi de base pour des systèmes adaptés à des médias plus récents ainsi que pour des systèmes canadiens. Conçu sous forme de signaux acoustiques qui s’autopropagent, il peut prévoir une catastrophe à l’échelle nationale mais en même temps il subordonne de plus petites crises.

Analyse : Cet article emprunte certaines théories des études sur les infrastructures médiatiques pour examiner le raisonnement et la fonctionnalité présentes dans les procédures réglementaires, les évaluations par les radiodiffuseurs et par les chercheurs en médias, et la structure sonique de signaux d’essai et d’avertissement.

Conclusion et implications : Les opérations acoustiques de l’EAS ont permis le développement d’une approche machinique pour s’adresser aux publics médiatiques. Dans le contexte d’un élan de déréglementation qui a diminué la fonction d’urgence de la radio, l’EAS produit une temporalité suspendue qu’il faut comprendre comme étant l’effet cumulatif de l’infrastructure, de son contenu et de son contexte.

Mots clés : Radiodiffusion; politique sur la radiodiffusion; communication de désastres et d’urgences; radio
Introduction

A piercing, synthetic tone arrests the country song playing over a car radio in Texas. A smartphone in Ontario emits an unfamiliar alarm, flashing an Amber Alert notification on its screen and startling its owner awake. A local television station in North Dakota airs its national network content uninterrupted as a panicked resident scans through channels, hoping to hear information about a rumoured toxic event in town. These moments arise as the interaction—or non-interaction—of media publics in the United States and Canada with an emergency communications infrastructure that interlaces these multiple media-industrial and geographic contexts. In those alert tones, in the substance behind their particular shrillness and the manner by which they travel autonomously through unattended broadcast sites, a complex tangle of infrastructural politics takes audible form.

To begin examining how that tangle can inform infrastructural media studies, this article focuses on radio and on the Emergency Alert System (EAS)—the present name for the node in this system that operates within American broadcast media. At its highest level and original purpose, the EAS gives “the President of the United States the capability to address the American public during a national emergency” (Federal Emergency Management Agency [FEMA], 2011, p. 1). AM/FM radio offers the most direct path into the EAS’s conceptual and material interior: between its historical development and the envisioned catastrophe where it should outlast phone and power lines, terrestrial radio is the first and last medium of American emergency broadcasting.

The type of national emergency that would justify a Presidential EAS alert would be a catastrophic event, where access to electrical power and communications systems may be significantly degraded or even eliminated. Under such conditions, the one communications media platform likely to continue operating is broadcast radio, accessible from battery powered consumer receiver sets and other means, such as car radios and hand-cranked radios. Accordingly, the EAS was designed to provide a simple live audio feed from the President, delivered initially to PEP [Primary Entry Point] radio stations. … [O]ther EAS Participants receive and, in turn, transmit the alert via the hierarchical broadcast-based EAS distribution system to consumers. (Federal Communications Commission [FCC], 2013, p. 6)

No president has ever employed the EAS in this capacity. FEMA and the FCC, the federal agencies that jointly oversee the system, did not coordinate the first test of the whole network until 2011 as “part of larger efforts to strengthen the nation’s preparedness and resiliency” (FEMA, 2011, p.1). In the meantime, routine test messages and localized public safety warnings play through sub-levels that encoded-yet-audible metadata define within the messages themselves. An EAS
alert, somewhat similar to an internet data packet, constitutes the structure through which it travels: an acoustic grid that materializes temporarily among enlisted broadcast transmitters. The materiality of media infrastructures—and even more so the effects that come into play when material features of separate media interact—matter a great deal to how and what signals pass through them, as Lisa Parks and Nicole Starosielski (2015) have convincingly argued. But sound has so far mainly featured in such analysis as a signal type or as an infrastructural effect, not as a material event capable of producing infrastructure in its own right. Lingering in the historical and ongoing context of broadcast radio, this article undertakes a sound-first account of media infrastructure.

A focus on radio also foregrounds the material continuity that infrastructures such as the EAS maintain between older and newer media. When researchers mine radio history for insights into internet culture or identify broadcast media as objects of “remediation” (Bolter & Grusin, 1999, p. 5) by subsequent digital designs, they recover important ties between media eras that industry spokespeople (and, at times, new media scholars) too often describe as cleanly distinct. In spite of such corrections, it can be easy to forget that even today, radio and television still persist alongside and interact with digital media in consequential ways. New media inherit not only formal and industrial conventions from broadcast media but also the infrastructural projects that developed within them.

EAS messages encode a legacy of national defense, apocalyptic imaginaries, and institutional decay. These themes are familiar to historians of infrastructure who focus on America in the twentieth century. Any reading of the system should follow the grain of that history, attending to how technical revisions in emergency communication accompanied changing configurations among media, American society, and the threat scenarios it envisioned. Toward that end, Tung-Hui Hu’s (2015) notion of the “graft”—both a spatial-historical description of how network infrastructures interrelate and a “method of analysis, a way of uncovering a structural relationship between power and networks” (p. 8)—casts light on the central role that network designs for resilient military communication have played in the EAS’s political nexus between entertainment media and crisis infrastructure. In Hu’s (2015) illustrative figure, an older network forms the root structure to a newer one’s scion, serving as a hidden foundation while imparting its political qualities; disguising the juncture, the new medium paves over the tracks that give it form. But the ongoing lives of radio and the EAS, which have continually transformed one another in material and definitional registers, complicate the graft’s sequential aspect. These two infrastructures have developed together in a more perpendicular conjuncture that has not so much transferred political qualities from one into the other as it has opened an inlet for power to modify both. The middle section of this article describes how a convoluted negotiation between the distributed network model and a centralizing radio industry seized on the EAS as a tool.
Apprehending networks’ shapes can help track what happens materially and politically when media infrastructures intersect, but for a fuller understanding, it is key to also consider the signal patterns and temporal mechanics that attend and enact those shapes.

Prior work on test pattern signals has identified moments where the boundaries between technical systems and systems of representation can dissolve for media audiences. Dustin Tahmahkera recounts how the “Indian head test pattern” bracketed each day of RCA television programming in the 1940s and 1950s and reads it for the ideological function that attended its technical utility. Describing the ritual regularity with which some television owners would inspect this calibration screen while adjusting their sets each morning, Tahmahkera (2014) shows how the test pattern ushered the “colonizing representation” (p. 1) of its logo into an intimate role in many American lives. As internal calibration images for the television industry projected a mono-racial fantasy of America into technical standards that steered colour technology (Mulvin & Sterne, 2016), production practices animated that vision. Susan Murray (2018) describes the role of the “‘color test girl’—a white woman employed as the singular standard of flesh and fidelity—who would stand before cameras in a studio before the broadcast of any color program while technicians and cameramen made color adjustments” (pp. 107–114) as a “living test pattern.” At the transmission’s other end, viewers joined in a final step of the colour calibration process. These routines directed producers, performers, and home viewers to reorient their bodies in accord with cues from their media devices. The first section of this article will examine an expectation built into the EAS design that radio listeners will form a responsive element in a similar human-machine chain when its tests and alerts activate it. The final section will return to the sounds that EAS radio signals make and the form of machinic listening they prescribe.

Similar to the Indian head test pattern, the distinctive tone bursts that begin EAS tests have become recognizable enough to recirculate as cultural objects—an unwelcome development for the government, since a recorded alert played back over the air could in theory activate EAS receivers in other stations. The FCC regularly levies substantial fines against broadcast networks for using the system’s attention tone in comedy skits, zombie dramas, or advertising spots, to list recent examples (Wiquist, 2019). The system’s audibility as a state intervention into broadcast media has made it an object of fascination as well for media politics provocateurs—one very direct example being the music and video art group Emergency Broadcast Network, whose 1995 Telecommunications Breakdown resampled popular music, war-apologist politician clips, and frenetic television oddities into a “hypermedia” (Bolter & Grusin, 1999, p. 42) artifact. Perhaps even more than for counter-cultural artists, the EAS has held a durable appeal for conspiracy theorists: just recently, for instance, widely circulated text chains and Facebook
posts predicted that Donald Trump would use the system to declare martial law and prevent his successor’s inauguration (Collins and Zadrozny, 2021).

But rather than any grand conspiracy of political violence or mass manipulation, the EAS has been complicit in an internal media crisis brought about by broadcasters’ and regulators’ repudiation of localism—the principle that holds a media station responsible to its geographic broadcast area. Toward the end of the twentieth century, localism gave way under practices of centralized, remote, and unattended operation (Hilliard & Keith, 2005). FCC rule-making processes conceived the EAS as an automatable update to its predecessor in order to align with these practices, only to then cite the EAS’s capacity for automatic operation as a reason why the practices should be further accommodated. In the wake of this loosening, broadcast studios sit unattended while local crises unfold outside; meanwhile, by broadcaster accounts, EAS warnings more often than not run up against administrative or informational blockages in the system before they can reach the air. Considering the meeting of failure and futurity within infrastructural sites, Akhil Gupta (2018) proposes suspension as a “particular type of temporality” (p. 68) in effect when a project has neither been made fully functional nor explicitly abandoned. That temporal logic is brought to bear on the EAS through an invitation to stretch and compress timescales: from the milliseconds in which alternating tones arrest machines and listeners to the decades over which the system has expanded its reach and retreated from its function, suspension characterizes the EAS. Suspension helps explain a unique affordance of this acoustic infrastructure: how it can maintain a monumental future threat despite failing to warn of present dangers.

Testing the public
When the EAS and its neighbouring systems have appeared in the news in recent years, the occasion has most often been either a national test or a false-positive failure. An instance of the latter unfolded in January of 2018 in the Wireless Emergency Alert component of the Integrated Public Alert and Warning System (IPAWS)—the umbrella system that now includes the EAS (FEMA, 2016)—when an operator mistook a testing procedure for a real emergency and sent an alert to all compatible cellphones in Hawaii that a ballistic missile was expected to hit the state (Kang, 2018). Less dramatic headlines attended a test of the same cellphone alert system in October of that year (Zraick, 2018) in coordination with another national EAS test (FEMA, 2018), though the “Presidential” label of the alert that arrived on personal mobile devices across the country carried a troubling valence in connection to a falsehood-spreading executive with openly authoritarian aspirations. Since the Canadian government has steered its own emergency warning systems toward interoperability with IPAWS (Timm, 2017), the same network of networks took part in the flurry of confusion and critique, followed by a stern backlash to that critique, that a late-night Amber Alert sparked in Southern
Ontario in early 2019 (Van Der Zwan, 2019). Spotlighting the ultimately inscrutable face of this sprawling infrastructure, these incidents evidence the friction that occurs in the mismatch between the local emergencies where it is deployed and the prospect of a global or national crisis that guides its design. With similar inscrutability pervading personal media devices and the software platforms they access, these moments accentuate a distinctly medial anxiety:

It is the relative control of the unseen administration of broadcasting and computing systems that creates user distrust. The circulation of a computer virus, the expansion of an inbox due to unwanted e-mail from seemingly anonymous sources, the moments when the Emergency Alert System tests its ability to take over the operation of a station—these bring the user to the potential for disaster. This sense implicates both the medium and the object that transmits and receives the medium. (Miller, 2003, p. 185)

The EAS did not invent the distinct dread that its messages bring suddenly to mind for listeners. Rather, it has developed under the same national projects wherein, as Joseph Masco (2014) describes, government publications and civilian defence exercises in the Cold War worked to distribute imaginaries of crisis and destruction in the service of normalizing such dread. The legacy of the EAS shows it as taking part in this distribution, but also as itself an imaginary of distribution, where the listening subject is alerted not just to the ever-looming national threat but also to their place within a signal chain for vital information. These arresting activations of the system blur the distinction between what Lisa Parks (2015) terms “infrastructural imaginaries—ways of thinking about what infrastructures are, where they are located, who controls them, and what they do—” (p. 355) and the infrastructures themselves. Hardly a relic resuscitated from a previous century, the “locally self-organizing, systemically self-amplifying threat of large-scale disruption” (Massumi, 2009, p. 153) remains an active production through which a distinctly post-9/11 American governmentality now operates. The imaginary that charts this threat and offers the EAS as an infrastructure that can respond to it insists on the national or super-national scale of the coming crisis.

Top-level EAS tests capture press attention in the same stroke by which they capture the whole hierarchical span of the system across the country. In contrast, local use looks to a “patchwork of testing regimes” (FCC, 2013, p. 7) that activate isolated sections of the branching EAS structure at its statewide and smaller levels on a weekly and monthly basis. Authorities and broadcasters activate the EAS at these levels for a secondary tier of events, “severe weather threats, child abductions, and other local emergencies,” (FCC, 2013, p. 7) that misalign with the system’s designed-for scenario of a singular, nation-scale calamity. The FCC (2013) explains that “non-Presidential EAS alerts do not require that EAS Participants open a live audio feed from the alerting source, but rather deliver alerts with pre-
recorded messages that can be delivered at the discretion of the EAS Participant, rendering non-Presidential alerts (and their related testing procedures) inappropriate for the test of a national alert” (p. 7). With the 2011 national test, FEMA and the FCC endeavoured to realign their anticipated and rehearsed scenarios by engaging the full signal chain of the system. They included the listening public in this signal chain (see Figure 1). “The Test plays a key role in determining if the public is able to receive timely and critical emergency information as part of a larger effort to assess national preparedness for all hazards” (FEMA, 2011, p. 1). The public here figures as an appendage of the test, which inspects neither a particular threat nor a technical point in the system. In this administrative vision, the nation’s decoder/receiver boxes and its media audiences join together in a grid of potential responsiveness.

Figure 1. The EAS architecture places the “public” in its branching signal chain for message relay

A YouTube record of the 2011 national test shows a radio listener taking part in that signal chain. Sitting in his truck with the radio turned up, the video’s narrator half-heartedly teases the possibility of some connection between the planned test and an ongoing storm, a meteor fly-by, and a rumoured apocalypse. Then, just as the scheduled time for the test has passed, the music from his car radio is cut off by a dissonant pair of tones. A voice recording, layered over the synthetic sound, is too distorted to make out. The man listens for a bit, then switches the radio to another channel. Finding only silence there, he keeps moving through frequencies in the FM band, catching snippets of the same tones and voice at varying levels of loudness and distortion. Finally, he reaches a station as it plays three unaccompa-
nied bursts of the tone pair and cuts back into the middle of another song. “I guess that was it. It didn’t say it was a test or anything—just a series of beeps,” the narrator reflects. “Obviously they’ve got some problems to work out with it. We’ll see what happens” (AtlanticTR, 2011). With regard to communicating actionable information to the listener, the system and its coordinated test seem to have failed. Still, the video ends on a note of anticipation; the event has held the future open to possibilities of repair and of catastrophe.

In the absence of stable criteria for what the 2011 EAS test measured, it is hard to call it a success or a failure. The FCC (2013), for its part, concluded that this “first-ever Nationwide EAS Test was a success in that it demonstrated that the national EAS would generally perform as designed, if activated” (p. 19). At the same time, the agency acknowledged that poor audio quality and equipment failures had left considerable gaps in the propagation of the test message. Despite its initial justification as being focused on public reception, the national test exercise withdrew to more technical criteria at the stage of evaluation. Having set up a web interface for EAS participants (meaning broadcast station operators) to report back on their reception of the test, the FCC (2013) “received and analyzed test result data from over 16,000 EAS Participants, and held discussions with EAS Participants, FEMA and other EAS stakeholders to analyze the test’s results” (p. 3).

Radio listeners entered as the endpoints of the branching signal diagram, but this membership in the network of response did not grant them “stakeholder” status when it came to assessing the system’s performance. Any audio that reaches the public has completed the circuit, the FCC’s evaluation implies—even if in becoming sound, that audio blends together into a uniformly cryptic dissonance.

Friction and failure in a never-utilized information infrastructure—here, the specific mechanism that would materialize out of seized media channels when “all EAS Participants are broadcasting the audio message from the President across the entire nation” (FCC, 2013, p. 8)—produce different effects from those of breakdowns in the infrastructures that circulate energy and physical resources. Infrastructure studies have invested in the sudden and total blockage as a methodological opening: “Studying moments when infrastructures cease to work as they normally do is perhaps the most powerful way of really penetrating and problematizing those very normalities of flow and circulation” (Graham, 2010, p. 3). When breakdowns themselves become routine, though, the disposition requires more nuance. “Perhaps,” Stephen Graham and Nigel Thrift (2007) propose, “we should have been looking at breakdown and failure as no longer atypical and therefore only worth addressing if they result in catastrophe and, instead, at breakdown and failure as the means by which societies learn and learn to re-produce” (p. 5). Graham and Thrift (2007) push back against two jointly over-valorized figures in social science: catastrophic failures and the “black boxing” effects of untroubled functionality to which these breakdowns are exceptions. They shift focus toward
the work that goes into producing that impression of smoothness. A maintenance-oriented outlook on infrastructure throws the relationship of normality and disturbance into a confused constancy of erosion and repair (Jackson, 2014). As a practice of maintenance within such a pattern, the EAS’s routine test messages constitute the system at the same time as they perform its presence, both historical and ongoing, for and through the listening public.

**From survivable communication to media decay: The EAS and American radio**

Paul Baran’s 1964 proposal for a “distributed communications system,” which laid a groundwork for the packet-switching technique that underpins the internet, has garnered renewed attention as media historians trace an American Cold War paranoia through to today’s cloud technologies (Hu, 2015). Baran argued (1964) that a “grid or mesh” (p. 1) of signal-relaying nodes would form a superior alternative to a centralized design under a central criterion: survivability. Nuclear detonation did not only loom as an emergency that would necessitate rapidly warning people dispersed across a huge area; this eventuality, along with solar and meteorological eruptions, posed a major threat to communication infrastructures themselves. Most importantly, for the Canadian and American defence projects that Edward Jones-Imhotep (2017) studies in *The Unreliable Nation: Hostile Nature and Technological Failure in the Cold War*, the ionospheric disturbance from these events could block military radio communication. Through these projects, though, the other category of disruption against which survivability endeavoured—inevitable internal failures within a complex system—came to not just motivate but characterize national relationships to technology. This section traces how the EAS took shape out of these same Cold War motivations and how, through the same process by which it entrenched radio as a national infrastructure against and under military threat, the EAS helped imbue both itself and broadcast media with fundamental unreliability.

The American federal government first formalized an emergency function for civilian radio transmitters in the 1950s with CONELRAD (Control of Electromagnetic Radiation). The program expressed needs specific to radio and its material properties: by requiring stations to all adjust their broadcast transmitters to the same frequency, the military could disrupt the ability of enemy pilots to infer their position over the country from the combination of signals their radio receivers picked up. By relaying emergency information through the broadcasters to listeners who knew to tune in to that single frequency, civil authorities could give instructions to the public through a distributed chain with redundant, electromagnetic, and acoustic links that would make it very difficult for an invading force to fully disrupt (Brinson, 2009). The Emergency Broadcasting System (EBS), launched in 1963, expanded the CONELRAD charter to address non-military hazards, such as weather. It also introduced the design whereby FEMA could send a presidential alert through a ded-
icated phone-line connection to “Primary Entry Point” (FCC, 2013, p. 8) stations. Following the same survivability logic as Baran’s design, the system ensured that an alert broadcast from a PEP station would then reach others over the air, enlisting stations in a branching, wireless propagation system.

Thinking through the “meshiness” that links Baran’s network visions, amateur radio communities, and activist-led local data networks, Rory Solomon (2020) points out that ham radio operators conceive of their practice as an important potential emergency resource. That these elements—emergency communication, terrestrial radio, and distributed network models—continue to converge outside of a governmental purview should remind us that emergency broadcasting as an infrastructure had no pre-determined correspondence with national defense. Much as Susan Douglas (1989) has argued of radio itself in the 1920s, the institutional design that won out for emergency broadcasting in the United States had to be entrenched through coordinated pressure among corporate and regulatory actors. In the EBS, this coordination required reconciling the distributed shape of a survivable system with the militaristic demand for centralized control. PEP stations, selected for their high licensed transmitting power, became the physical juncture points between the centralized and distributed axes of this design. Accordingly, these stations were the first to show that national emergency communication would architecturally and geographically transform broadcast media rather than merely insert receiver boxes into their stations. PEP stations received backup power and structural reinforcement for their transmitter sites (see Figure 2), typically located in the outskirts of urban centres, to increase the likelihood that FEMA’s direct lines would remain intact amid bombing.

**Figure 2. A Primary Entry Point station transmitter site near Austin, Texas**

*Note: From FEMA (2014)*
These transmitter sites changed from antenna sheds into barbed-wire-enclosed, windowless structures that evoked the urban telecommunications exchange building and its “rhetorical figure within a military-industrial imaginarius of danger” (Godel, 2015, p. 36). Since the national security apparatus pulled transmitter sites out into the hills outside a city while the working lives of announcers and programmers kept broadcast studios closer to its centre, the ongoing division of radio labour into talent versus engineering roles redoubled in a geographic register. Division, in turn, aided efforts to render each of these roles and sites more automatable. Re-entering a city as a ubiquitous part of its soundscape, the signals processed in this “architecture for machines” contributed through their sonic prominence to a “sense of security and preparedness” (Mattern, 2017, p. 24) that infrastructural nodes in other urban media fostered; and whenever an EBS test took over that signal, the sense would be made explicit.

When the EAS earned government approval in 1994 as a set of incremental refinements to the EBS, its designers articulated the system’s older motivating character (survivability) to a newer one: automation. Where the EBS design had followed a distributed propagation concept similar to the internet’s packet-switching system, EAS messages could behave even more similarly to data packets in that they directed their own propagation. Encoded information in each message’s header portion now preceded the alert audio, communicating to receiver machines through predesignated codes that would “define who originated the emergency message, the nature of the emergency, the location of the emergency, and the valid time period of the emergency” (FCC, 1994, p. 1814). These new features offered greater precision as to where and when an alert would air, but they also delivered a timely assurance that the alerts would complete their journeys, regardless of whether or not a human operator was in the room with each box they reached. Commercial stations, particularly in the ownership consolidation race that would accelerate after the Telecommunications Act of 1996, increasingly relied on techniques of automation and remote control in order to reduce personnel expenses. Corporate networks responded enthusiastically to the proposed EAS (Wilson, 2007). Citing strong support for “the use of automation in the new system” among broadcasters who had submitted comments, the FCC (1994) reasoned that automated and remote-controlled modes for EAS equipment would do away with the “costly, time consuming, and ... often ineffective” need for a “full-time person on duty to determine the content and nature of EBS messages” (pp. 1821–1822). By promising to become automatable, the EAS assisted in a larger project that automated away station maintenance roles and aided centralization.

In separate “companion” (FCC, 1994, p. 1823) proceedings to their rulings on the new EAS, the FCC also requested comments and revised rules regarding the unattended operation of broadcast stations. Up until 1995, radio broadcasters in the United States needed to ensure, in most cases, that any time their station’s
transmitter was powered on, a licensed employee would stay on site to monitor it. Asserting that technological advancements had rendered the provision against unattended operation unnecessary, the FCC sought to lift what it now described as an undue burden on broadcasters. The old EBS and the new EAS entered this deregulatory push in a flourish of circular logic: the manual operation requirements of the EBS stood in the way of unattended operation and thus needed to be upgraded; unattended operation, made feasible by the redesign, would encourage EAS equipment upgrades and thus should be pursued as a public good. Paraphrasing comments from equipment manufacturers and broadcasters who noted that “the current EBS cannot be reliably automated,” the FCC (1995) suggested that “it would be appropriate to link unattended operation with implementation of the EAS” and that this “linkage [w]as an excellent opportunity to encourage the rapid implementation of the EAS” (p. 11481). The rule-making document all but explicitly signaled trouble to come, noting in one breath that the EAS was “specifically designed for unattended operation” and in the next that “various concerns over the EAS technology have arisen in recent months” leading to “uncertainty in the implementation date for the EAS” (FCC, 1995, p. 11481). Reasserting that an automatable EAS promised a “no risk benefit to both the licensees and the public” (FCC, 1995, p. 11481) that outweighed its technical prematurity, the agency moved forward with allowing unattended operation.

A decade later, the same FCC bureau would acknowledge that the 1995 proceedings transformed radio in unintended ways. In a 2007 notice, the agency sought “comment on whether it is appropriate to review the rules that have facilitated the development of automated broadcast operations” (FCC, 2007, p. 48). By this point, broadcasters had “broadly embraced this new technical flexibility” with many stations now operating “for extended periods without station personnel at or near transmission facilities” (FCC, 2007, p. 48). Noting that the 1995 commissioners had cited EAS automation in their reasoning, the 2007 notice pointed to a particular instance of breakdown in suggesting that the assurances of automated broadcasting might need rethinking: it noted a failure in emergency communication following a 2002 train derailment in Minot, North Dakota. Eric Klinenberg (2007) recounts the Minot disaster, in which caustic fumes from the Canadian Pacific Railway’s freight cargo blanketed the town, at the start of his book, Fighting for Air: The Battle to Control America’s Media, which indicts deregulated and centralized broadcast media for eroding media’s public service functions. During the chemical spill, which caused one death and many injuries, some residents tuned in to local radio and television channels for information. Despite these listeners taking up their scripted place in the signal chain, no information arrived—neither through the automated EAS, which state-level emergency officials neglected to activate in time, nor from the city’s remotely owned and operated stations.
Government materials around the EAS continue to stress how the system forms a “survivable communications network” (FEMA, 2011, p. 3), reinvigorating America’s mid-century threat scenarios and their germinal relation to distributed infrastructure designs. IPAWS and its pan-medial ambitions would seem to echo Hu’s (2015) point that “war circuits are indistinguishable from civilian circuits, because, in a time of emergency, everything will be part of a war circuit” (p. 16). In fact, the EAS shows an inversion of this formula insofar as the “time of emergency” is far less defined than the mechanism by which military communication can conscript other media. The insistent unreliability and systemic inscrutability that media audiences experience from the system are qualities that Hu (2015) and other media historians have used to characterize a continuum from Cold War technologies to present-day platforms. These qualities are bound up not only in military but also in corporatist efforts to simultaneously distribute and centralize communication. More importantly, they persist across media eras in a process that might be better analogized to acoustic interference—as different signals co-mingle, they mask, distort, or interrupt one another—than to sequential layering. By pulling temporality and sound to the foreground, it is possible to better grasp how the EAS punctuates radio and to what consequence.

A system of suspension

A typical formulation relating infrastructure and emergency might hold that an emergency can cause a system to exit the infrastructural category when, failing to function, it becomes too visible. But the conflicting institutional ambitions at work in the EAS have confounded its capacities to an extent that, in this infrastructure, failures precede rather than follow from emergencies. The acoustic materiality at the core of its design ensures that these failures accrete into distinct affective patterns. The EAS is anticipatory not just in its designed warning function but in that its principal effect, in place of fulfilling that function, is to confer anticipation—the sense of the generic-yet-prepared-for catastrophic event and its relation to futurity (Anderson, 2010)—on the public it addresses. This reading of the EAS reveals that test signals not only constitute the structure through which they travel, they also perform its affective work of directing the listener’s anticipation. The EAS thus inverts the infrastructural trait of becoming “visible upon breakdown” (Star, 1999, p. 382): where an infrastructure characteristically “recedes into the invisibility of routine” (Barney, 2018, p. 80), the EAS test’s attention-grabbing tones make arrestingly audible the normal operation of the system, while its failures to provide warning amid actual emergencies such as that in Minot take the form of only retro-audible silences.

The mechanics of this inversion come into sharper detail through Karen Pinkus’s (2017) development of the grid within a new materialist lexicon. Pinkus (2017) points out that “the assemblage that is the grid comprises various actants that cooperate under normal circumstances but may fail to do so under an emer-
ergency scenario” (p. 331). The elements that together constitute the EAS within radio include audio encoding standards, encoder and decoder devices, dispatchers, broadcast engineers, and the audio signals themselves. Further out in the grid, through the IPAWS architecture, it reaches more elements in television, cable, and mobile telephony. A centralized system of scheduling, testing, and reporting facilitates cooperation among this ensemble. Yet Pinkus (2017) draws attention to the fact that the same eventuality around which the EAS is defined is the circumstance in which these cooperative links may be expected to break down. The top-down design of the EAS envisions a future calamity so total that it bypasses the need to distinguish a particular emergency against a particular normality. In practical life, this need cannot be bypassed. The threshold of articulating an effective “emergency claim” (Rubenstein, 2015) determines who can act to utilize or influence emergency media (Ellcessor, 2019). For the sub-national levels of the EAS, where its only non-test activations have so far occurred, technical and organizational misalignments let the symbolic emergency disrupt the system well before the physical emergency could.

Codes and categories become the stuff of communicative blockage amid the EAS’s conflicting inclinations toward hierarchical control and business-friendly flexibility. A variety of problems within the functioning message flow conglomerate into delays, dilution, and confusion that often defeat the purpose of warning. Responders must communicate against the grain of hierarchical design: “[e]mergency management officials in the county where an incident occurs have to ask their state counterparts to issue an alert” (Potter, 2005, p. 68), adding turbulence to a message’s flow through the EAS before it even begins. Differences in encoding standards among devices in the EAS network then reduce the specificity of a warning, with older decoders generating “a ‘civil emergency message’ for everything from a terrorist attack to an Amber Alert for a missing child because the equipment can’t distinguish the codes” (Potter, 2005, p. 68). These factors can compound into a total sense of suspended purpose, as expressed by a TV station’s news director: “The notices come in so late and are so vague, she says, ‘I cannot remember a time when an EAS alert has sparked us into action or told me something I didn’t know’” (Potter, 2005, p. 68). These breakdowns in classification, a core level of information infrastructures, demonstrate the design’s neglect for the “articulation work” (Bowker & Star, 1999, p. 310) needed to sort out the emergency from the routine and to handle unexpected contingencies. Stemming from this fundamental neglect, postponement and diversion emerge as qualities of the EAS infrastructure rather than just events within it.

Where the opening tones of a test or warning message might produce an effect of suspense for the radio listener, similar to a swell of dissonant string instruments in a horror film soundtrack, the larger temporality that these messages and their misfires produce is what Gupta (2018) terms suspension. Suspension holds open
the possibility of the dysfunctional infrastructure and makes palpable the multiple futures it thereby produces. As with Brian Larkin’s (2013) attention to the poetics of incomplete—or never designed for completion—infrastructures, Gupta (2018) uses suspension to unseat a binary between failed and functioning infrastructure and considers what infrastructures might do outside of or in place of their stated purpose. In the case of the EAS, suspension coalesces the myriad delays and dilutions of signal flow that, without ever culminating in a total failure, lead people to experience the system as forever awaiting its realization. Here the EAS is “shaping the present through a politics of anticipation” (p. 63). The silences of localized failure and the shrill beeps and monotone syllables of routine testing all command attention toward (and within) the system, yet they insist that its true operation will be something other than the test. These patterns converge in their production of the eventuality—the singular national emergency—that will activate the system at the top of its hierarchy and commence the designed-for flow in earnest. EAS tests punctuate the quotidian flows of broadcast media and attune listeners to this eventuality, the shape of which at any given point depends on the political present and the particular threats that anchor its vision of the future. The tests thus give rhythm to the way that “the future configures the present” (Gupta, 2018, p. 63), stitching the future threat and the security of its anticipation into the material presence of the tested media infrastructure.

The acoustic emergency
The internal structure of an EAS signal affirms its dual status as both the channel-making agent and the content passing through that channel. As the National Association of Broadcasters’ Engineering Handbook describes, “An EAS message consists of four elements, in the following order: digital header code (repeated three times); two-tone attention signal; audio, video, or text message describing the actual alert; and digital end-of-message code (repeated three times)” (Wilson, 2007, p. 250). The waveforms in the message’s header code and end-of-message code relay the state-changing information to the receiving station’s EAS hardware device, opening and closing it.

Except for the actual audio message itself, the header is the portion of the EAS message that contains the most information. The two-tone attention signal is not intended to serve any purpose other than to audibly alert the audience that an EAS message is about to be broadcast, and the end-of-message code is simply … used to indicate that the alert is over and that the EAS equipment should reset itself to its normal, non-alert state. (Wilson, 2007, p. 251)

At the same time that the machine-addressing and audience-addressing portions of the message are separated into discrete components, these pieces align in the way they aim toward a state change in both hardware device and listener. The at-
tention signal, placed in between the digitally encoded header and the voice recording, performs this alignment at an acoustic and affective level.

Priming the audience for the incoming spoken announcement, the attention signal transitions between the header code’s instruction to the machine and the verbal interior of the message. This part of the message likewise tethers the older and newer parts of the system around its acoustic logics: “The two-tone attention signal is created by simultaneously transmitting the 853 Hz and 960 Hz tones, the same two-tone signal that was used in the old EBS” (Wilson, 2007, p. 251). A two-tone signal approach also serves as the basis for the method of digital encoding in the outer portions, which were introduced in the transition from EBS to EAS: “The header codes and the end-of-message codes in an EAS message are composed of a series of digital bytes and are transmitted using the 1562.5 Hz and 2083.3 Hz tones” (Wilson, 2007, p. 251). All four tones fall squarely within the audible range of the frequency spectrum. With its rapid alternation between tones as a way of transmitting a digital bit sequence (National Weather Service, 2011), the header code as heard sound stands apart from the attention signal’s continuous tone pair by way of a higher pitch and more varying texture. Except to a listener specifically acquainted with the EAS and its message format, the progression from header to attention tone marks a change predominantly in the timbre of the sound, not in the kind or purpose of the signal. The similarity is not a coincidence but rather a sonic reunion of the two signals’ shared underpinning logic.

The EAS message’s couplet of header code and attention signal blends acoustic and symbolic representation in its simultaneous conferral of an emergency state onto machine and listener. The dissonant tone pairs, similar to the church bell sounds that “called the Western man to the borders of reason, of war, and of his earthly finiteness” (Siegert, 2013, p. 118), produce anharmonic sounds that “signal a state of emergency in the symbolic order because they are this state of emergency in the acoustical real” (Siegert, 2013, p. 110). A purely harmonic sound contains only frequencies that are integral multiples of a common factor—this tone is the sound’s fundamental frequency and is heard as its pitch. An anharmonic sound is still heard as having a stable pitch, even though this fundamental frequency is missing from its component tones. Mobilizing a Western affective rubric for harmonic versus anharmonic sounds, the attention signal thus aims to jump out from the auditory context it has interrupted—broadcast radio’s flow of speech and music sounds—in order to call the listener to responsiveness. With most stations’ encoder/decoder machines today running in automated mode (Kepner, 2010), the EAS performs this acoustic operation on the listener as much in its tests as in its warning messages, as the listener has no way of knowing whether a message is a warning or a test until the attention signal concludes and a voice recording plays. The beginning of the message, by design, captures listen-
ers’ attention and holds them in suspense. The technical action of the signal follows this model as it acts on the decoder device.

In the audio sequence of the EAS message format, the attention tone follows the header code, but in the system’s development, the header code arrived later. The header’s two alternating tones for binary information representation, along with the interior format that the digital contents of the header follow, come from the Single Area Message Encoding (SAME) protocol (Moore, 2010). The National Oceanic and Atmospheric Administration (NOAA) developed SAME in the 1980s as a way to increase the precision with which the National Weather Service (2011) could geographically direct emergency dispatches in their flow toward specialized consumer weather radios. The EAS formally incorporated SAME in the transition from the EBS, facilitating a newly interoperable and automatic juncture between these two emergency communication networks (Moore, 2010). As with the transition from EBS to EAS, SAME was itself developed atop an existing system: the NOAA Weather Radio, which activated its receivers and called their owners to attention through a weather alarm tone: eight to ten seconds of 1050 Hz (National Weather Service, 2011).

The method for encoding digital information as sound in the EAS, in other words, first took shape in a semantic and signal context already populated by an attention tone. The encoding method addresses the decoder machine as the alarm tone addresses the human listener, switching their state to one of full attention and readiness to follow instructions. In this merger, reinforced by the ongoing aural similarity of the attention and header signals, the EAS treats machine listeners as human-like and its human listeners as machinic. The EAS orients this obedient listening subject through the subject’s vital need for information under the threat of national crisis, and it does so most saliently by holding the fulfillment of that need in suspension. The same political and temporal property of suspension characterizes the EAS both at the narrow timescale of its messages’ audition and at the long timescale that the system’s messages and failures together construct.

**Conclusion**

In adapting recent media studies frameworks to centre acoustic rather than visual or spatial materiality, this study has used emergency broadcasting’s distinct alert sounds as a means to begin unravelling its effects on adjoining infrastructures. The EAS is present in radio as these sounds, as cable lines, and as hardware devices—but it is also present as an ongoing tool for the (anti-) regulatory actors who continually renegotiate radio’s form and function as a medium. At the same time that it conferred the form and status of survivable network on radio and other media, the EAS and its predecessor systems made way for the centralization that has often deprived these media of their expected utility under actual emergencies. In explicating that mechanism, this article aims to provide caution for policymakers in Canada and elsewhere who have looked to adapt parts of the
American model for cross-media emergency warnings against its re-centralizing pitfalls. It also aims to shed further light on a condition in the United States where deep-set complacency about infrastructural stability is at ever greater odds with the eroded institutions that its publics encounter: “across the global North, one cannot be faulted for feeling a creeping sense of decay spreading across many infrastructural environments” (Boyer, 2018, p. 224). The EAS, in the long-term rhythms composed by its audible test signals and its inaudible failures, produces such an environment and the feeling of its disrepair.

The EAS does not simply lurk in American broadcast media’s past or underneath a newer scaffolding as an insidious conduit for military power. It is certainly part of the Cold War socio-technical story that such figurations have crucially revealed, but it is also an ongoing point of negotiation and interoperation among disparate media designs, eras, and power brokers. Emergency alerts remind us that, no matter how far CONELRAD has receded into the past, state power can still seize many communicative circuits. The anxiety of that fact, though, can help disguise a more nuanced reality: the state power in question, in the interest of easing corporate centralization, has more readily loosened the couplings in that seizure apparatus than it has made use of them. Alert signals help sustain a notion of emergency as a temporally bounded state of exception, but the larger decay of emergency communication capabilities in America rejects this notion. The EAS, even at the historical timescale, demands to be heard in order to be understood; indeed, because a listening public forms part of its signal chain, it only fully materializes as a network in the action of its being heard. To approach an infrastructure through and as sound, as the EAS requires, is to shift analysis inward from the architecture that surrounds media signals and into the material, temporal, political action of signals themselves.

Note
1. Listeners would typically only know whether a message was a test or an actual warning prior to hearing its content if a DJ or announcer, working in a broadcast studio where the EAS encoder/decoder has been set to manual rather than automatic mode, chooses to mention it before manually triggering the playthrough of the message. This scenario depends on elements of training, in-person staffing, and device settings that are all, according to Rita Kepner (2010), exceptions to the present norms in the American radio industry. Centralized and automated practices in this way determine the affective operation of the EAS, not simply its technical successes and failures.

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From Labrador to Leipzig: Film and Infrastructures along the Fur Trail

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ABSTRACT

Background: Since 1919, the Hudson’s Bay Company has sponsored films to document and advertise its trading operations. Films such as Hudson's Bay Company Centenary Celebrations (1919), The Heritage of Adventure (1920), and Leipzig Exhibition footage (1930) offered views of North American landscapes and Hudson’s Bay Company trading posts and department stores alongside ethnographic footage of Indigenous Peoples.

Analysis: Drawing on archival research conducted at the Hudson's Bay Company Archives and textual film analysis of these “fur films,” this article theorizes their production and circulation within settler visual culture.

Conclusions and implications: Tracing the films’ paths from the Eastern Arctic to Montréal, and from London, England, to Leipzig, Germany, this article demonstrates how these moving pictures participate in the entanglement of settler and infrastructural projects that characterize early twentieth-century Canada.

Keywords: Hudson’s Bay Company; infrastructure studies; film history; fur trade; industrial exhibitions; media studies; labour; colonialism

RÉSUMÉ

Contexte : Depuis 1919, la Compagnie de la Baie d’Hudson a commandité des films pour rendre compte de ses opérations commerciales et pour faire connaître celles-ci. Des films comme Hudson’s Bay Company Centenary Celebrations (1919), The Heritage of Adventure (1920), et Leipzig Exhibition Footage (1930) offrent des perspectives sur des paysages nord-américains et sur les postes de traite et les magasins à rayons de la Compagnie ainsi que des scènes de peuples autochtones à valeur ethnographique.

Analyse : Cet article se fonde sur une recherche menée aux Archives de la Compagnie de la Baie d'Hudson et sur une analyse textuelle de « films à fourrures » pour examiner la production et la circulation de ces derniers dans un contexte de culture visuelle colonisatrice.


Introduction

For commuters passing through the Gare Centrale de Montréal, the cavernous hall of the city’s central train station offers a glimpse into the industrial development of Canada. Completed in 1943 by the Canadian National Railway, the station is part of a centuries-long infrastructural project to facilitate the transportation of goods, people, and ideas across this settler colonial state. The architectural design of the interior concourse, with its high ceiling and elegant azure and white bas-reliefs adorning the upper walls, projects an air of mid-century international modernism. The bas-reliefs, in particular, are eye-catching (see Figure 1). Designed by Canadian artist Charles Comfort in the art deco style and realized by Sebastiano Aiello (Parks Canada Agency, n.d.), the friezes depict industrious individuals engaging in a variety of economic, scientific, and cultural activities: prospecting for gold, gazing at the night sky by telescope, harvesting wheat, swimming, composing music, manufacturing locomotives and airplanes, and preparing for war. Each wall, labelled according to the cardinal directions, participates in the cultural production of the idea of Canada by representing a region—“Est,” “Ouest,” “Sud,” and “Nord”—through stylized depictions of arts and industry since the earliest days of European colonial settlement.

Figure 1: Bas-reliefs adorning the concourse of Montréal Central Station (Québec)

Source: Author photo, July 2016
The concourse’s back left wall, which presides over a fast-food restaurant and restrooms, visualizes the country’s colonial fascination with Northern landscapes and settler myth-making. Romanticized images of fur trappers and dog sleds intertwine with those of fashionable modern ladies donning furs, an igloo, and scampering minks. Undergirding these activities are the lyrics to “Ô Canada,” which would become the national anthem almost four decades after the artwork’s installation: Ô Canada! Terre de nos aïeux, ton front est ceint de fleurons glorieux. Notably, these imaginary scenes of “Northern” life in Canada position fur as its material epitome. Fur is at once a product and reminder of the fur trade’s once-prominent position within Canada’s cultural, economic, and political development. Within settler Canadian and Western cultures, fur has also become a luxury object, passing in and out of fashion and controversy depending on societal levels of discomfort with the hunt.

Similar to other historical and cultural sites across the country that memorialize the experiences of the Québécois voyageurs, Indigenous trappers, and other moments of colonial contact, Montréal’s Central Station is a concrete marker of the industry’s profound impressions on Canada’s settler infrastructures and visual culture. These imprints of fur and ice on settler imaginaries and myth-making extend across media—including, popular culture, architecture, public art, and fashion. This article turns to a collection of silent films produced and collected by the Hudson’s Bay Company (HBC) that similarly participated in and contributed to the political and cultural economy of fur captured in the Comfort bas-reliefs. Chartered as a British Crown corporation in May 1670 with exclusive trading rights over the Hudson Bay watershed, the HBC operated as a fur-trading business for several hundred years, exporting furs to American and European markets well into the mid-twentieth century. Today, the HBC is perhaps most well-known for its chain of department stores: The Bay/La Baie.

Starting in 1919, as part of the commemorative activities celebrating the company’s 250th anniversary, the HBC turned to cinema as a tool to document, advertise, and celebrate its corporate activities in Canada and abroad. As visual documents and material traces of settler and Indigenous relations during the early twentieth century, these “fur films” assumed a range of forms, from travelogues to short films to corporate pictures with limited release. These include sprawling, theatrical-length sponsored pictures, such as *Hudson’s Bay Company Centenary Celebrations* (Wyckoff & Derr, 1919) and *The Romance of the Far Fur Country* (Wyckoff & Derr, 1920) and its counterpart for British release, *The Heritage of Adventure* (Wyckoff & Derr, 1920); film advertisements designed for international exhibition, such as *Leipzig Exhibition footage* (Hudson’s Bay Company, 1930); and amateur productions, such as *To the North, “Nascope” Voyage* (Mills, 1937), recorded aboard the HBC supply ship. Documenting the continent’s varied landscapes, modern life in burgeoning Canadian cities, political visits by corporate and
governmental officials to Indigenous communities and trading posts, as well as the operations of the fur trade itself, these films offer a rare view into settler societies in the first decades of the twentieth century.

The HBC, alongside the federal government, the Grenfell Mission, and religious organizations, such as the Anglican Church, used film, scientific and tourist photography, magic lantern shows, oil painting, publications such as The Beaver, and other media forms to produce the North as an object for scientific analysis, a means to nation-build, and an ethnographic spectacle for southern viewers. Corporate image-making became an established component of the Nascopie’s seasonal supply runs, with wealthy tourists, artists, and filmmakers frequently making the voyage and recording their journeys in oils, photo emulsion, and the written word (Geller, 2004). American cinematographer Richard Finnie and his wife, Alyce Finnie, for instance, shot footage aboard the 1937 supply run of the Nascopie for Patrol to the Northwest Passage (1937), an unreleased silent picture sponsored by the federal Department of Mines and Resources. The HBC’s public relations department, along with the American Wildlife Institute, also sponsored American nature photographer Lorene Squire, funding her travels through northwest Canada in 1937 in collaboration with the HBC’s corporate magazine, The Beaver (McManus, 2015). The HBC continued to financially support the production of shorts and feature-length films for promotional purposes and internal use well into the 1980s.

As an institution, the HBC is also noteworthy for its deep archive, meticulously collected and maintained for over three hundred years. Records of its corporate operations, expansion, land sales, and public relations date back to the late seventeenth century. According to the website of the Hudson’s Bay Company Archives (HBCA) (Manitoba, 2021), the company’s head office in London, England, started organizing and describing its records in the 1920s for internal and scholarly use; in 1974, four years after the HBC moved its head office to Canada, the company loaned the records to the Archives of Manitoba. Today, the HBCA holdings include more than 140 film and videotape recordings; hundreds of sound recordings; around 13,000 photographs, maps, and architectural drawings; a small art collection; and a vast collection of corporate and private textual records, which were officially donated to the Manitoba in 1994 (Hudson’s Bay Company Archives, n.d.). The films analyzed here were donated by the HBC to the British Film Institute in London in 1956. Archival prints of The Heritage of Adventure (Wyckoff & Derr, 1920), Hudson’s Bay Company Centenary Celebrations (Wyckoff & Derr, 1919), and Leipzig Exhibition footage (Hudson’s Bay Company, 1930) were repatriated to Canada in 2011, when the British Film Institute donated them to the HBCA (n.d.).

This study of the HBC’s fur films fits into a broader conversation about the relationships between empire, cinema, and the archive. Many prominent film scholars have written about the colonial film archive as a visual corpus and epis-
onomological institution, about the ways that colonial and ethnographic filmmaking participated historically in the racialization of non-Western and non-white peoples, and strategies employed by Indigenous and racialized scholars to remediate visual archives and “speak back” to these histories of colonial violence (Amad, 2013; Grieveson & MacCabe, 2011a, 2011b; Rony, 1996). In their two-volume project on British colonial cinema, Lee Grieveson and Colin MacCabe (2011a) argue that turning to the archive destabilizes previously insular histories of “Britain” (p. 8) and those of its colonies. Such sustained archival work makes clear that the “history of British cinema is the history of empire” (p. 9), just as documentary—a mode employed by the Empire Marketing Board under John Grierson (who later founded the National Film Board of Canada)—“can only be understood in relation to the complex legacy of imperialism” (p. 11).

In a similar vein, this article examines an early collection of sponsored films from the HBCA, held in Winnipeg at the Archives of Manitoba, that evidence the colonial foundations of Canadian film culture. The emergence of non-theatrical and what Charles Acland and Haidee Wasson (2011) term “useful cinema” (p. 2) practices in Canada are bound up in the country’s layered histories of white settlement; the territorial dispossession of First Nations, Inuit, and Métis peoples; and extractive resource economies (Jekanowski, 2018, 2019). The HBC fur films can be read through these multiple, intersecting frameworks of useful and settler filmmaking practices. As corporate films, their production was certainly motivated by a desire to help manufacture the HBC’s public image using the new, mass communication technology of cinema, capitalizing on the industry’s association with modernity, mobility, and spectacular motion. These texts were also “useful” in that the spectacles of modern luxury, wilderness adventure, and Indigenous ethnography in which they trafficked could help bolster the longevity of the HBC as an institution (Acland & Wasson, 2011). Similar to later documentary and non-theatrical films produced by the National Film Board of Canada,3 the HBC films perform a “colonizing discourse,” contributing to a visual language within British Canadian culture for representing and making sense of Indigenous people, the natural environment, and white settlement (Gittings, 2002). Filmmaking in Canada is intertwined with these mutually constitutive projects of settler nation-building and extraction as a resource colony.

In attending to the workings of the fur trade—its logistics, labour, and many supply routes—the HBC fur films offer useful entry points for historians and media scholars into the imbrication of transportation and communication infrastructures along the fur trail. At the same time, they offer important glimpses into the early years of non-fiction, amateur, and advertising film shot in Canada for audiences in southern cities—Montréal, Calgary, Edmonton, Vancouver, New York, Boston—and overseas. In what follows, research conducted at the HBCA is drawn on to analyze the film texts within their production and circulation contexts as
examples of the corporate and ethnographic visualization of Indigenous peoples, animals, and environments in non-theatrical motion pictures. At the same time, this visual discourse analysis draws parallels between the strategies employed in the HBC films and other advertising media from the period, most notably in a 1930 public fur exhibition. Unpacking the visual representations of other forms of production within and adjacent to the fur industry makes it possible to map some of the many interconnections between mercantile, settler, and communication infrastructures during the 1920s through the entanglement of film and fur. This includes the production of colonial space, the rendering of animal remains as capital and energy, the extraction of Indigenous labour, and the production of settler imaginaries about the East Arctic and Indigenous peoples. I approach this research as a white settler film scholar; I am as much a visitor to these mercantile histories as to the archive itself.

This article loosely traces the pathways and networks of fur mapped out on celluloid by the HBC between 1919 and the 1930s. Departing from the city of Montréal, which European settlers erected on lands known to the Mohawk Nation as Tiohtia:ke, the article then moves northward to sites of fur production in the Eastern Arctic on Baffin Island, Nunavut (then still part of the Northwest Territories), and Nunatsiavut (Labrador) to trace the expansion of fur infrastructures as settler infrastructures. The second section continues this movement east, across the Atlantic Ocean to Europe, landing in the warehouses of London, England, to examine the production of trans-Atlantic intimacies through gendered labour along the fur supply lines. The article concludes with the trade shows of Leipzig, Germany, where filmic advertisements for the HBC also served to advertise the former British empire, Canadian modernity, and the transformation of animals into energy infrastructures. Mapping the transnational commodity lines of fur through film foregrounds the concomitantly material and imaginary forms of production that these films facilitate.

**Labrador: Fur infrastructures as settler infrastructures**

In July 1934, Sir Patrick Ashley Cooper, governor of the Hudson's Bay Company, and his wife, Kathleen, set sail for the eastern Canadian Arctic aboard the *Nascopie*. Departing from the port of Montréal amid much fanfare, the couple would accompany the ship on its annual supply run to HBC trading posts in Nunavik (northern Québec), Labrador, modern-day Nunavut, and the coast of the Hudson Bay. As the *Nascopie* steamed down the St. Lawrence River, camera operators quickly recorded the scene: the ship, the procession of bagpipers, the cheering crowds. The Hudson's Bay Company would use this footage of the governor's official tour in two 16mm films later that year: * Governor's Trip to Eastern Canadian Arctic* (1934a) and *Trading into Hudson’s Bay* (1934b).

In July 1919, fifteen years prior to Sir Ashley Cooper's journey northward, American cinematographers Harold M. Wyckoff and Bill Derr of Educational Films
Corporation also left Montréal, hired by the HBC to make a film commemorating its 250th anniversary. On what would become known as the “Moving Picture Expedition,” Wyckoff and Derr traversed the Eastern Arctic by ship, travelled inland across the prairies to Winnipeg, Calgary, and coastal British Columbia, and ended in the Athabasca region of northern Alberta in the winter of 1920. They produced about eighteen hours of footage of the land, fauna, Indigenous communities, and the HBC’s diverse operations, which Educational Films used to create what would become one of the earliest feature-length documentary pictures: *The Romance of the Far Fur Country* (Wyckoff & Derr, 1920).

As visual records of company operations across vast stretches of Canada, these films notably and persistently attend to the various ways in which the filmmakers, as well as the commodities and peoples they documented, moved across the land and waterways. The footage of portage routes, dog sleds, airplanes (both from the ground and the sky), railways, canoes, and steamships structure the narrative progression of many of the fur films. Some scenes in particular were arranged so that the cinematographer could shoot his own crew as they packed up or travelled by canoe. Like Sir Ashley Cooper and the film crew of the Moving Picture Expedition, the mobility of certain (white) individuals, film images, and goods underpin the text, impetus, and production of the fur films—both financially and logistically. The result is a visual corpus that is indexed to the social and physical infrastructures of the early twentieth-century fur trade.

As with many other former British colonies, Canada functioned as a producer of raw materials and a market for British manufactured goods, an economic relationship well-documented in the fur films. However, as a settler society, Canada—then and now—occupies the lands and waterways of Indigenous nations. The British Crown, religious institutions, corporations such as the HBC, and later the Canadian state employed a range of policies and strategies to dispossess, assimilate, and suppress Indigenous Peoples (as well as their land claims and cultures) and dispossess them of territory that European settlers sought to inhabit and remake (Veracini, 2010). Infrastructures, according to Brian Larkin (2013), “are built networks that facilitate the flow of goods, people, or ideas and allow for their exchange over space” (p. 328). Made possible through the creation of physical networks, such as trading posts and transportation routes—as much as by more intangible systems, such as finance—the fur trade can be understood as a foundational infrastructure for the nascent settler state.

Like the railways that served as a national infrastructure following Confederation, the HBC and its competitors, such as the Northwest Company, established a web of transportation routes and settlements, some of which became permanent (Young, 2017). Harold Innis (1999) famously theorized the fur trade as a staples economy, along with the cod fisheries and other extractive industries. In his staples thesis, Innis (1999) argues that Canada’s economic development oc-
curred in relation to European economies, as the country’s resources were extracted and then shipped abroad as “staples” (p. 383) to be manufactured in metropolitan centres in exchange for processed goods. This model of the staples economy reordered Indigenous economies and social orders, as well as ecosystems, as this imperial system connected what empire considered to be a “peripheral zone” to industrialized centres of commerce by way of the “extraction, transportation, and exchange” (Young, 2017, p. 240) of a single resource.

The route taken by the HBC’s Moving Picture Expedition roughly structures the narratives of several pictures emerging from the HBC’s short-lived partnership with Educational Films, and also parallels the centre-periphery model of Innis’ (1999) staples thesis. The first reel of Hudson’s Bay Company Centenary Celebrations (Wyckoff & Derr, 1919), for example, begins with a brief, congratulatory history of the HBC’s founding and then cuts to present-day Montréal with a title card announcing, “Two hundred and fifty years later.” Touristic views of downtown Montréal recorded from the famous Belvedere lookout point atop Mont Royal Park are leisurely followed by shots of the Montréal Harbour and shipping warehouses, where labourers load supplies onboard the Nascopie (see Figure 2). From here, according to the film’s title cards, the Nascopie will set sail for the icy coasts

Figure 2: Dock workers loading supplies aboard the Nascopie in Montréal (Québec)

Source: Courtesy of the Hudson’s Bay Company Archives, Archives of Manitoba, Hudson’s Bay Company Centenary Celebrations, 1919, F119
of Labrador to supply remote communities, such as Port Burwell on western Killiniq Island (in contemporary Nunavut). As a settled community of company employees and Inuit, the town of Port Burwell developed around the post constructed by the HBC to source and transport furs (see Figure 3). Panning shots of Port Burwell recorded by boat showcase the port’s harbour filled with local fishing boats and ice floes, as well as company buildings, a warehouse, and a church on-shore. From here, precious furs will be packed and transported south for sorting and wholesale in industrialized centres such as London, New York, or Leipzig, some of which will finally reach Canadian shoppers in fancy new department stores in Winnipeg and Montréal.

**Figure 3: Entry to Port Burwell on Killiniq Island (Nunavut)**

An early scene from the now-lost *The Romance of the Far Fur Country* (Wyckoff & Derr, 1920) similarly records what is presented as the mundane operations at one of the HBC’s many remote warehouses. On Charlton Island, located at the mouth of the Rupert River in James Bay, workers unload supplies from the *Nascopie*, transporting them by trolley cart to a warehouse emblazoned with a large HBC crest (see Figure 4). This tiny island, a title card informs the viewer, is a distribution point for the James Bay district. The only visible structures are a few wooden saltbox houses and the corporate warehouse. Remote trading posts and distribution sites that are accessible only by ship are depicted in other scenes as well. These locations are presented as evidence of the HBC’s geographical reach and corporate success, boasting a vast network of footholds across the waterways and topographies of the continent. Considering Innis’ (1999) analysis of the roles of transportation and communication technologies in the production of space, the routes travelled by fur (and the HBC Moving Picture Expedition) perform a kind of space-making as well. The centrality of transportation to the film’s production and narrative produces a mercantile geography that is represented on screen through the fragmented depictions of the extraction sites, markets, and trails these mobile commodities passed through.
Infrastructures also constitute the “architecture” (Larkin, 2013, p. 328) of modern societies. Modernity is, of course, highly uneven, unspooling across geographies and societies in unequal forms, embedding different types of economic, political, and technological inequalities in the process. In Canada—as part of the former British empire and a contemporary colonial power founded on the dispossession, removal, and assimilation of Indigenous Peoples—the nineteenth and early twentieth-century expansion of modernity also facilitated new forms of land grabs, white settlement, and legislated Indigenous assimilation. Central to these intersecting colonial practices was the expansion of transportation and communication infrastructures, such as the transcontinental railway and telegraph system, which Innis (1971) details in *A History of the Canadian Pacific Railway*.

Settler jurisdiction is both actualized and legitimated through these communication systems and infrastructures (Cowen, 2018). Pointing to the cyclical logic of settler colonialism, Deborah Cowen (2018) reminds us that “the infrastructures of settler colonialism are in fact, settler colonial infrastructures” (n.p.) because the lands on which these structures and systems are built were never ceded by Indigenous Peoples in the first place. As a technology frequently associated with modernity and increasing mobility, early cinema (especially 16mm) helped to cap-
ture and promote new urban developments, nation-building and infrastructural projects, and settlers’ social lives. At the same time, cinematographers—including those behind the HBC fur films—also turned to the continent’s varied landscapes and “wilderness” as subjects of wonder or concern, sites of conquest, and places for imagining and legitimating Anglophone and Francophone settler identities. Films such as *The Romance of the Far Fur Country* (Wyckoff & Derr, 1920) and *Governor’s Trip to Eastern Canadian Arctic* (Hudson's Bay Company, 1934a) forged a kind of “photographic encounter” (Geller, 2004, p. 5) between settler society and Indigenous communities, between the imagined urban spectator and the distant environments of Baffin Island, Hudson Bay, and the places in between.

While the HBC fur films examined here never received broad distribution in Canada or elsewhere, they nevertheless contributed to the expansion of settler infrastructures and land ownership in material ways. Starting in 1919, the HBC sought to use its financial interests in Educational Films Corporation to promote its real estate operations in Manitoba, Saskatchewan, and Alberta. In 1870, the Government of Canada purchased Rupert’s Land from the HBC, a vast territory that constitutes a third of what is now Canada (including parts of Alberta, Saskatchewan, Manitoba, the Northwest Territories, Ontario, and Québec). As part of this deal, the HBC maintained title to its many trading posts and five percent of the arable lands within its former holdings. By the 1910s, the HBC controlled approximately three million acres of what it termed “undeveloped farming lands” (The Beaver, 1920, p. 10). Seeking to avoid further taxation on these holdings, the HBC sought to sell this land to what a 1920 article published in its corporate magazine *The Beaver* (1920) called “bona-fide settlers only,” supporting the “steady, helpful development of Western Canada’s agricultural interests” (p. 10). According to archived corporate memos, the HBC board of directors debated whether cinema might be a useful tool to “stimulate the public interest in the Hudson's Bay properties” (Manitoba, 1919, n.p.). Although the scope of the HBC’s experimentation with sponsored filmmaking fell short of that imagined, the board clearly understood cinema as a means of “advertising the Company, and incidentally its lands, without appearing to do so” (Manitoba, 1919, n.p.). In seeking to leverage cinema’s affective and spectacular qualities to reduce the HBC’s tax burden, the strategy also implicitly furthered the colonial transfer of lands from Indigenous to settler hands.

**From Baffin Island to London: Labour’s trans-Atlantic intimacies**

In Labrador and the Eastern Arctic, unlike the territories in Western Canada that were under treaty, the fur films intersected with a different assemblage of economic interests and colonial practices. Government policies of the period sought to enforce the settlement of Inuit communities, often in ports formed around HBC posts or religious missions. While infrastructures may serve to “build and sustain human life” (Cowen, 2017, n.p.), these systems also serve to extract and consume the vitality of certain lives for the benefit of others. The HBC fur films trace a ma-
terial intimacy between fur and flesh, animal and human bodies, that extends from the East Arctic to centres of commerce and the former British Empire. Tracing these material relations can reveal how the colonial infrastructures of the fur trade also radiate from cities such as London. The location of the HBC headquarters as well as many of its warehouses, London appears as a site of corporate wealth and material excess in several films, including *The Heritage of Adventure* (Wyckoff & Derr, 1920) and *Leipzig Exhibition footage* (Hudson’s Bay Company, 1930).

In *The Heritage of Adventure* (Wyckoff & Derr, 1920), one such scene narrates the processing of fox skins into fur commodities by stitching together footage of Inuit women from Baffin Island (in modern-day Nunavut) with staged images of white female shoppers in urban department stores (see Figure 5). The sequence opens with the title card: “Women turning white fox skins, worth their weight in gold….” Four Inuit women are seated in a row outside, dark fox skins drying on a line behind them, meticulously turning cured pelts inside out to process the leather. The pelts are long and delicate; their bright white colouring only punctuated by the darkened holes where the animals’ eyes once looked out. As the camera pans to the right, more women working the pelt line are revealed. They work quickly and industriously, although no sign of their skill is given. Their linear positioning implies that they are seated this way for the camera, although their gaze remains primarily on their work.

**Figure 5: Labour along the supply line for white fox furs**

Another title card interrupts the scene to pick up the story of the pelts’ production, explaining that the “men press the pelts into bales ….” The next scene returns to the group of Inuit women, who are now hanging the furs on a drying line with pelts from several larger animals. Husky dogs play underfoot, and the camera’s pan left reveals the press mentioned in the text. Next, two women are depicted sewing up the bales of fur, first in a long shot and then in a close up as they stitch. These bales will be shipped off to “London market.” The next scene enacts a remarkable geographical and temporal leap, metaphorically following the pelts from Baffin Island to “the great fur warehouses.” The tightly packed bales of fox fur are suddenly revealed to be only some of the millions of furs exported to urban markets for resale. Within the warehouse, several white men hang, tote,
count, and unpack piles upon piles of furs: white fox, red fox, beaver, muskrat. Fur bleeds into all corners of the frame, draped over handrails in the foreground, suspended in massive bundles along the walls. The workers are dwarfed by the enormous quantities they handle. From this charnel house of skin and hair, fine women’s attire emerges, or as the case might be in the final scene, a white fox fur muff and shawl. A smiling white woman poses for the camera, turning round to display her matching furs. Her stylish dress, along with the decor of the furnished showroom, appeals to an upper class (or aspiring upper class) viewership, thus bringing the scene’s cycle of labour to a close.

Viewed through this montage, the international supply chains for commodities such as white fox fur relied heavily on women’s racialized labour, as both producers and consumers. Writing about ethnographic visualization on screen prior to World War II, Fatimah Tobing Rony (1996) observes how ethnographic and scientific cinema racializes Indigenous peoples, displacing them temporally from Western civilization and consigning them to an early stage in the “history of humankind” (pp. 7–8). The juxtaposition of the Inuit and white women in these scenes, and the forms of labour they enact, serves to naturalize social categories of race and gender as well as the women’s respective stations within this supply chain. While the Inuit women’s skill, labour, and knowledge are put in service to a colonial-extractive economy of fur (one that threatens the survival of Inuit communities, even as it depends heavily on them), the white woman in the department store models one of the final products of the trade. As either an upper-class consumer of luxury products, or a retail worker imitating one for the benefit of the film, she stands in as another type of worker, one whose labour is hidden behind her imagined purchasing power. Unlike the Inuit workers, the department store girl is highly feminized, gazing directly at the camera as she nods and winks knowingly. Her impeccable make-up, whiteness, youth, and fashionable attire place her in a social class and lifestyle that implicitly benefits from racial capitalism and settler colonialism, even while white women’s suffrage in Canada remained limited across the country. The sequence expands the boundary of the extractive zone from spaces where animals are trapped and processed, such as Baffin Island, to the storerooms of London and city department stores, sites in which other types of racialized and gendered labour grease the wheels of capital.

Although the women at the beginning and end of this sequence (and commodity supply line) remain anonymous to one another other, the film nevertheless constitutes the white fox fur as a type of cinematic contact zone between these workers and bodies. As a circulating point of contact—material yet also difficult to trace in the pelts’ standardized sameness—the skins become sites of encounter, between bodies along commodity and colonial frontiers. Framing the fur trade in Canada as a sexual economy of nation building, Chantal Nadeau (2001) argues that the “social and historical encounter between skin and pelts” (pp. 8–9) shaped
notions of gender as well as sexualized nationalist narratives. The beaver, Nadeau (2001) argues, functioned in the Western cultural fabric as more than an exchange commodity or “symbol of the French and British colonial enterprises” (p. 9); it was also a marker of the nation’s “sexual economy” (p. 9). By extension, the white fox fur, similar to that of the beaver, ties race and gender to imperial economies as much as it binds the human body across transnational supply lines.

At the same time, there remains a level of ambivalence within these depictions of the HBC’s relations with Indigenous communities on Baffin Island and within the Eastern Arctic. While films such as The Heritage of Adventure (Wyckoff & Derr, 1920) leaned heavily on racist stereotypes and ethnographic film techniques of the period, with scenes depicting their Inuit subjects as childlike and exotic, their depictions of relationships between HBC employees and Indigenous peoples are not reducible to them. Reading these images against the grain, the excessive documentation of fur trade operations across the continent (including miscellaneous and choppy montages of diverse landscapes and scenes, from Boreal forests to Atlantic ice floes; local towns; Indigenous traditional outfits and day schools; film crews’ transportation methods; ruined colonial forts; smiling infants; and packs of dogs) also opens space for counter-readings of animal energies, Indigenous resilience and expert knowledge, and the limits of settler control over the land.

It is not only women’s bodies that are made available as forms of labour and exploitable to varying extents. Fur-bearing animals were subjected to over-hunting and near-extinction over the course of the trade. As two forms of energy, productive human labour and reproductive animal labour, animal and human are made more intimate through the procurement of fur—using practices that also render these lives more precarious. Nicole Shukin (2009) describes the industrial processing and “recycling of animal remains” into commodities as a form of “rendering” (p. 20). For Shukin (2009), rendering indexes the “complicity” (p. 20) of industry and the arts in their production of wealth via the twofold “economies of representation” and “resource economies trafficking in animal remains” (pg. 21).

Shifting from an analysis of the human labour required by this process of rendering animals into capital to the animals themselves, it is apparent how very few live animals are depicted in the scenes of the HBC’s supply lines. With the exception of scenes showing transportation animals, such as sled dogs and horses, and footage of bison herds on the prairie in a later reel, the majority of the animals that traverse the screen in The Heritage of Adventure (Wyckoff & Derr, 1920) are already dead, bodies in motion through the exertion of human force. Frozen carcasses are pried from trappers’ snares and nets; skins are scraped, pressed, transported, and (finally) worn by fashionable ladies; a harpooned sea lion is hoisted on board the Nascopie as it steams north past Labrador. Such images reaffirm the integration of non-human animals into economic systems as a raw material, ex-
tracted from nature and processed into a portable commodity (see also Taschereau Mamers, 2020). Scenes of London warehouses brimming with furs and packed bales of dried pelts provide the only evidence in the films of the enormous scale of the trade’s subtraction of animal life. The scale of the dead and the ecological implications of this centuries-long commercial hunt are likely impossible to know, particularly since archival records and other company documents (including these films) offer only a partially accurate account of the number of pelts harvested (Hood, 2011). Moreover, this practice of rendering animal life into settler cultural capital extends to the manufacturing of celluloid film stock as well. As Shukin (2009) reminds us, early twentieth-century film stock was itself a product of rendered animal gelatin. The HBC fur films render animal life for elite consumption on multiple levels: as visual spectacle, as luxury commodity, and as raw material for mass motion-picture technology.

**Leipzig: Advertising a fur empire**

One fur film that did receive a wider audience was *Leipzig Exhibition footage* (Hudson’s Bay Company, 1930), a bilingual (German and English) picture created for the HBC’s display at the 1930 *Internationale Pelzfach Ausstellung* (IPA), or International Fur Trade Exhibition, in Leipzig, Germany.6 Produced to showcase its corporate activities, employees, and products to an international audience, the film also implicitly advertised the bundled practices of extractive capitalism, imperial ways of seeing, and colonial modernity through its attention to the infrastructures of the fur trade and the many peoples touched by it.

Designed to promote the Leipzig fur industry within Germany and abroad, the IPA (1927) ran from May 31–September 30, 1930; it was scheduled to coincide with the peak German, European, and American tourist seasons and Leipzig’s annual fur auction (Internationale Pelzfach-Ausstellung Leipzig memorandum, 1927). Leipzig functioned as a crucial meeting place for North American and Eastern European markets during this period, funnelling pelts from across two continents to European auction houses. The IPA consisted of about a dozen exhibit stands from around fifteen countries, including dominant players in the industry, such as Great Britain, the Soviet Union, France, and the United States, and corporations such as the HBC (Declercq, 2017). It also featured a variety of other amusements to attract the public, including displays of live animals used to produce pelts (some of which were imported, others were provided by the Leipzig Zoo), fur fashion shows, art exhibits, science and technology displays, an amusement park, and restaurants. Hosting almost 800,000 visitors over the four months, the IPA had a broad appeal to members of the industry and the public, reflecting the growing popularity of fur as both a luxury product and mass commodity (Declercq, 2017). Connected to the event was an international hunting exhibition (*Internationale Jagd-Ausstellung*). The International Fur Congress, which sought to establish a regulatory body for the industry, coincided with the IPA.
As part of the German tradition of exhibition culture and urban trade fairs dating back to the medieval and early modern periods, the IPA sought to alternatively entertain and educate exhibition-goers (Declercq, 2017). Displays mounted by government agencies, such as the U.S. Department of Agriculture, fur manufacturers, retailers, and other stakeholders included dioramas and natural history displays (such as a panorama of the Arctic tundra), taxidermy and hunting trophies of “exotic” species (including zebras and giraffes in the southwest African exhibit and seals in the American exhibit), and, of course, films. In addition to Leipzig Exhibition footage (Hudson's Bay Company, 1930), a number of industrial and advertising films were commissioned specifically for the IPA. The promotional film Die Weltumspannende Bedeutung des Pelzes (The Global Importance of Fur), produced by the Leipziger Werk und Werbefilm (1930), for instance, served an important role in the IPA advertising campaign. Die Weltumspannende Bedeutung des Pelzes was translated in twelve languages and screened in cinemas across Europe (Declercq, 2017). While no extant copies remain today, like other exhibition advertisement films made in Austria and Germany during the 1920s, Die Weltumspannende Bedeutung des Pelzes represents the confluence of several historical phenomenon: the industrialization and professionalization of trade fairs, the emergence of film advertising, the hardening of modernity and industrial capitalism, and new models of film spectatorship (Cowan, 2014).

Leipzig Exhibition footage (Hudson's Bay Company, 1930) was screened to IPA attendees in a “daylight cinema” as part of the HBC’s exhibit. Letters and other internal records from HBC staff reveal that there were shipping delays with the film prints. Although the IPA opened at the end of May, the film did not arrive in Leipzig until mid-June, delaying the public screenings by a few weeks (Manitoba, 1930c). Three prints of the film were provided to the exhibitors, in case of wear and damage, with another copy kept in London at the HBC’s head office (Manitoba, 1930e). While precise numbers of how many people viewed Leipzig Exhibition footage (Hudson's Bay Company, 1930) are difficult to determine, documentation of the HBC’s exhibition at the IPA can provide some clues regarding the film’s potential reach. The leather-bound HBC Exhibition visitors’ book, for instance, is filled with attendees’ signatures from across Europe and parts of North America. The first page of the ledger, dated May 31 (the opening day of the IPA), records visits from distinguished guests, including British Ambassador Horace Rumbold and Consul General Otto Prager of Leipzig, alongside ordinary attendees from places as far afield as London, Brussels, St. Louis, Kassel, and Aberdeen (Manitoba, 1930b).

In addition to the film, the HBC’s exhibition stall included displays showcasing Canadian furs and views of North American landscapes, alongside materials narrating the company’s role in the fur trade and development of Canada. This materials included photographs of HBC department stores in Winnipeg, Vancouver,
and Calgary; an illustrated map of company trading posts; reproductions of the HBC’s original charter and company records documenting its connections to Germany; photographs loaned by the Canadian National Railway and Canadian Pacific Railway; a model of Hudson’s Bay House in London; and a curated collection of thirty oil paintings by Canadian painter John Innes, entitled “The Epic of Western Canada” (Manitoba, 1930a). Other display cases presented a variety of furs, including fox, ermine, mink, black bear, beaver, raccoon, seal, and wolf (Manitoba, 1930a). HBC staff working the exhibition were tasked with cleaning and maintaining the displays, handing out pamphlets and catalogues in German and English (including reprints of a short history of the company), operating the cinema, and obtaining signatures in the visitors’ book (Manitoba, 1930c).

It is likely that the exhibition-goers would have had little first-hand knowledge of Canada, let alone of the riverways, trading posts, and communities depicted. European spectators would have presumably filtered their understandings of the film through their own specific cultural and colonial lenses; particularly in response to ethnographic scenes such as that of “Labrador Trappers” and Inuit fishermen on Baffin Island, whose hunting practices are described for foreign viewers in the simple present tense (see Figure 6). Scenes of the HBC’s corporate headquarters in London at the end of Leipzig Exhibition footage (Hudson’s Bay Company, 1930) might also have stood out to British spectators familiar with representations of Canada as part of the British Commonwealth.

Figure 6: Title cards in German and English describing Inuit society in the ethnographic present

Source: Courtesy of the Hudson’s Bay Company Archives, Archives of Manitoba, Leipzig Exhibition footage, 1930, F1

A predominate theme woven through both the Leipzig film and exhibition is the use of ethnographic and imperial ways of seeing to frame these advertisements. The film’s opening title card, for instance, characterizes the HBC’s (1930) reach as extending “From Atlantic to Pacific, from Polar Sea to Southern Boundary of Canada”; an empire built on trade and consolidated in moving images and pictorial form. Significantly, the film’s depictions of Inuit and Chipewyan First Nations peoples were echoed in the wider HBC exhibition, which included a panorama depicting what company records called scenes of “Eskimo and Indian life” (Manitoba, 1930d).
These tableaus, according to one letter, were thought to complement the selection of animal pelts on display (Manitoba, 1930d). Offering views of two different landscapes (forested and Arctic), punctuated by reproductions of Indigenous transportation and hunting technologies (a kayak, spears, an igloo; a birchbark canoe, a fish stage, snowshoes, traps, and bear snares), the panorama combined elements of the natural history diorama with settler ethnography. By displaying settler reproductions of Indigenous cultures and technologies alongside pelts and other animal remains, Indigenous bodies were transformed into scientific objects and spectacle, dehumanized as one more element of the natural environment alongside other North American flora and fauna. As many cultural historians have shown, exoticized and racialized depictions of Indigenous, colonized, and non-white peoples have a long, bitter history within Western visual film and culture, with advertising cultures of the early twentieth century being no exception (Ciarlo, 2011; Cowan, 2014; McClintock, 1995; Rony, 1996). Inuit and Sami peoples were even put on display in European ethnological exhibitions and “human zoos” in the exhibitions of the nineteenth century, including in German cities such as Hamburg and Berlin (Cowan, 2014). As a whole, the HBC’s exhibition—the panorama and film footage, in particular—which reflected these imperial ways of seeing Indigenous bodies and consuming history as a commodity, was typical of the period’s museums, trade shows, and world fairs (McClintock, 1995).

While Leipzig Exhibition footage (Hudson’s Bay Company, 1930) has more aesthetic and narrative similarities to ethnographic cinema than to the genre of exhibition advertisement films more commonly associated with industrial exhibitions such as the IPA, it nevertheless reflects a similar ideological investment in using cinema to control “the movement of bodies and attention” (Cowan, 2014, p. 4) within industrial capitalism. In this case, it is the bodies of colonial subjects and fur-bearing animals that are alternatively circumscribed and transported by the fur trade and empire. In the exhibition panorama and throughout Leipzig Exhibition footage (Hudson’s Bay Company, 1930), there is a consistent attention to the technologies and mechanisms of movement, from the canoes and kayaks carrying Inuit hunters in summer and sled dogs in winter to the various forms of what the film’s intertitles calls “modern transportation,” such as airplanes and ice-breaking steamers. As Liam Cole Young (2017) contends, infrastructures bring together human labour with non-human ecologies, the material, and the technical. Within the film, extractive capitalism is shown to necessitate the integration of animals into infrastructure itself, as energy as well as commodity. Alongside technophilic shots of combustion-powered transport by air and rail ensuring the smooth circulation of company supplies and employees are scenes of non-mechanical vehicles: sled dogs, fish caught to feed hunter and dog alike, kayaks propelled by human exertion. At the same time, these scenes of transportation within the film’s diegesis become a metaphor for cinema and the thousands of miles trav-
elled by the film reels themselves. Cinema, writes film historian Jeffrey Ruoff (2006), is “a machine for constructing relations of space and time” (pp. 1–2): through the composition and editing of images that move, and the industrialized modes of transportation that make the manufacture and transportation of this media possible. In Leipzig Exhibition footage (Hudson’s Bay Company, 1930), the steamship, the train, and the automobile to which Ruoff points not only transported the unnamed camera operators through Labrador and southern Canada, they also formed part of the infrastructure for the trade being documented.

In The Fur Trade in Canada (published, it is worth noting, a decade after the Moving Picture Expedition’s tour across the country), Innis (1999) uses the term “energy” to describe the ways populations and infrastructures were directed toward the exploitation of raw materials in the Canada’s resource economy. This occurred in two ways: people were directly involved in the production of staples and “indirectly in the production of facilities promoting production” (p. 385). In Innis’ view, the productive labour and capabilities of Canadians were bound up in both explicit and implicit ways in staples economies. Workers exerted energy to physically extract raw materials, and they invested in the different transportation and communication infrastructures necessary for the transformation of resources into staples for European and American economies. Staple industries, therefore, guided the movement of materials (capital, labour, and natural resources) from far-flung geographies to manufacturing centres, necessitating a reciprocal trade in food and fuel to power these transportation networks and trading-post settlements. While Innis (1999) refers to human populations in this text, the fur trade was quite clearly predicated on animals’ reproductive energies and the harnessing of non-human energies (from sled dogs and horses to railways powered by steam and coal) to move staple commodities. Reading the films’ depictions of labour and animal capital together, staple economies can also be thought of in terms of the exertion and (re)production of energy.

Leipzig Exhibition footage (Hudson’s Bay Company, 1930) and the other fur films do not only trace the transformation of animals into luxury goods, they also demonstrate how fur is rendered into fuel, transforming animals into energy infrastructures. In her theorization of fuel and energy, Karen Pinkus (2016) contends that “any object—living or dead—that moves another object [can] be considered a fuel in the broadest sense” (p. 21). While dead, the financial and symbolic value of these furry remains motivated people to migrate across vast territories, build transportation routes and trading posts requiring other resources such as timber and iron, and enact forms of colonial legislation favourable to these economic practices. In effect, fur powered the engine of Canadian and European economies, not with an internal combustion engine but with the promise of wealth. During its height, the fur trade facilitated the reorganization of a settler economy to circulate and exert energy along certain axes, making and remaking environmental
and human relationships in the process. In this sense, the bodies of animals fuelled the expansion of economic frontiers, even as they became integrated into infrastructures of colonial mobility and extraction.

**Conclusion**

By way of a conclusion, we return to Montréal. On an unusually hot, dusty evening in the spring of 2019, I exited the Grande Bibliothèque on Boulevard de Maisonneuve after a particularly long afternoon typing away on my computer. Waiting on the street corner for the light to change, my eyes drifted across the intersection. I caught sight of some graffiti adorning the side of the former Gare d’Autobus: “- capital + animal” (see Figure 7). *Moins de capital, plus d’animaux*. Less wealth, more life. While it is unlikely that the artist meant to reference the mass killing and removal of furry animal life from this continent to other shores, the juxtaposition—bus station, animal, culture—was serendipitous. Perhaps the writer intended this equation as an ecological balance sheet, a call for change in the time of disaster capitalism and mass extinction. Perhaps they intended something else. Facing the former bus station, however, this text can be read as one further reminder of the layered relationships between media and economy, infrastructure and the non-human world.

![Figure 7: “Less wealth, more animals” at the Montréal Central Bus Station (Québec)](source: Author photo, March 2019)

As cultural texts and historical objects, the HBC fur films defy easy categorization. The films are episodic, at times amateurish, emphasizing dramatic scenes, unique views, and different technologies over a coherent plot or dramatic narrative. Their image compositions borrow liberally from ethnographic film and the travelogue, incorporating tourist views of milling crowds and Arctic hunts alongside
wide-framed landscape shots. As a corpus, these fur films contribute to shaping an emerging settler film culture in Canada, upholding extractive economies and imaginaries even as they offer fertile grounds for counter-readings and resistant histories. By mapping settler infrastructures, labour, and trans-Atlantic networks of the fur trade between the two World Wars, these films assisted in the cultural legitimation of this imperial economy and materially facilitated the transfer of land to settler ownership. In this way, these moving images can be understood as another form of infrastructural mediation, structuring both human and non-human life in unequal and extractive ways. As vehicles of movement, they document the physical transportation of furs and celluloid film across vast distances while feeding the imaginaries of settler culture. As the substructure of so-called Canada, extractive practices shape both visual culture and more-than-human ecosystems, even as globalized commodity chains offer the illusion of distance from the negative consequences of what Leanne Betasamosake Simpson characterizes as “extractivist behavior” (quoted in Klein, 2013, n.p.).

Although these moving images from the HBCA contribute to the sedimentation of settler stories of conquest and extraction, archival films such as these also offer fertile grounds for inquiring more deeply into infrastructures and the narrative architecture of colonialism. Whether watching the flickering intervals of light and shadow projected on screen, catching a glimpse of public artworks while walking to catch a train, or photographing graffiti, media scholars can use these interactions to make visible colonial pasts and presents, crafting new knowledge for a decolonial future.

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Notes
1. For other histories of film production in Labrador and the Eastern Arctic, see: Films on Ice: Cinemas of the Arctic (MacKenzie & Westerståhl Stenport, 2016), The Iconic North: Cultural Constructions of Aboriginal Life in Postwar Canada (Sangster, 2016), and “Nunatsiavut’s Cinema”
Jody Berland (2015) also surveys the importance of the beaver to Canadian visual and material cultures in her chapter, “The Work of the Beaver,” in *Material Cultures in Canada*. 2. There appear to be no extant prints of *The Romance of the Far Fur Country* (Wyckoff & Derr, 1920). In 2011, the Winnipeg-based production company Five Door Films undertook an extensive digital reconstruction of the lost film using production records and footage from the Hudson’s Bay Company Archives. While the 2015 reconstruction of *The Romance of the Far Fur Country* (Five Door Films, 2015) offers an important glimpse into what the original film might have resembled, according to archivists, *The Heritage of Adventure* (Wyckoff & Derr, 1920) remains the closest to the lost 1920 film.

3. For more on the role of the National Film Board (NFB) in producing a settler colonial imaginary through publicly funded documentary and government policy, see Zoë Druick (2007). John Grierson founded the NFB in 1939 with the intent of cultivating a national cinema for Canada, in the vein of the British Film Institute and its colonial filmmaking practices. While a comparative study of the early NFB years and the HBC fur films is outside the scope of this article, these films contributed to shaping a shared visual language for the developing settler nation. 4. Bill Derr departed partway through the shooting, returning to New York City from Winnipeg in mid-September. In Vancouver, Harold Wyckoff was joined by HBC employee Captain Thomas P. O’Kelly, who continued with him until the conclusion of the journey (Geller, 2004).

5. *The Romance of the Far Fur Country* (Wyckoff & Derr, 1920) received a limited theatrical across the Western Canadian provinces through the Toronto-based Allen Theatre Enterprises during the spring of 1920. It premiered in Winnipeg at the Allen Theatre in May 1920, to an audience comprised of HBC clerks, members of the public who received free tickets at affiliated department stores, and Indigenous performers hired to promote the film and the HBC’s corporate image (Geller, 2004). The HBC also made an agreement with the Allan Theatre chain to offer free screenings to customers who picked up tickets at its retail stores (phone interview with James Gorton, August 7, 2015). Little archival evidence exists of any public screenings of *The Heritage of Adventure* (Wyckoff & Derr, 1920), despite the company’s stated intention to release it in Great Britain (Geller, 2004).

6. *Leipzig Exhibition footage* (Hudson’s Bay Company, 1930) is one of two versions of a film created for the IPA. While both pictures contain very similar footage, the length and order of the scenes and title cards differ somewhat (Manitoba, 2020).

7. For accounts of Germany’s colonialism prior to World War I and its influences on German visual culture and public memory, see: “The Visual Archive of Colonialism: Germany and Namibia” (Steinmetz & Hell, 2006) and *Advertising Empire: Race and Visual Culture in Imperial Germany* (Ciarlo, 2011).

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**Filmography**


References


Mediating the Tree: Infrastructures of Pulp and Paper Modernity in The Bowater Papers

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ABSTRACT

Background: Through a close reading of the four issues of The Bowater Papers, this article aims to understand the rise of a paper modernity and to reinsert it—as material and infrastructure—into media studies.

Analysis: Producing wood paper is a strain on the landscape and the environment. The Bowater Papers showcases the histories and material possibilities of paper media products. A paper-dependent modernity can be understood as an infrastructural assemblage of harvesting, production, circulation, and consumption.

Conclusion and implications: Paper calls for a natural history and geography of media. Thinking about the mediations from tree to paper through the encompassing notion of “xylomedia” is a way of articulating the intersection of the material, environmental, and infrastructural in media studies. Today is still a paper world, one that is also the age of lignin, package, and Amazon.

Keywords: paper; trees; media; materials; infrastructure; environment

RÉSUMÉ

Contexte : Par une lecture attentive des quatre numéros de The Bowater Papers, nous cherchons à comprendre l’essor de la forme moderne du papier. Se faisant, nous le réinsérerons—en tant que matériau et infrastructure—dans le champ des études médiatiques.

Analyse : La production de papier de bois est lourde de conséquences pour l’environnement. The Bowater Papers nous renseigne sur des aspects historiques et matériels du papier. La modernité, dépendante du papier, peut ainsi être appréhendée comme un assemblage infrastructural liant récolte, production, circulation et consommation.

Conclusion et implications : Le papier appelle une histoire et une géographie naturelles des médias. Penser aux médiations de l’arbre au papier avec le concept de « xylomedia » est une façon d’articuler l’intersection du matériel, de l’environnement et de

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Introduction
Despite the efficiency of electric, electronic, and digital communication systems that transform information into bits, blips, light, and waves, we continue to be avid paper consumers. Paper—with its inscriptions and weight, its materiality that must be stored and cared for, sensed and felt, carried, and held—has proven itself a resilient and versatile medium with distinctive and enduring characteristics. Even while a “paperless” society has been imagined for quite some time (Lancaster, 1978; Sellen & Harper, 2001), homes and offices are still full of paper—books, forms, receipts, boxes, envelopes, notebooks, paper towels, Post-it notes—that have yet to be entirely replaced by those markers of high-tech living: screens, buttons, speakers, drives (Plotnick, 2018; Unger, 2017). The mythos of paperless living goes hand in hand with an ideology of progress that supports the convergence of material culture into as few digital devices as possible. But digital media’s increased efficiency has not yet entirely replaced older analogue options, and it is still difficult to imagine living entirely without paper. It might be the result of a personal preference—such as when some readers deliberately choose the sensorial experience that the printed page affords—or have a more instrumental rationale: students swayed by the evidence that note-taking on paper helps retention (Mueller & Oppenheimer, 2014); archivists insisting on the stability of paper; environmentalists approving of its recyclability; bureaucrats and lawyers commending the authoritative quality of the page. At the same time, paper also serves as an analogue, retro, or nostalgic “alternative” medium: book and printing fairs, slow movements (from slow publishing to slow reading), and a renaissance in paper-based practices such as calligraphy, collage, and colouring books are only some of the examples of paper’s continuing cultural relevance (Rauch, 2015). As people look to tune out, disconnect, and detox from the digital (Harris, 2014; Kingwell, 2019; Morozov, 2013; Odell, 2019), paper has offered a way to respond to the cold and sleek world of electronic hardware with an intimate material reaffirmation of a tactile medium (Brillenburg Wurth, Driscoll, & Pressman, 2019; Mueller & Oppenheimer, 2014; Special Projects, 2019). Paper’s material affordances are enmeshed in humanity’s broad array of social formations, and its use and influence can hardly be overstated.

Paper is a complex material, full of contradictions and ambiguities. What we call “paper” stands in for a diverse range of things, made up of different materials and with different formal qualities. Some papers we discard easily (newspapers, popular magazines, tissue paper), while others are carefully looked after (diplomas, handmade papers); some we read (the paper), others we carry as extensions of
us ("hand me your papers"), and yet others are there to contain or circulate (envelopes, tickets, boxes). And this is just the tip of the papery iceberg. In general, paper refers to material that is naturally fibrous and contains cellulose, but it is only made possible because of technical processes; it requires human ingenuity and tools to transform something "raw" (the tree or wood) into the medium that is paper. Whether it is the simple vats of the Middle Ages or today's industrial mills, multiple steps are required to transform a tree into paper or a paper derivative such as pulp or cardboard.¹ And no matter the method or desired end product, making paper requires water energy: for harvesting, milling, and pulping. As a consequence, pulp and paper mills must be located near both forests and a considerable stream of flowing water. This proximity to nature is, however, misleading: despite a natural connection to woodlands and waterways, industrial chemical mills² are major polluters (largely due to the bleaching that occurs when processing materials such as rags or wood), producing a noxious smell through smoke and fumes that can cover entire communities, as well as being prominent (dominant and disruptive, some might say) structures in what are otherwise sparsely built-up landscapes, often on or adjacent to land under Indigenous jurisdiction.³ While paper has a long history, this article will concentrate on the relatively recent pulp and paper industry that is based on trees and wood pulp.

Thinking of paper via the tree requires some new conceptualizations of environmental media theory. First, trees are a problematic model of an "extractive" logic, since they are not exactly extracted from the land but cleared, razed, felled, harvested, and exploited. This act of deforestation can—at least in theory—be followed by its opposite, reforestation: trees are an example of a resource that is not finite and that can be replaced. Second, paper provokes an expansion of what constitutes elemental media, broadening from the four elements (earth, water, fire, air) as used by John Durham Peters (2015), to include other primary matters, such as the tree.⁴ This might lead to the question: could there be a media philosophy of tree, or wood, or forest? Could we think of these together under a common rubric such as "xylomedia" (from the Greek "xylo" or "relating to wood"), and would such a material enfold be a useful way to approach a materials-based media theory? And third, while paper in this case is articulated through the tree (and thus as grounded, metaphorically, to the Earth), the pulp and paper industry’s reliance on water as mixing agent, energy generator, and mode of transportation means it is also part of a hydraulic network and politics. Already in the nineteenth century, trees and water were considered in tandem as Canada’s "crucial raw materials" (Kuhlberg, 2006, para. 5), and as Harold Innis argues, lumber, pulp, and paper took their place as Canadian staple commodities, while waterways have allowed the flow of these and other staples across the vast settler Canadian territory.⁵ It is the expansive presence of both trees and water that makes it impossible to consider Canada’s pulp and paper production as separate from its geography.
The tree is a resource that is renewable and recyclable, malleable and organic. It can be processed to take on various forms and qualities, depending on its ultimate use: it can be as fine as tissue, as sturdy as cardboard, or even used as a building material or textile. The invention of wood-based paper in the mid-nineteenth century coincides with the Industrial Revolution and automated metal machinery, allowing for the mass production of standardized paper as well as an expansion of media produced using the cellulose fibres of the tree. This development of wood as a multi-purpose material runs in parallel with the expanding notion of media, which was shifting over time from referring narrowly to tools, surfaces, and containers (and other artefactual intermediaries) to more enveloping conceptualizations of ecologies, systems, and conditions that “determine our situation” (Kittler, 1999, p. 1), or, as Durham Peters (2015) has more recently put it, as “vessels and environments, containers of possibility that anchor our existence and make what we are doing possible” (p. 2). Indeed, thinking of the process from tree to wood to paper is an example of thinking environmentally and infrastructurally about media, and becomes a way for integrating the material expertise from other discourses and disciplines (such as material culture, art history, print studies, new materialisms, or forestry, to name just a few) into a xylomedia history and geography.

Even with the undoubted ubiquity of paper, media scholars have very sparsely attended to the supply chains that, in the example of newspapers, connect “trees to factories to readers” (Stamm, 2018, p. 11), or more broadly, to the politics, aesthetics, geographies, histories, and economies of media derived from the tree. The appearance of paper in media studies often draws from the histories of writing, books, and printing, focusing on specific paper artefacts and how they have allowed us to inscribe and circulate information and knowledge, whether in reading media such as manuscripts, newspapers, and books; in documents such as contracts, passports, or architectural drawings; or in ephemera such as postcards, calling cards, or tickets (Desan, 2015; Joshi & Zieger, 2017; Müller, 2015; Robertson, 2012, 2014; Taws, 2013; Wilson, 2005). Media scholars have also considered the paper-dependent developments of new cognitive forms and logics, such as those that occur during indexing and filing (Day, 2014; Kamin, 2018; Krajewski, 2011; Robertson, 2017, 2019; Vismann, 2008), as well as during the procedures of bureaucratic documentation, ordering, and paperwork (Bothwell, 2017; Day, 2019; Gitelman, 2014; Hunter, 2012; Kafka, 2012; Latour, 2002; Lubar, 1992). Ian Sansom (2013) goes so far as to say that, “as such paper logic relentlessly proceeds, so paper itself might be revealed to be the unlikely foundation of the world” (p. xv). Additional examples of media research on paper might include cases where there is a destruction or distortion of the physical form, with activities such as shredding (Constable, 2019), cutting (Heesan, 2014), or burning (Scott, 2007). Similarly, environmental media scholars, despite their growing attention to the resources that support communication, have yet to undertake a materially inflected analysis of
paper and its various origins or derivatives—or, by extension, of trees, wood, or forests—as they have with such problematic products as plastic and petroleum (Barney & Tollefson, 2019; Boetzkes, 2019). As media studies’ recent turn toward the material and environmental has made the discipline more attuned to the natural resources needed to produce media artefacts and ecologies, there is a need for richer reflections of paper as technology and infrastructure, as practice and culture, and for a media history and geography of and through the tree.

Paper products were important to the imagination and reconstruction of the world in the 1950s. This period of great infrastructural growth was also a time of “unprecedented boom” for the Canadian forestry industry, a “golden era” as “the world’s appetite for wood products—everything from construction lumber to toilet paper—exploded” (Bourchier, Stanton, & Kuhlberg, 2012, para. 12). The pulp and paper industry presented its products as modern technologies, both in terms of how there were made and how they could be used. This paper modernity was articulated in trade publications by the coming together of these different facets of paper placed indiscriminately side by side: pictures and descriptions of the colossal industrial mills placed right next to the discussions of types of paper and their uses, including shipping, marketing, printing, packaging, and a whole host of other applications that made this new modern world go round. Paper, though a technology with a long and rich history, has not only itself become modern, it has become an essential infrastructure of modernity.

One such trade publication is closely examined here as a way to anchor this analysis of tree-derived paper infrastructures. The Bowater Papers are an ode to arboreal media. This small but rich set of magazines consists of four aesthetically striking issues produced by the Bowater Paper Corporation in the 1950s. The publication moves freely between lessons in forestry, manufacturing, arts and crafts, and much more—all the while marketing their various products. The Bowater Papers were published in the midst of a booming era for the company: “profits rose rapidly” between 1945 and 1960, and the company came to “maturity” (Reader, 1981, p. 197). Indeed, W. J. Reader (1981) calls the particular period of 1954–1956 the “zenith,” a time of “optimism unlimited,” when Bowater was the “largest producer of newsprint in the world” (p. 225). In addition, after the “diversification policy” (Reader, 191, p. 188) of the late 1940s, which ensured the company was producing a variety of paper commodities, the Bowater Paper Corporation could present paper as a lasting and essential commodity for the modern world. As a coherent set, the publication demonstrates the efficiency of the British company’s global supply chains and production process while also showcasing and educating readers on the ways paper can be made and used. As paper crosses the ocean into North America and is eventually made with trees rather than with rags, it forges a connection to the settler-claimed coniferous forest and becomes associated with notions of rawness, extractable nature, and the elemental. While his-
torians tend to emphasize the role of paper as a support for writing and information, as “the raw material of human communication,” the very raison d’être of The Bowater Papers is to demonstrate that “paper, the commodity, is not only for the chronicler” (1950, p. 2). Indeed, in a time when the apparent ubiquity and renewability of trees made it seem that paper was a limitless resource, there was an opportunity to pitch Bowater as not only the global purveyor of newsprint but of a variety of goods and solutions. The Bowater Papers offer a stylized recasting of pulp and paper as a high-quality, durable, sophisticated, and adaptable material that benefits from the ready availability of adequate trees in Canada’s vast boreal forest. Bowater’s largest North American mill was situated on the island of Newfoundland—the company’s operations rooted, literally, in the same trees it was there to exploit. Through The Bowater Papers, the company would present an infrastructural (paper) foundation for the prosperous, hopeful, and increasingly globalized and mobile world of the 1950s.

How then do we think of paper when the focus is not on the words on the page but rather on the fibrous page itself (Stamm, 2018)? By treating paper materially through the dual lenses of media history and environmental media studies, its importance as a resource, technology, and infrastructure can be restored. It is not uncommon, especially in media studies, to characterize social formations in terms of “ages” that correspond to dominant media (e.g., the age of print or the Gutenberg era, the information age, the golden age of television, etc.). In this vein, it could be tempting to speak of a singular “age of paper,” but what exactly would this refer to? After all, paper refers to a variety of materials, and it has been part of human culture for centuries, making it a very long “age” indeed. Rather, the “age of paper” can be fragmented into the “ages” that capture significant aspects of papermaking: the age of wood, the age of lignin, and the age of packaging. Thus, the first section here—the age of paper—provides a brief historical overview of “paper” as ambiguous material and terminology. The second section—the age of wood—focuses on paper made from trees and on the Bowater publication’s efforts to present a tree-paper modernity. A reading of the form and content of the four issues of the publication reveals much about the ways Bowater imagined the possibilities of “xylomedia.” The next section—the age of lignin—considers the serious environmental resources and impact of transforming trees into lumber, woodchips, and pulp, and the consequences of its passing from resource, to material, to commodity. The final section—the age of the package—considers the role of paper in today’s carbon-intensive infrastructures of circulation, mobility, and logistics. Using The Bowater Papers as a way to reinvest media studies with these historical, material, and environmental considerations of paper, infrastructures of arboreal paper are presented as part of a modern system of industrial capitalism that extends into contemporary conceptions of mobile digital economies.
The age of paper: Beginnings of a papery world

While the Bowater mill produced tree-based pulp and paper, paper can be produced using any material made from cellulose, a common organic compound that is found abundantly in plants, including papyrus, cotton, silk, bamboo, and wood. To release the cellulose, plants are processed using moisture, heat, and/or beating (Bloom, 2001). The use of wood pulp to make paper appears late in the history of paper and the context is unclear. Charles Fenerty is noted for having first made paper from wood in 1841, producing his first sheet in Halifax. He placed a notice in October 1844 in The Acadian Recorder, the local newspaper, that clearly captures the novelty of his product for him and potential readers (see Figure 1). He writes:

Enclosed is a small piece of PAPER, the result of an experiment I have made, in order to ascertain if that useful article might not be manufactured from WOOD. The result has proved that opinion to be correct, for—by the sample which I have send you, Gentlemen—you will perceive the feasibility of it. The enclosed, which is as firm in its texture as white, and to all appearance as durable as the common wrapping paper made from hemp, Cotton, or the ordinary materials of manufacture, is ACTUALLY COMPOSED OF SPRUCE WOOD, reduced to a pulp ...

Figure 1: Letter from Charles Fenerty


However, probably unbeknownst to Fenerty, a few European texts slightly predate his revelation: a Frenchman inspired by American wasp nests containing wood.
saw its potential for paper; a British patent was granted to Matthias Koops in 1800–1801 for printing using, among a long list of materials, “different kinds of woods and bark” (via Bloom, 2001, p. 5), though the details have been lost. In 1840, a German named Friedrich Gottlob Keller obtained a patent for a machine that used wood for papermaking (Bloom, 2001; Sansom, 2013). Despite these initial proposals sprouting from various corners of the world, a variety of chemical experiments still had to take place to refine the process. It took until the late 1860s for wood pulp to become commonly used across the world for the mass production of paper.

Few have probably heard of Fenerty, Koops, or Gottlob Keller. They are, in their obscurity, emblematic of the limited place of paper in media studies; paper is an innovation whose impact cannot be overstated but one whose very ubiquity renders it unspectacular, quotidian, unnoticeable. In this way, it is an example of the sparsity of research devoted to the materials of media and infrastructure, or those inquiries that problematize the “raw” material of communication media. This is not for a lack of general interest in paper: there have been many popular and scholarly histories, both partial and comprehensive, written on the topic (Bloom, 2001; Gendron, 2018; Hills, 1988; Hunter, 2011; Innis, 2011; Kurlansky, 2016; Müller, 2014; Sansom, 2013). Yet surprisingly, even though Canada is a major paper producer and Canadians have mythologized their relationship to the forest, historians have until recently shown “a surprising lack of interest” (Kuhlberg, 2015, p. 4) in addressing the modern Canadian pulp and paper industry. The past few years have seen an uptick of research devoted to the topic, mostly written as case studies of particular mills, uses, or places affected by the severe environmental and local impacts of the industry (Baxter, 2017; Boothman, 2020; Kuhlberg, 2015; Stamm, 2018). But while these political, economic, and environmental stories are valuable additions to understanding the multidimensionality of paper, there is still a need to further examine what happens when the production of paper shifts from using one raw material to another, and to consider these developments as media scholars.

Media histories have tended to take paper for granted or to address it as a footnote in the rise of the mechanical printing press in the fifteenth century, situating the printing press and the printed book as “the perspectival anchor of modern media theory” (Müller, 2014, p. x). Paper takes a backseat in the story of the “Gutenberg era,” with only the most materially attuned scholars working through the physical elements of paper, printed and otherwise, and delving into the particulars of the vellum, gold, metals, and inks that Gutenberg used to produce his famous bibles. In general, however, as has been repeatedly remarked, “historians have tended to subsume the history of paper within the larger story of printing and the printed book” (Bloom, 2001, p. 2). As a consequence, paper has been very narrowly historicized, even while it has become ubiquitous. Media historians are in part responsible for this problem, emphasizing the cultural resonances of the printed, mechanically copied, and accessible word, and the resulting social and
political changes of this newfound accessibility of writing and reading. With few exceptions, paper remains a largely implied element, the “neutral” substrate or “empty slate” upon which history is written.

The broad strokes of the story of paper are familiar. It was invented in China a century or two before the Common Era and took almost a thousand years to get to Europe. The migration westward made its way first through the Middle East and northern Africa before the Moors made the leap onto the European continent via the Iberian Peninsula. As it moves westward, paper shows itself to be a remarkably versatile concept, and the raw materials from which it is made adapt in response to the availability of the resources at hand, becoming thin or sturdy; translucent or opaque; fibrous or smooth; kraft brown, white, or colourful depending on the materials in a given location. The first European papers in the eleventh and twelfth centuries were primarily made from linen rags that transformed into fibrous pulp through a process of beating by hand or mill, but up to that moment, paper had been made with a variety of other organic materials that contain cellulose, such as papyrus, cotton, or hemp. As rags become the prime raw material used to make paper in Europe (as opposed to, for example, the luxurious use of animal skin such as vellum or parchment), paper becomes common and widely accessible. No longer reserved for singular manuscripts, it could now be used for throwaway newspapers, the burgeoning paperwork bureaucracy of “registers, deeds, and commercial documents” and, increasingly, for a variety of common goods “from teabags to wallpaper” (Bloom, 2001, pp. 1–2). Despite this plethora of uses, newsprint was for a long time the most important product for paper-makers, so much so that by the early 1960s, Bowater’s increased capacity and capital investments came up against a global newsprint market that was drastically oversupplied. In the lead-up to this period the company produced The Bowater Papers: a trade publication that could show its clients the potential of paper commodities beyond newsprint, presenting paper as an aesthetic, practical, and flexible option for a wide variety of needs and products (e.g., marketing, shipping, building, etc.), all the while offering an education in paper production that is rooted it in the mythos of the Canadian landscape. Across the four issues, paper emerges as a term that encompasses a variety of commodities that can each have different material compositions and qualities depending on how they are used. As the editorial in the second issue remarks, “paper is, in the best sense, a truly cultural subject, touching at every point civilized existence” (1951, p. 2). Paper’s versatility is also captured in the Dictionary of Paper (1980):

This book is not a “final achievement.” As the industry and its operating environment continue to change, new scientific and engineering developments will result in additions to its [paper’s] language and with increasing frequency. Since the Third Edition was published, for example, there has been a literal explosion in the terminology as a result of
environmental developments alone. Thus, we expect that as soon as this volume is published, its obsolescence will already be under way. (pp. vii–viii)

Bowater and the age of wood: The golden era
By 1950, Canada had become by far the world’s leading producer of newsprint (Stamm, 2012). Bowater, a British company, had struck gold (in a manner of speaking) with its investment in North America’s forests. After World War II, Bowater relentlessly expanded its capacity in various ways, building and acquiring mills across the globe, from the American South to France and from New Zealand to Canada. North American forests would become key to the company’s profitability over the decades leading out of the Great Depression; indeed, the United Kingdom was “dependent on imports of pulp, because there was no adequate [local] timber” (Reader, 1981, p. 5). One of Bowater’s largest mills was located in the province (and former British colony) of Newfoundland and Labrador. As Reader describes in his 1981 corporate history of Bowater (a project solicited by the company’s board in the late 1970s), the firm’s international holdings began to take shape in the 1920s with their investments in Corner Brook, Newfoundland: initially by sitting on the board of the local Newfoundland Paper and Power Co. Ltd., then with the acquisition of Hudson Packing and Paper Co. in 1923 as the newly formed Bowater Paper Co. Inc., and ultimately, with the purchase of the Corner Brook mill in 1936. Wood was intensely important to the Canadian context, with much of the country covered by a boreal forest and a tradition of logging that took root in the earliest days of colonization (Innis, 1946). In his study of Canada, Innis included lumber, pulp, and paper on a list of the country’s staple raw materials: resource-dependent commodities that drive the country’s export-based economy and development. In the 1950s, the pulp and paper industry was still one of the most important industries in the country. As Michael Stamm (2018) puts it, “the exploitation and trade in trees would reorient Canada’s relationship to the rest of the world” (p. 12).

The first issue of The Bowater Papers came out in 1950, and there was editorial optimism in the potential scale and scope of the magazine in these early days:

We do not intend to be tied to a regular schedule of publication, but we shall hope to produce about two issues a year, each to be complete in itself. Into every production we shall put as much work and as much time as may be necessary for its artistic and technical excellence. (p. 2)

This ambitious publication schedule proved to be just that. Over the course of the 1950s, Bowater would produce only three more issues of the magazine, in 1951, 1954, and 1958. While there are only a handful of issues, each is made up of around 65 hefty and carefully designed colourful pages that offer wide-ranging paper-centric content, including stories on harvesting; manufacturing and distribution; history; important figures; aesthetic options, such as the merits of certain
types or engravers; the cultural histories of everyday paper-based media, such as calendars, wallpaper, and newsprint; and how to use different kinds of paper, such as packaging or wrapping.

The publication is dedicated to showcasing the technical and sensory qualities of its paper products: the types of paper, inks, finishes, and coatings; elements such as French flaps and foldouts; and individual page inserts that use tracing paper, crinkled candy wrapping paper, or colourful transparencies (see Figure 2). In this, the magazine was firmly rooted in the corporate print culture of trade catalogues, with an intended audience of other paper producers and wholesale buyers. (Along with the example of other paper-industry trade publications,7 the unremarkable nature of this is perhaps revealed by the fact that Reader [1981] does not mention this publication in Bowater’s corporate history.)

Figure 2: Feature on “Package and Prestige”

Looking through an issue is a discovery of the possibilities and extensions of paper in general, and a showcase of the products that Bowater has to offer its current and potential customers. This is clearly demonstrated in the final pages of each issue, which contain a detailed “Production Specifications” table with information on how each article was produced, including technique (letterpress, photogravure, etc.), paper (from Bowater products such as Pure Book Paper, Lithocote M/2, or Pure Unglazed Kraft, including their weight measurements in grams per square metre), typeface (with Baskerville and Perpetua predominating), blocks (specifying
tones and the degree of screening), and inks (with Winstone’s B.S ink series 89 permeating the magazine’s pages) (see Figure 3). Immediately following this table is a “Directory of Credits” indicating the British printers that undertook the letterpress, photogravure, or block printing, as well as the binding of the issue. And yet this foregrounding of the magazine’s production process, techniques, and materials turns each issue into a performative argument for paper: both in terms of paper’s malleability as a cellulose-based vegetal material that could be used as a surface or container, and also as what makes up the common, readable pages of the print industry. The four magazines thus accomplish a distinct folding together of semantic content (knowledge on paper and its natural and human histories) with sensory paper-based materiality. In this self-proclaimed example of “artistic and technical excellence” (1950, p. 2), medium and message support and demonstrate each other, working in unison to show the infrastructural possibilities of paper.

Figure 3: Production specifications, at the back of issue

The connection between land and human activity, between the rawness of the tree as a “green” resource and the complexity of capitalist forms of organiza-
tion that require paper, is something that recurs in the magazine. In one editorial, the storage medium of paper is linked back to Canada’s forests:

> paper is the substance upon which human memory is stored. ... It is to transmit this vital experience that forests (which replant and replace themselves with the aid of man) are felled in Canada throughout the coniferous belt of the North; that machines are invented and improved; and that a vast industry serves the largest ranges of customers in the world. It is certainly for this reason that the ramifications of paper are almost as wide, its lore almost as rich, and its contacts almost as multifarious as agriculture—the cultivation of soil and care of animals. (*The Bowater Papers*, 1951, p. 3)

In drawing a parallel between the commodity of paper and the work of forestry, the text inadvertently gestures toward rethinking of paper through something conceived as a “raw” material for the circulation of human culture.

Throughout the issues, the message of a modern and futuristic paper-dependent connectivity is presented alongside a historicization of Bowater and of wood paper that places them within British imperial print culture and the broader project of settler-colonial cohesion: a treatment of printed road maps from Elizabethan England (1951) for example, or an article on “Canada’s ‘Maritimes’” that seeks to demonstrate the region’s longstanding ties with European settlers (1958). Put differently, the publication is not merely selling paper; it is writing Bowater and its paper into history, cementing the company’s ties to the essential dimensions of the imperial British project as a part of the infrastructure of empire that could record, relay, and recirculate information. In an article entitled “Reporting the Great Occasion” (*The Bowater Papers*, 1954), the opening paragraph muses on the recent coronation of Queen Elizabeth II, an event famous in part as being one of the first televisual media events (Dayan & Katz, 1992) (see Figure 4). Even here, the royal family’s special relationship with print media manages to reverberate. While the article acknowledges that “technological advances in the methods of collecting and transmitting current news—notably the development of radio valves and the cathode-ray tube—meant that millions more than the privileged few in Westminster Abbey were able to ‘attend’ the ceremony itself,” they quickly add that “the role of the Press remains equally important for those remoter sections of a public, which on this occasion was by no means limited to Britain” (*The Bowater Papers*, 1954, p. 5). *The Bowater Papers* uses the event of the coronation to provide a sweeping account of the rise of the public press from the sixteenth century onward, particularly centring on the coronation of kings and queens and the “domestication” of the British throne. There is, however, a significant paradox at play here, a tension between the reach of empire and the underdog colony rich enough in resources to imagine a different kind of modernity. Bowater is firmly
committed to its Canadian investment and to the medial possibilities of its prime papermaking trees, but it also seeks to present itself as having British “credibility,” very much in keeping with its corporate lineage in British paper production (Reader, 1981).

**Figure 4: Double-page spread on “Reporting the Great Occasion” to tie in with the coronation of Queen Elizabeth**

While the British Empire is among the topics recurring across the issues (e.g., articles on major figures of British culture, including Shakespeare and the British monarchy), Newfoundland’s social, cultural, and political economic history are too. The province is the subject of a trilogy of articles that appear in the first three issues of the magazine. The first begins with “The Making of Newfoundland,” which brings the former colony’s history into the present while emphasizing Bowater’s consequential role in the province’s economy. It was a convenient story to tell: long-standing claims of Anglo settler-colonial dominion that aligned with the corporation’s reliance on the former “possessions” of Britain’s imperial economy. The second article of the trilogy lands on the town of Corner Brook, the site of a newsprint mill that was one of the most important in Bowater’s international network. The narrative follows the relative decline of the province’s international fishery and the rise of its newsprint industry in the early decades of the twentieth century: “it was the coming of the pulp mills which really turned Newfoundland’s forests to a
profit” (The Bowater Papers, 1954, p. 26). The Corner Brook mill was in many ways Bowater’s Canadian base of operations, and the company emphasized these ties (equally historical as infrastructural) as a means of legitimating the clearing and harvesting of the country’s boreal forest. Historic maps, woodcuts, and contemporary illustrations by the British firm Kempster/Evans depict Newfoundland as colour-saturated labour environments in full swing. This content, which was sustained across the run of the magazine, strengthened British claims to Canadian arboreal resources while always keeping in the foreground the image of wood as a “raw” and “natural” material. The final article in the trilogy emphasizes Newfoundland’s strategic importance in the emerging era of aerial connection, with the airport at Gander ensuring that the town, thanks to the economic activity of the nearby mill, was now integrated into the spatio-temporal flows of global mobility (see figure 5). The Bowater mill, in other words, would be the metaphorical connector between empire and colony, between the resources of the Canadian forest and the commodity-hungry modern world.

Figure 5: “Newfoundland in the 20th Century”

The fourth and final issue of the magazine, published in 1958, differs in approach from the first three. While the latter integrate that anonymous, corporate “we” as the editor and author of all content, the fourth issue contains content provided by writers, journalists, editors, and other cultural producers invited by Bowater to contribute. From the well-known British novelist Leonard Strong to the sole female contributor, Daphne Rands, a journalist and editor of Sales Appeal,
a trade magazine that qualified her “to analyse and discuss the undeniably bright future for fibreboard containers of all kinds” (The Bowater Papers, 1958, p. 3), the nine contributors suggest that the onus of producing the magazine, and particularly writing the content, had become too difficult to sustain. The issue’s editorial suggests as much, noting that they were, after all, just “papermakers” (The Bowater Papers, 1958, p. 2). Moreover, the issue specifies that it was edited by Ellic Howe, the author of several books on printing history and a public relations consultant in the printing industry. Despite this, many of the same themes from the first three issues do resurface. The Newfoundland thread continues with an article by John Usborne, a British teacher and amateur expert on corn growing in England. “The Deepening Green” is written from the perspective of one convinced that “natural resources were being squandered to provide the raw material for newspapers” (Usborne, 1958, p. 3), but it nonetheless extolls the work Bowater is doing to create agricultural plantations of monocrop pines, which are carefully managed and destined for production as pulp. Usborne saw how “coniferous vitality” (p. 22) could be made to rise from Newfoundland’s sparse soil through human engineering and need. However, despite some similarities at the level of content, there is a discernible shift in pronoun and perspective. In going from the bird’s eye view of corporate interest to the partial perspective of individual authors, the magazine reinforces its status as a media artefact that can be both expert-driven and broadly informative, and in which the papery future of the North Atlantic world is imagined collectively, even while the company’s fortunes had at this time started to reflect the economic downturn (Reader, 1981).

The consistency of content reflects a desire to address pulp and paper, both the Bowater Corporation’s clearing and harvesting processes and its practices of commodification. The anonymized editor works to tie together a set of “paper values” (the title of the third issue’s editorial) that could make claims for how “we talk of paper and find that the whole world is our oyster” (The Bowater Papers, 1954, p. 2). These values speak through paper as an “international material” that could be British-owned, capitalist in orientation, and move across well-trodden communication routes that were relics of the United Kingdom’s colonial domain. “The cycle of any one of its products, may well circumnavigate the world,” the same editorial continues, “from a forest in Newfoundland to, say, a school text-book in the Straits Settlement or a paper dragon in some Far Eastern festival of the New Year” (The Bowater Papers, 1954, p. 3). Paper as a ubiquitous commodity derived from trees presents the possibility of tracing over formerly colonial networks of trade and control—a literal chain of commodified connections that could maintain relations between former colonies, such as Newfoundland and Singapore.

The Bowater Papers are, therefore, much more than a performative display of paper or an advertisement for Bowater’s products. Rather, the publication presents
an argument for wood paper as the infrastructural material for building the modern world (see figure 6). As was being pointed out as early as the 1920s, “when one considers the part which wood plays in modern life—housing, transportation, manufacture, and particularly the dissemination of knowledge by means of books and newspapers, this is truly an Age of Wood” (Gifford Pinchot cited in Stamm, 2018, p. 10).

Figure 6: Spread from “All Aboard,” showing the infrastructural potential of trees

Articulated around paper as both pulp and inscriptive surface, both material and content, the magazines provide vivid examples of how to imagine the wide-ranging uses of the infrastructural mediated tree. This vision of arboreal vitalism is predicated on having readers come to see trees on their full infrastructural spectrum—from sapling to the actual page on which Usborne’s words were printed. “The truth of the matter is that the devoted teams of experts involved have long known that in the perfect state of nature—that is to say with man co-operating—nothing is lost or spoiled except waste and, with waste removed,” Usborne (1958) writes, “the elements which interact for the benefit of man are enhanced and glorified” (p. 23). Seedling, pine, and pulp become a single element that can be turned to human purpose, making Usborne’s article emblematic of how the magazine knitted together an infrastructural treatment of pulp and paper that was predicated on the creation of a third “element,” wood fibre, that was neither “natural” nor “human” but charged with meeting the global demand for paper.
The age of lignin: From cellulose to dead media

By-products of pulp and paper come with long-lasting environmental costs. Mills have a colossal impact, requiring the harvesting of forests (often the result of monocrop planting) and the intensive use of hydro energy, all while producing an abundance of waste and pollutants. Papermaking thus leaves a complicated mark on the Canadian landscape, something that is reflected in the pages of *The Bowater Papers*: images show the natural bounty of the forest next to industrial harvesting and mills. A good example is the cover of the inaugural issue, which depicts a loosely unfurled sheet of paper. On its front is a gridded map of what is presumably Bowater’s network of production (red) and distribution (blue) centres (see Figure 7). On its back, a dense coniferous forest lets in a slanted shaft of day-light that gives a sort of benediction to a growing tree. The image is a succinct summary of the magazine’s abiding concern: how a “naturally” occurring material such as wood pulp is integral to a globalized paper infrastructure. This inaugural cover acknowledges the forests behind the roll and hints at the behind-the-scenes information the magazine will share. The coniferous tree becomes a material base and original container for the open-ended future that white rolls of paper suggest.

*Figure 7: Cover, The Bowater Papers, no. 1, 1950*

Cellulose is a polysaccharide that consumes air and minerals found in soil, and eventually forms bonds that become tensile plant matter. When it comes into
being as, for instance, a southern pine located in a Bowater monocrop plantation
(a species particularly well-suited to the production of pulp, given its ability to
grow quickly in adverse climate conditions), then it becomes part of a process of
mediation in which contemporary forestry and paper industries are end points.
In this reading, cellulose becomes part of a more consequential accounting of
paper as infrastructure that is rooted in the planet’s arboreal vitalism, whereby
wood fibres become paper-based commodities. The intent here is not to point to
the spectre of the monocrop sapling that permeates our fading reliance on paper
as a storage medium. Rather, it is to sustain a focus on the malleability of cellulose
that gets shaped into exploitable wood-based media that then exceed their func-
tion of information exchange and storage, and, in turn, become materials of mo-
bility. What The Bowater Papers helps us see, through the lens of a 1950s British
corporation surfing a fading wave of colonial capitalism, is a still very much pres-
ent vision of ubiquity that mobilizes paper as an infrastructural commodity that
demands the creation of a supply chain from tree to world using water, road, and
rail. As the authors of Wood Pulp and Its Uses published in 1911 proclaim, “(t)he
world has had its Stone age and its Bronze age: later its Iron age, and the present
is a Cellulose age” (Cross, Bevan, & Sindall, 1911, p. v). The Bowater Papers is a set
of media artefacts that articulate how this paper has not yet faded but has rather
become embedded across a range of wood-based media.

This article’s treatment of The Bowater Papers mobilizes the issues as media
artefacts that help parse historical and contemporary questions around the mate-
rial constitution of the media of communication. The past decade has seen an
energetic expansion and increased malleability of the category of “media.”
Following work by Durham Peters (2012) and others, it is no longer an epistemo-
logical leap to support the claim that environmental phenomena, including trees,
send and receive messages, store information, and more generally participate in
broad practices of mediation that enter into relation with human-centred forms
of communication. Environmental media studies is now entering an exciting
phase of analysis that can assume the legitimacy of a broad range of milieux as
co-shaping human and more-than-human interactions. Melody Jue and Rafico
Ruiz (2021) suggest that all environments are “ontologically dense situations”
(p. 2) in which multiple elements co-saturate one another, and thus demand a
mode of analysis that attends to a condition of co-presence where anthropo- and
eco-genesis merge, blur, and coalesce. What The Bowater Papers show is that “raw
paper” is neither strictly the product of extractive processes nor the result of plan-
etary conditions that produce and sustain elements in a chemical sense. Broken
down into its constituent components, the disaggregation of paper becomes a
dendrological clock running in reverse: from hard bark to cellulose. It is renewable,
in that new seeds and trees can be cyclically grown and harvested on a plot of land
up until that soil has been extracted of its nutrients. Raw paper demonstrates how
even “renewable” resources, particularly those reliant on the cyclical character of hydrological or other ecological systems, can hit a limit, particularly under the damaging conditions of global warming.

The final issue of The Bowater Papers, produced in 1958, exemplifies the full spectrum of possibilities for tree mediations. The front cover is a jarring one for environmentally aware twenty-first century eyes (see Figure 8). The cutting of the tree, presented with a joyful looking hopping squirrel, reminds us of paper as a natural resource connected to land and habitat, the Canadian settler forest and nature. There is a beautiful simplicity to the graphic arrangement, with this spontaneously felled tree in the foreground, lumberjacks resting on their newly cut stumps adjacent to monocrop saplings in the middle ground, and a flotilla of long trunks awaiting transport in the deep background. The long, arcing diagonal of the cut tree invites the reader to open the magazine’s cover. The inside flap features a more caricaturized version of that same tree, with “Bowaters” cursively spelled out in its root system and its bunches of needle-strewn branches containing the corporation’s wide array of soon-to-be manufactured products, from multiwall sacks to acoustic panels. But the chain of associations does not end there. Inside the flap is a schematic blueprint for the design of a large-scale paper mill—the next step in the production process for those severed pieces of tree (see Figure 9).

As the tree branches show, paper’s infrastructural networking effect makes it a prime material of modernity’s mantras of efficiency, progress, and growth. The Bowater Paper Corporation makes a pitch for paper as a useful all-around material to build this better world, and allows us to peek into the making—literal and imagined—of a structuring medium that bears the hallmarks of infrastructural influence. Paper infrastructures are thus a way to characterize the collection of materials and systems that rely on wood and the generative power of cellulose to maintain modernity’s focus on a mobile and growth-based model of capitalism.
This elaborate design corresponds to a feature article titled “How Do You Build a Paper Mill?” that attends to the elaborate work undertaken by Bowater’s engineering division in the siting and construction of mills. The close of the issue picks up the chain of production, with the continuation of the linear blueprint and a back cover that echoes the severed pieces of tree in atmospheric transit. Paper is thus an infrastructural commodity that mimics the malleability of the tree, and particularly of cellulose as a vital material. This final issue of *The Bowater Papers* plays up these impressive manufacturing and infrastructural exploits of transforming the tree as “raw” resource into paper commodities that are essential material supports of everyday life, and of creating the networks that connect the forest to the consumer.

Creating the illusion of paper’s rawness as a natural form of communication masks the environmental impact of Bowater’s chain of production and of the energy and infrastructures required to transform the tree into “xylomedia.” By-products such as lignin, as well as the intensive use and pollution of waterways in the manufacturing process, particularly due to bleaching, are the subject of occasional features on the environment in the magazine. A lengthy article on lignin, “Waste Product or Potential Wealth?” (*The Bowater Papers*, 1951), frames the discussion as an example of “progressive industries” turning these “waste products” (p. 6) to good use. For example, the article notes that lignin can be used as a dis-
persant in the production of ceramics, a natural alternative to more harmful tanning chemicals, and a road surface binder and dust-laying agent. Lignin is the derivate of this “raw” paper that is not so natural or unmediated after all, and it is produced in substantial quantities: an average day for a chemical pulp mill, the article notes, makes use of 200 tons of wood, from which 60 tons of lignin remain. It serves as a counterweight to the “coniferous vitality” that Usborne saw emerging from the “deepening green” of Newfoundland’s profitable forests. Lignin, water, and energy are a case of eco-genesis and anthropogenesis folding together and becoming articulated through a practice of “infrastructural mediation” (Ruiz, 2021).

In many respects, the contemporary decline of the newspaper as a paper medium at once extends and reverses Stamm’s (2018) framing of trees as “dead media”; trees have become both inert matter, their roots severed and rendered into pulp by a growing “smart” forestry industry, but also antiquated media forms that no longer represent the future, nor hold the nearly-sole responsibility (and profitability) of containing the wide range of human practices of communication. However, this does not mean that paper and trees have become obsolete as media of inscription, nor that they are no longer made to perform other modes of containment: soundproofing and trapping heat within the interior of buildings, ensuring the viability of food products in the form of kraft sacks, or containing mundane objects of everyday life (i.e., a paper bag). Similar to the better-known case of an infrastructural politics of “flow” that the oil-bitumen nexus generates (Barney & Tollefson, 2019), the mediated tree, as showcased throughout The Bowater Papers, likewise flows across a process of mediation that begins, at least symbolically, with timber logs streaming down the river current toward the mill to begin their cycle of material transformations, or as a “paper trail [that] flows majestically over about a five-hundred year period” (Sansom, 2013, p. 13) from China to Europe. As Darin Barney and Hannah Tollefson (2019) point out, practices of extraction and commodification force materials to be on the move and become bound up in the creation of infrastructural networks of production and exchange. The large-scale processing and manufacturing of tree to wood to pulp to cellulose to paper entails a reification in distinct media forms that continue to support contemporary infrastructures of capitalism, mobility, and containment for trade. One of its most ubiquitous contemporary artefacts is the rectilinear corrugated cardboard box, which facilitates the circulation of international flows of wood fibre-based commercial exchange.

The age of the package: Cellulose on the move
The Bowater Papers and its claims to shoring up a universal wood fibre culture in the 1950s also begins to mark a nebulus shift toward distributed computing and the foreshortening of paper as a storage medium. The containment of solid-phase bitumen becomes a charged mediating practice that relies on generating particular container technologies, such as pucks or pellets, that manage all the risks that
come with moving and selling such an environmentally damaging and politically loaded substance (Barney & Tollefson, 2019). By way of contrast, paper and its industrialization, both through its longevity and its pervasiveness, has placed particular species of trees, their wood pulp, and the ways of cutting and sometimes replanting them, as the damaging and renewable figure at the base of its clearing and harvesting logic. Lignin is the substance that must, similar to bitumen, ensure an infrastructure of production and consumption that both embraces and mitigates its status as a noxious by-product. Seen through its manifold possibilities of cellulose bonds forming and disaggregating, trees, similar to oil, are not only made to flow toward points of consumption, they must also support the material movement of goods through the cardboard circulation of at-a-distance digital capitalism (see Figure 10). The Amazon box is perhaps the most prominent contemporary manifestation of this arboreal politics of containment trees have become bound up with. Whereas paper has usually been considered a storage medium because of the inscriptions it “carries” (e.g., books as archives of knowledge), wood pulp also makes up the containers of packaging that are used to hold and circulate information and commodities across the networks of postage and shipment that are designed to make paper move (see Figure 11). The banal ubiquity of envelopes and boxes littered across largely Western porches, doorsteps, and mail trucks conceals the question: why are they made of trees?

The paper package is part of the culture and infrastructure The Bowater Papers has participated in and helped shape, or what Susan Leigh Star and Karen Ruhleder (1996) describe as creating an infrastructural smoothness. The article “Package and Prestige” (The Bowater Papers, 1953) offers a historical perspective on the build-up of material infrastructures meant to deliver goods directly to the home. It suggests that the creation of the mail order business is the result of the
so-called American “frontier,” where the distance between consumer and producer was expanding and where new services and products were needed to supply these far-flung settler communities. This was a settler-colonial context that required new forms of light and cheap packaging to support new nodes in networks of circulation. As the editorial from the third issue of *The Bowater Papers* (1954) claims:

> important as this use [as a writing surface] of paper continues to be in the instruction or entertainment of civilized men, a more specifically modern function of paper is being perfected in altogether different fields. If in a sense it is permissible to think of this century as the Age of the Package (it is the ‘Age’ of a good many other things too, of course), scientific developments in paper as a packaging medium do lend some weight to the catch-phrase. (p. 3)

It does not take much to jump from packaging in historical mail-order businesses to a contemporary reliance on paper in the quotidian performance of infrastructure: “Amazon,” which began with books, as a river-like flow of commodities, highlights the essential link between circulation, pulp and paper, and of the infrastructural and material production of a lifestyle of convenience from the 1950s onward. From the mail-order catalogue to the envelope, papery media are essential components of the consumption of things that move from

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**Figure 11: “Corrugated Packages for All Purposes”**

“somewhere” right to our front door, so that “package and prestige” go hand in hand:

Nowadays we buy merchandise of every kind produced in distant places packaged and protected as often as not in paper or a kindred material. But packaging must do more than protect. It must speak for the quality of the product and bridge the gap between producer and consumer. In these competitive times first impressions count for everything in the struggle for public favour. (The Bowater Papers, 1954, p. 29)

The final issue of The Bowater Papers itself contains a short article called “Cardboard is Contemporary.” Daphne Rands (1958) extols the archaeological weight that humble corrugated fibreboard could hold as a technology dating from the 1860s and as “one of the finest flowers of our civilization” (p. 41). Rands is writing from a moment in time when cardboard was expanding: production increased eighty percent in the U.K. between 1950 and 1958. These are long echoes that continue to reverberate today with the re-opening of brown paper mills to meet current global demand (Corkery, 2019). “For, like some other eminent Victorians,” Rands (1958) perceived that “the corrugated fibre board case has proved itself almost miraculously adaptable to the needs of our fast-moving, fast-selling, fast-spending century” (p. 42). She forecasted that these characteristics of her contemporary economy would only increase, and that the strong, light, and cheap corrugated fibreboard box would continue to support the exponential growth in volume of goods that are being manufactured, shipped, and consumed.

Conclusion: Seeing trees in the age of Amazon

In the age of Amazon, industrial mass production is the norm. Paper products are standardized and machine-made, leaving no trace of their material origins: the fibres have become a smooth surface, unnoticeable. The vitality of trees, the possibilities of regrowth and recycling, are what generates the ubiquity and enduring use of such industrial and modern paper infrastructures. Wood paper has become the accessible mass-produced branch of papermaking, but while such paper helps maintain the protocols and pace of modern living (e.g., bureaucracy), it is also a paper that reminds us of the sensorial and temporally inefficient pleasures of analogue media consumption (e.g., reading books).

Analogue and sensorial qualities are reminders of the materiality of paper, a product of woodlands and waterways that calls for a natural history and geography of media. This approach into paper products, which understands the “environmental origins and the industrial processes involved in manufacturing trees” (Stamm, 2018, p. 12) is a way of articulating the intersection of the material, environmental, and infrastructural in media studies. Trees have the particular condition of a harvested material; they are renewable yet vulnerable. Producing wood paper is a strain on the settler-claimed landscape and the environment, requires
massive amounts of hydro energy, and generates industrial waste and pollution. While avoiding critical perspectives, The Bowater Papers captures many of these infrastructural facets of papermaking from trees as well as the more material presentations of its paper media products: the issues are very intentionally paper products advertising paper products for a complex paper-dependent modernity that can be understood as an infrastructural assemblage of harvesting, production, circulation, and consumption. The Bowater Papers might well have been published in the modernizing era of the 1950s, but following the paper trail to the present day reveals that much of the same still holds true: despite the projections and expectations of digital and smart media artefacts and ecologies, it is still a wood-paper world, an age of lignin, packages, and Amazon.

Notes

1. Paper is used in a broad sense to indicate commodities that are produced by the pulp and paper industry, which “consists of manufacturing enterprises that convert predominantly woody plant material into a wide variety of pulps, papers and paperboards” (Kuhlberg, 2015, para. 1). We therefore take paper to include everything from tissue to cardboard.
2. As opposed to papermaking that relies on friction only.
3. Susan Leigh Star (1999) describes infrastructures as largely invisible. In thinking of paper mills, we can see that they are an example of the way the visibility of infrastructures can become a matter of equity.
4. For instance, in the Chinese philosophy of the wuxing—also known as the Five Elements or Five Phases—the world is divided into five basic “energies” or processes, one of which is the symbol mù, which is translated as both tree and wood. See Wang, Bao, & Guan (2020).
5. For more on this, see Robert Babe (2015) on Innis.
6. Fenerty’s name in particular is largely absent from most accounts of the history of paper.
7. Many of the characteristics discussed here regarding The Bowater Papers can be found in other pulp-and-paper trade publications, such as the Canadian Printer Publisher, Paper & Ink Paper Makers, and the Inland Printer, including the juxtaposition of natural imagery with the industrial machinery of the mill.
The Bridge Spanning Past, Present, and Future: Time Infrastructure

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ABSTRACT

Background: This article considers the temporal aspects and effects of infrastructure that bridges past, present, and future rather than connecting places or delivering services.

Analysis: Four “moments” of time infrastructure will be considered in the case of a reconstructed heritage wooden bridge: heritage sites that link to the past, undertakings that mark the present, endeavours that project the current society forward into the future, and the forgetful overlooking of infrastructure as a taken-for-granted and abject temporality.

Conclusion and implications: This requires a topological approach, studying “infrastructurality” as heterochronic and as a liminal “super-object” that transcends its normative presence and Euclidean dimensions.

Keywords: time infrastructure; heterochrony; infrastructurality; super-object; heritage; Wakefield, Québec

RÉSUMÉ

Contexte : Cet article examine les aspects et effets temporels des infrastructures qui relient passé, présent et futur plutôt que de relier des lieux ou de fournir des services.

Analyse : Quatre « moments » de ces infrastructures temporelles seront considérés par rapport à un pont en bois patrimonial reconstruit : les sites patrimoniaux qui évoquent le passé, les initiatives qui marquent le présent, les efforts qui projettent la société actuelle vers l’avenir, et l’oubli de l’infrastructure car on la considère comme temporalité abjecte qui va de soi.

Conclusion et implications : Cette étude requiert une approche topologique où l’on envisagerait l’« infrastructuralité » comme hétérochronique et comme « super-objet » liminal transcendant sa présence normative et ses dimensions euclidiennes.

Mots clés : infrastructure de temps; hétérochronie; infrastructuralité; super-objet; patrimoine; Wakefield, Québec
**Introduction**

Infrastructure is usually thought of in terms of built, physical infrastructures that bridge, shelter, or support everyday life, or as a “communication infrastructure” that allows interaction. Infrastructure is commonly understood as that which scaffolds both social and environmental relationships and practices. Material infrastructure such as a bridge holds together what is distributed in space, often circumventing the friction of distance and time. In contrast with the familiar references to material space-spanning infrastructure in the communications literature, this article considers the “time infrastructure” aspects of a wooden, covered bridge (see Figure 1), a local heritage example of what was once a common bridge-building technology in timber-rich regions.

*Figure 1: Wakefield Covered Bridge as seen from the waterfront main street of Wakefield, Québec*

![Image of Wakefield Covered Bridge](image_url)

*The Wakefield Covered Bridge is a recreation of the 1915 Gendron Bridge over the Gatineau River, Québec, which was destroyed by arson in 1984. It was rebuilt between 1984 and 1997 by community volunteers. Source: Photo by author, 2019.

Just outside Wakefield, Québec, a covered bridge recreates the wooden Gendron Bridge, which was built in 1915 and destroyed by arson in 1984. After the fire, a grassroots community project lasting over 20 years was undertaken to raise funds and collectively rebuild the bridge according to historical techniques. Ironically, the bridge no longer connects a significant route and is blocked to modern cars and truck traffic. It also lies outside the town, but is visible upriver from the main street. It was not the site of an important historical event; however, it represents the sum of a settler-colonial economy and the lifestyle of the region, which was a lumber-producing hinterland. The Gatineau River played an important historical role in floating logs to downstream mills, where they were turned into lumber to supply the housebuilding industries of early modern Ontario and Québec. The scale of the bridge, built to accommodate horse-drawn wagons and early automobiles, represents some of the historical mobilities of the past. Specifically, the bridge evokes the period of the expansion of Euro-American “settler modernity” into resource peripheries during the late 1800s and early 1900s. Today, people walk, bicycle, look out from the structure, or use it as a backdrop for wedding photographs. It has ludic as well as functional purposes, a bit like a
picturesque stage prop. However, despite its hand-crafted qualities, the bridge is only awkwardly an aesthetic or design object. Rather, it seems just as infrastructural as the historic bridge that it replaces, and it preserves this “infrastructurality” as part of its identity as a bridge even if it functions only as a pedestrian bridge.

Beyond presence
A bridge built or deliberately rebuilt in a historical manner, such as the Wakefield Covered Bridge (see Figures 1 & 2), evokes the past and perhaps reminds us of outmoded technologies, such as the horse-drawn wagon. A bridge may even become a form of monument, such as the historical and contemporary cultural importance given to the 1557 single-arch Mostar Most (Mostar Bridge) over the Neretva River in Bosnia, which was destroyed in the Bosnian War in 1993 and rebuilt from 2001 to 2004. This makes of a spatial thing a temporal object. Such temporal dimensions are merely the tip of the iceberg of a more complex dimensionality that categorizes such infrastructures as “super-objects” that transcend mere presence. Simply put, super-objects are more than meets the eye.

Figure 2: Wakefield Covered Bridge: Interior structure*

The time dimension is not simply a linear duration; it is complicated by leaps of memory and comparisons between different moments in the life of an object or a construction. Super-objects are entangled with the projects of subjects and their contextual relations and affordances. They thus transcend classical Newtonian conceptions of the object abstracted as an independent entity. They are inflected by the way they are taken up and appear as parts of projects or are actualized according to the affordances that arise or are created in their relationship with other objects (Gibson, 1992; Wilhoit 2018).
Super-objects are extraordinary yet routine ingredients of everyday life that anchor interaction and communication through their grounding in past processes and their anticipation or projection of a normative present state into the future. In simplistic terms, every message will have a recipient who will understand its meaning in part by referring back to the sender’s context and references that are or were in place. The ability to understand objects as relics of the past supports the reach of infrastructure in this manner. Super-objects, such as a heritage bridge, function as time infrastructure that reach forward into the future as well as back to the past. This may be one reason why the Wakefield Covered Bridge seems such an appropriate place for that hopeful genre of self-representation labelled the “wedding photograph,” for which it is a frequent backdrop.

The Wakefield Covered Bridge recreates a historical piece of infrastructure: a local bridge crossing the river. However, the new bridge both functions as ordinary infrastructure: it is a pedestrian and bicycle bridge and is a citation of the past bridge. The community effort involved in fundraising, planning, and re-fabricating the bridge represents a devotion to local history in the form of historical building practices and engineering. Visible upriver from the main street of the town (see Figure 1), the view of the bridge is an accomplished case of saturating the present with the past. Replacing the bridge in prestressed concrete would have been easy. But after the timbers were salvaged, archivists searched for the original plans. Historical conservation experts were engaged to advise how to reconstruct the bridge with original techniques, and carpenters reused nineteenth-century fittings, forged replicas, and created traditional joinery in an exacting manner. Finally, in 1997, elected leaders unveiled a bronze heritage plaque detailing the process (see Figure 2).

In as much as infrastructures may be more than a spatial presence and function, these are also virtual in that they enfold extra dimensions that are non-Euclidean and non-Cartesian. In effect, the bridge in question takes on dimensions beyond its three-dimensional presence. Its temporal and other links exceed the Euclidean geometry of its built form. There is more to the thing than its mere presence to hand in the present. If one imagines a non-Euclidean time-space topology, there are three-dimensions plus extra dimensions reaching into the past and the future. There is a politics in how these temporal relations are structured and direct our attention only in certain directions. Topology signals the complex, reversible, and contentious dynamics that are possible, as opposed to a static, archaeological layering of epochs.

The Wakefield Covered Bridge is more than a reproduction, for it now serves different functions and needs from the original, given that one cannot actually drive across it. With historical objects such as the bridge, visitors read historical plaques or learn their story. The objects’ historical nature brings the past into the present. Beyond this simple temporalization of the past (Gell, 1992; Munn, 1992),
these objects imply a future and are connected to present projects and tasks. They obviously have not only material but social and economic qualities or dimensions (see Tonkiss, 2015). For example, the bridge presents only one aspect and one period of the region’s past. It would be easy to criticize the absence of any sense of the Kitigan Zibi Anishinabeg use of the river, which stretches much further back. The bridge was originally named after Ferdinand-Ambroise Gendron, a local lumber manager, merchant, and politician intimately tied to the organizing of land titles and resource extraction leases as the Crown Land agent for the region. The bridge is part of two or so centuries of white local history and its recreation celebrates the settler forest economy.

Infrastructure in communication studies

This article draws on expanded and critical uses of “infrastructure” from organizational communication, information theory, and semiotics, the social studies of technology and cultural studies that investigate and theorize the term. The communications literature has discussed infrastructure over the last decade in relation to broadband technologies and the ways in which these link to civic space and become operationalized in urban contexts and reconfigure social networks (Cowen, 2017; Kavanaugh & Cohill, 2000; Powell, 2011). In this literature, infrastructure has been embedded in the historical arc of state provision, maintenance, and policing. This governmental context is the basis of our expectations of infrastructure as generally a common good and also as accessible — yet unequal depending on one’s technological means to actualize the service or platform (for example, the capabilities of cars and trucks differ, as do the speeds of modems). The still uneven geography of digital infrastructure centred on cities affects social and economic interaction, service delivery, and access to information (McMahon, 2011). The spatial and temporal dimensions of the impacts of the materiality and mundaneness of infrastructure is clear in highly cited studies such as those by Lisa Parks and Nicole Starosielski (2015) and Peters (2015). Harold Innis (1950) theorized the temporal and spatial implications of communication infrastructures such as the Roman road network as the “bias of communications” (1950). This topology is not merely abstractly informational or intangible (i.e., virtual), but has tangible socio-economic impacts.

Indeed, communications dominates the contemporary crescendo of the term “infrastructure” in the academic literature. However, it is often mentioned only as a by-product of comments on the expansion of digital communications and services.1 Mindful studies (Plantin & Punathambeekar, 2019) review an “infrastructural turn” in recent media studies that has reframed the study of digital platforms to explore how they operate infrastructurally—that is, in the background of communications, media industries, and cultural services. However, they do not just support computing or the transmission of messages but implicitly reframe relations
of scale, labour, power, culture, and citizenship. The Wakefield Covered Bridge fits well with this literature.

However, time itself has been considered a “secondary infrastructure” to literary and video-game communication (Choy & Amini, 2020). This ontological approach has provided, “a means of analyzing epistemological transformations (Ribes and Polk, 2012), emerging categories of knowledge (Bowker, 2000), and techniques of inscription (Latour and Woolgar, 1986)” (Carter & Acker, 2020, p. 4). Tempo and rhythm—mostly in the present—have been a focus of studies. Media infrastructures depend on time standards at the heart of protocols for synchronizing devices (Mulvin, 2017). Hartmut Rosa (2013) theorizes the temporal consequences of evolving media as a social acceleration. Digital technologies, in particular, allow technologically accelerated tempos to desynchronize socio-economic development from political will-formation, decision-making, and implementation (Kaun, 2017; Rosa, 2013). The result is a changing “temporal assemblage” of cultural production that tries to bridge these rhythms and tempos by reorganizing the labour and practices of media organizations (Ananny, 2016; Sheller, 2015). Rather than simply homogenizing temporality, platforms such as Facebook can perform a similar role by bridging across a multiplicity of incommensurate networks, not all of which can be brought into human experience. The time of infrastructure directs us to an uneven ‘social’ that emerges from the negotiation of multiple, often obscured forms of temporal difference, managed through multiple, often obscured systems of hardware and software that remain beyond … conscious experience. (Bollmer, 2016, p. 20)

People are unequally required to “recalibrate” their experience of time in relation to the temporalities of technologies in ways that reflect power, control, and privilege (Sharma cited in Bollmer, 2016). Platforms can, therefore, serve as temporal infrastructures that sort and arrange bodies (Bear, 2014; Hodges, 2009). This directs attention to “practices, technologies … through which the social life of time is expressed and constructed” (Harris & Coleman, 2020, p. 611).

Some people are thus “recalibrated” while others are privileged, merely left “out of time” or unacknowledged, such as the night-time taxi driver whose disrupted body clock is a sacrifice to the convenience of others (Sharma, 2014) or the Indigenous absences at the bridge. Adelaide Lusambili (2007) shows the reliance on women’s labour for sanitation in Kenyan slum conditions. By carrying water or carrying an immobile person, people can be infrastructure (Simone, 2004). Similarly, digital calendars are logistical media, coordinating arrangements, configuring displacements (Wajcman, 2019), and even playing a key role in demands for compliance and the disciplining of subjects expected to show up on time. The politics of temporal-logistical media are embedded in software and interfaces, yet they are obscured in the infrastructural operation of digital platforms.
Similar juggling of relations in time and space seem to happen at the Wakefield Covered Bridge, with similar demands. The bridge seems to not only connect but calibrate us with the movement of official local history and progress, from the historical rural settler economy to the town’s current main street tourist economy. Classic definitions of infrastructure emphasize not only this taken-for-granted quality but the real and actual (tangible) aspects of infrastructure. Whether a built object or a service, it is reduced to being a means for others’ ends. This is true of the bridge, the night-time taxi driver, and people standing in for a lack of assistive physical infrastructure in underdeveloped areas.

A cultural, topological approach contrasts with functionalist approaches. Cultural topology attends to space and time, the tangible and intangible (i.e., the virtual). Past studies have drawn on examinations of “large technical systems” pioneered by Ted Hughes (1983). The focus has been on function and the infrastructure has been understood as a machine-like, closed system. Infrastructure is “designed to become invisible as it is stabilized” (Lampland & Star, 2009, p. 207; see also, Bowker & Star, 1999). However, infrastructures are not simply systems (Bowker, Baker, Millerand, & Ribes 2010; Star & Ruhdeler, 1996). The quality of “infrastructurality” can be understood as heterogenous networks distributed in space and time that are characterized by coordination rather than control. Infrastructurality is relational, a means into which practice and action sink. It is not necessarily material; it can be virtual, as in the case of languages and communication platforms, or even abstract, as in the case of building codes. Susan Leigh Star (1999) defined infrastructure as the invisible, embedded systems that orchestrate the background conditions of social processes. Another of Bowker and Star’s (1999) contributions was to extend the notion of infrastructure to classifications and standards, including engineering and building codes. These bureaucratic artefacts are politically negotiated and collaboratively produced and are integral to the functioning of infrastructure but are not the function(s) itself. Codification is central to the translations or exchanges that allow the interoperability of systems that, in turn, allows them to sink into the background as infrastructures. Standardization is an essential rule of coordination. Standards “normalize ... relations and make a series of links predictable, limit fluctuations, [and] align actors” (Cozza, 2017, p. 291). Codes and standards are representational narratives that extend infrastructure as not only actual things. Standards are ideal forms and more specifically representations (e.g., safety regulations and signs). These are in turn tangibly realized and actualized in both built forms and in the coordination of these things to work seamlessly together.

However, the “embeddedness” that characterizes these theories of infrastructure has been only loosely defined. Context is hypostatized as a static container space, rather than a socially, politically, and economically constructed topology of relations. The term, embeddedness, rose to prominence in the 1980s through the
work of Mark Granovetter, who argued that economic activity is “socially embedded,” which can be understood as being both “contained and constrained” (Streeck, 1997, p. 206) by ongoing structural embeddedness—social processes and norms that form the relational structure—and by relational embeddedness or immediate ties and relationships.

Communication theory has built on the emphasis of infrastructure as something framed within or subsumed into social processes and interaction. That is, it critiques infrastructure that is treated as a “black box,” something dissolved into an overarching context and thus losing part of its identity. Infrastructure is treated as a type of social “backstage” (Goffman, 1973) that is hidden or not “brought to the stage,” so to speak. This allows infrastructure to work unseen and unrecognized under our very noses and beneath our feet. Its dynamics are lost to view. This echoes the repression of domestic labour despite the importance of the household to capital (Wilson, 2015). Overlooked, taken for granted, infrastructure’s invisibility may cloak its relations to sense and meaning. Infrastructure as a present-absent set of services embedded in everyday processes and environments can confound its own status as an object. In cases where it disappears into its context, embedded, its ontology may be negated despite standing in plain sight. Yet in many other cases its object status is supplemented; for example, it can be difficult to exclude processes or services from any understanding of a thing. In these situations, potential exceeds material actuality.

Infrastructure, far from being static, has a dynamic and a rhythm. This is a matter of the functioning of provision—the elapsed time it takes to deliver a service. For example, “industrial infrastructure emerges through a sewing together of a vast network of heterogeneous associations within a productive complex. By conscripting tools, materials, labour and other elements, specific interactions can be institutionalised and extended through space and time” (Edensor, 2005, p. 65). The temporality of infrastructure is central to institutions and the continuity of networks and built facilities. It has a life cycle that encodes and enforces certain kinds of collaborative rhythms, durability, and maintenance and upgrade schedules (Edwards, Jackson, Ribes, & Knobel, 2007; Graham & Thrift, 2007). Yet at the same time, public and political discourses often refer to infrastructure in celebratory terms that emphasize its timelessness, monumentality, and ubiquity—precisely its assumed infinite qualities. The resulting syncopated rhythms are “infrastructure’s own existential horizon—the time scale through which it develops, the shorter spans in which humans use and experience it, the continuities and breaks that take place when new infrastructural systems are built and old ones decay” (Eatough, 2015, p. 692).

In these approaches, the temporality that runs through infrastructure is rhythmic (operational, seasonal) and has multiple, unequal effects (those waiting versus the waited on) and modes (timeless, sudden). It is both experienced tangibly
and is invisibly intangible. Time is subsumed and embedded, yet it also imposes a coordinating effect on incommensurable processes and on users. A super-object such as a heritage covered bridge adds to this sense of syncopated temporality, a distinctive set of explicitly temporal functions and capacities with respect to the past, present, and future.

**Heterochrony: Four moments of time infrastructure**

“Time infrastructure” brings together the past, present, and future while maintaining their difference. A metastable construction fixes this arrangement. It marks and causes us to remember history. The distinctively temporal function of this form of infrastructure is an important aspect of all “infrastructurality” but is little remarked on itself, even though “the transmission, context, vulnerability, or resilience of infrastructures is not possible without a commitment to time scales’ of infrastructure” (Ribes & Polk, 2012).

As a whole, infrastructure accumulates over time in direct relation to social activity and needs (Edwards, 2003; Edwards, Jackson, Bowker, & Knobel, 2007; Larkin, 2013), capturing the slippage between official discourse and actuality, between codes and built performance, and the ways that infrastructure is co-opted for private needs or vandalized (Lusambili, 2007; Schieffelin, 2007; Smith, 2016). A bridge changes from a useful object of the present to a time-worn witness of passing time. Gaston Bachelard (1950) refers to this as “recurrence” or “recursion,” where an object appears first in one form, then returns as the same phenomenon yet in a different form. David Ribes and Jennifer Polk (2012) argue that recursion is not only epistemological but an ontological change in an object that parallels the changes in the users and context. More precisely, its ideal, virtual qualities and identity remain while the material actuality of the thing changes due to, for example, the aging of a thing or person. Not only is infrastructure material but it is ontologically ductile and variable. Not only is the reconstructed covered bridge honouring the past but its heterochrony underscores its over-dimensioned quality as a non-Euclidean super-object. It includes a reversibility between everyday object and historical monument that lends a certain liminality to the bridge. We will return to this oscillation “betwixt and between” temporal moments.

Theorizing time infrastructure focuses on an aspect of embedded services and objects that is easily overlooked in the design disciplines. Time infrastructure bridges non-Euclidean antinomies such as past and present. It brings together and relates us to difference to make it possible to relate to otherness. Infrastructure transacts this in several ways. First, by making the past present, as in a monument or heritage site. Second, when acting as a mark that inscribes the present moment in history. Third, as a projection of the present into the future, often in the name of progress. Infrastructure also, however, oscillates between these and a null temporality of forgottenness, reification, and abnegation, as infrastructure theorists widely note.
Remembering the past
The example of a heritage or historical infrastructure illustrates how temporal functions can have an increased importance over the spatial role of an object or construction. Martin Heidegger’s (1971) discussion of a bridge and its spatial role deserves a mention as a well-known trope of connection and relation that draws together a landscape and place. Heidegger’s bridge is an example of a bifurcation, a singularity that arises out of a continuous, surrounding milieu and is inseparable from how that topos is understood as a passive landscape animated by the conjoining force of the bridge.

Infrastructure can also function as a connector in temporal terms, bringing together and conjoining a past or future to make it tangibly present. It may even be obsolete or in ruins, but it retains the quality of spanning time as a metaphor or figure of the past. In other words, it both embodies and creates historicity. It performs this legitimating role by manifesting and demonstrating the relevance of a specific past moment that may only be dimly remembered. It substitutes presence for adequate proof. This substitution and the effect of selecting and amplifying specific aspects and time periods of the past or specific future aspirations is fundamentally political. Even if the Wakefield Covered Bridge embodies white Francophone settler history, it is a common object, while the reconstruction of a heritage bridge may create an element of everyday infrastructure, it is also a memorial and yet not a monument per se. The experiential, haptic encounter with the historic object prompts more questions about the relationship of the viewer to the object and its life; questions that are answered by historical narrative and the discovery of the historical ontology of the object (Foucault, 1984; Ribes & Polk, 2012). The result is to elide a selective history of the past with the shared needs of everyday life in the present and by extension, a shared destiny. For these reasons, such infrastructure can also be a political target for defacement or destruction. However, such useful commemorations challenge critical understanding. Although it generates a specific relation to the past, its functionality still interpolates the community in a broad manner. It is thus essential not to hypostatize the past by assuming it is a shared history or a simple, linear relation of past-present and future.

Marking a moment
The un-nostalgic quality of reconstructed historical infrastructure is achieved by its grounding in present actuality. By making the present into a mark on history, as in a major project that defines a government or epoch, infrastructure inscribes the present into history. Well-known examples would be the self-aggrandizing “Grands Projets” in Paris, spearheaded by presidents Georges Pompidou and François Mitterand. Mitterand’s projects, for example, include an eponymous national library. Precariously located next to the Seine, the library features numerous
steps to a monumental plinth that surrounds a below-grade garden, emphasizing the architecture’s monumental priority over accessibility and over the users of the library. A spate of major projects around the turn of the millennium provides other examples. Architects frequently aspire, as the Danish architect Bjarke Ingels puts it, “to create something the world has not yet seen” (Ingels quoted in Bozikovic, 2017, n.p.). Archaeologists note that “like monumental architecture, infrastructure provides the opportunity for expressions of performance and branding by a sponsoring civic authority” (Smith, 2016, p. 2). Even where it is not completed by subsequent authorities or is rapidly outmoded, such as the Thames Barrier in the face of rising sea levels, grand infrastructure announces the intentionality of rulers to mark history with enduring constructions that subsequent generations will be dependent on.

Making a mark on history is as much a question of the present as it is a projection forward to the future. Time infrastructure becomes Promethean. The bridge designs of Santiago Calatrava are widely described as “building for the future” (Fazzare, 2017). Practical function or reliability may be secondary. Commenting on a new subway project at Ground Zero in New York, Calatrava specifically identifies another famous bridge,

The Golden Gate Bridge in San Francisco is for the community of San Francisco. And the Brooklyn Bridge, which is one of the most magnificent bridges ever built, is also a monument to the community, you see. And this is what I was trying to do with Ground Zero, to have a building to celebrate the day-by-day with 300,000 or even more users. And hoping that when they use it they think, “New York is the best place.” (Fazzare, 2017)

The case of the reconstruction of Wakefield’s covered bridge by local volunteers demonstrates the strength and ongoing vitality of the current community. It makes a mark architecturally that commemorates the present as much as remembering the past by reasserting the enduring presence of the community in the historical form of a bridge. In this sense, it is a crystal that fuses the past and present into a jewel-like, multifaceted formation. This labour of devotion and heritage is a proclamation of the virtuoso capacities of local coordination, technical and political skill, knowledge and organizational acumen. Furthermore, as long as the covered bridge is attended to in its infrastructural temporality of regular maintenance and refurbishing, it continuously proclaims the community vitality of that present moment. By contrast, infrastructure may be removed in a gesture of erasure. Both attempt to stabilize present arrangements, especially in periods of rapid change, by fixing a relation to the passing of time, interpolating a broad community, as well as by binding the hands of future regimes through sunk costs, over-expenditure, and the occupation of key sites and available spaces.
Projecting the future

A bridge might not only have Promethean qualities in its ambitious span; such infrastructure is the very arrow of progress. It has a temporal scale and rhythms that extend far into the future and well beyond the span of any one user’s engagement with it. Infrastructure is significant in that it is intergenerational. It spans generations of humans and other animals, policies, and technologies, past, present and future. Daniel Carter and Amelia Acker (2020) have also noted the need to consider infrastructural futurity. This involves an imagination of disappearance and ruin as well as continuity and perdurance (Boyer, 2019). “Infrastructures’ aggregation of material resources in the present weighs on future capacities for rebuilding” (Carter & Acker, 2020, p. 4) and maintenance. Such “sunk costs” may create a path dependency that precludes change. Obduracy structures practice, resists new protocols (David, 1985). Thus, even in the face of an ideological critique, heritage infrastructure (unlike a monument) is difficult to change if it combines practicality for those in control and sunk costs for the community as a whole.

A construction such as a bridge is intended to serve over long periods of time and it is, therefore, conceived and constructed in a future-oriented manner. Designs attempt to be “future-proof.” The result is the stabilization of present modes of life as well as their projection into the future. The difficulty of replacing infrastructure introduces an inertia, slowing material, technological, and social change. This is enshrined in infrastructural design in practices such as scenario planning. Infrastructural futures are imagined through narrative schemas (Schoemaker, 1993), group storytelling about alternative futures. These are imagined and even foreseeable but are neither predictable nor simply the outcome of trends. For contemporary planning, this approach originated in the work of the RAND Corporation’s Herman Kahn, who worked on nuclear attack and defence scenarios. Scenario planning attempts to imagine infrastructure as an object that could bifurcate into contradictory worlds over time, each represented by its own, ‘scenario.’ Based on unpredictable events, infrastructure could expand or contract, new public utilities could come into existence or fail to be realized, and the government could have more or fewer resources to devote to infrastructure. (Eatough 2015, p. 692)

To evoke the speculative quality of scenarios, consider the Wakefield Covered Bridge: a bridge burns in an unforeseen act of arson; members of the community imagine the replacement. But without doubt, municipal authorities would have been commissioning engineering and transportation studies of the alternatives available. There is no record of plans, but scenarios might have included extending a divided four-lane highway that is only one or two kilometres away from the bridge site and town. Half a kilometre upstream, a concrete bridge had replaced the transportation role of the covered bridge. The possible worlds
of different scenarios represent a bridging of present and future in the form of multiple alternatives. The heterogenous, multiple futures that scenario planning works with exemplifies the non-synthetic quality of time infrastructure.

By predicting, forecasting, prophesising [sic], conjuring, pro- and evoking, adumbrating, dreading, hoping, planning, projecting, envisioning, arranging, intending, designing, budgeting, aligning, organising, coordinating, we attempt to subject the future content of the progression of time to our agency. Much human practice is directed at making one’s desired outcomes more probable … we might actually accelerate, decelerate, interrupt, or delay if not time itself, then particular future contents of time or relations between these contents … such practices do not have to result in the emergence of something new; they also effect. … the maintenance and endurance of certain practices, infrastructures and ideas. (Ringel, 2016, pp. 8–9).

From this over-dimensioned viewpoint, the Wakefield Covered Bridge becomes a super-object that transcends a reduction to a Euclidean present because it is always already historical, has a relevance in the present, and stands as a local collective projection of community going forward to the future.

Forgetting the past

Theorists emphasize that infrastructure is made up of services whose sources have been forgotten. Time infrastructure may operate in a reified manner typical of infrastructurality. For all its technical flair and innovation, infrastructure is not only a Promethean advance but is shrouded in Epimethean repression and neglect (Stiegler, 1998). Bruce Robbins (2007) brilliantly argues that these spatio-temporal modes of infrastructure have corresponding sensory qualities. For him, forgetting is the smell of infrastructure. Forgetting and distraction are key to the “black boxing” of infrastructure that reifies it, allows it to drop from knowledge, and creates its taken-for-granted and abject temporality. This “anthropological slumber” (Foucault cited in Stiegler, 1998, p. 100) also reduces the user, who becomes a hostage to fortune and contingency.

Thus, as it ages, it is 20 years old at the time of writing, even a striking covered bridge fades into the woodwork (so to speak). It performs an in situ suturing of past, present, and future as a useful addition to bicycling and river-crossing infrastructure. It augments the town’s touristic economy and edifies the picturesque river views. Seen from the main street downriver, it is unclear even how to get to the bridge (see Figure 1). What is its relation to the community? From this point of view, it is an odd landscape feature, similar to an architectural caprice created for an English garden. This abnegation, subsumption, and disappearance into the wider context is the final moment of virtuosity performed at, in, and by time infrastructure. The virtuoso makes the labour of working up a performance disappear, so that the result seems effortless: infrastructural.
Lessons of time infrastructure for infrastructurality

North American infrastructure has a diminished place for heritage. The very idea of time infrastructure may be greeted with derision. North American modernity has corralled nostalgia for commercial purposes and limited it to areas such as popular song. However, time infrastructure is an important aspect of material culture as a material form of anchoring the present and as projections that are presented as constituting the material march of progress and the unassailable vitality of the present as a template for the future. Time infrastructure advertises its presence in memorial plaques. Not only heritage sites but millennial, grand projects, and futuristic initiatives become the focus of tourism as time infrastructure. These are not merely exploiting conditions under which space infrastructure is visible, but point to a significant function of infrastructure that may be motivated by and built to accomplish temporal connections and linkages.

Conclusion

All of these temporal aspects of infrastructure bring together and crystallize different elements and rhythms of the past, present, and future without completely combining them in a synthesis. The reduction of infrastructure to its function or to spatial presence alone has been critiqued. The implication of time infrastructure is that infrastructure can be both black boxed and also highly visible and noted in public discourse—it has the complex temporal-spatial topology of a super-object. The approach used here has attempted to relativize the temporal stance of infrastructure and to show that there is a political dynamic that underlies the hypostatization of the past and, by implication, the aspects of the present that will be engraved in history, in the archaeological record and, on the back of these constructions, the way certain futures are projected. This contrasts with the existing literature that assumes the character of infrastructure rests primarily with its invisibility as an interstitial means, not an end. New infrastructure is inaugurated as heroic evidence of progress. It is only when infrastructure is established and stabilized that it becomes overlooked. Infrastructurality involves a more complex rhythm of visibility that is taken for granted. Time infrastructure exploits the heterochronous and reversible temporalities and rhythms of all infrastructure. It is complex due to its over-dimensioned, non-Euclidean quality as a recurrence; as temporalization and as always already—but reversibly and liminally—past, present, and future.

Acknowledgements

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Note

1. Infrastructure appears rarely as a term in the 1960s flowering of communication theory in Canada among, for example, the Explorations group (Darroch, 2008). The Google Books Ngram Viewer of its 2012 English 1800–2008 corpus of texts shows a similar story, with the term peaking
around 2004 in a reflection of the expansion of digital infrastructure. The Web of Science’s “Results Analysis” of academic publications using both “infrastructure” and “communications” shows a steady rise over the 12 years since 2008. The years 2018 and 2019 featured over 26 percent of the total publications in communications, interdisciplinary social sciences, and geography. As a field, communications dominates in Web of Science, having produced 51 percent of all of these texts from 2009–2019—over 62 percent if geography is excluded from these three fields (Clarivate Analytics, 2020). The usual caveats of the selectivity and English language bias of texts included in Web of Science applies, but this conveys a snapshot of the rise of the term.

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Desire is neither
the appetite for satisfaction,
nor the demand for love,
but the difference that results
from the subtraction
of the first
from the second.

Infrastructure is often viewed as a material substrate that fulfills needs. Pipes circulate water. Transportation systems traffic people. Heating, ventilation, and air-conditioning systems maintain habitable environments. Organizational infrastructures make order out of otherwise unintelligible information. And yet, as scholars of infrastructure have long observed, infrastructure promises much more than basic care. It relays meaning. It sustains attachments. It forms the basis for imaginative worlds. In other words, the demand for infrastructure extends beyond need—it encompasses desire. The desire for capitalism and resistance, for extraction and inclusion, for sovereignty and occupation, among a multitude of other objects and forces.

The demand for infrastructure is
a demand for a certain kind of inhabitable ground,
and its meaning and force derive precisely from that lack.
—Judith Butler, 2015, p. 34

What does media and communications studies want from infrastructure?

These approaches might inform a renewed approach
to phenomena that have otherwise been
centre stage in media studies.
for a very long time.
—Darin Barney, “Infrastructure and the Form of Politics”

Media studies’ infrastructural turn has asked scholars to attend to material substrates and the geographic and historical sites in which they emerge. Its objects range from “traditional” hardware to systems and assemblages to forms of knowledge. The editors of this issue, among others, point out that infrastructural research has always been part of media studies. Its re-emergence in the current moment evidences a desire to re-mediate infrastructures, to study them differently.

This is a study not from below, nor a view from on high, but of somewhere in the middle.
—Patrick Brodie, “Hosting Cultures: Placing the Global Data Centre ‘Industry’”

For years, media and communications studies—in this turn—have explored the fantasies invested in infrastructure by publics, states, and corporations; infrastructure’s representations and poetics; its political economies and scalar transformations of space and time; its ongoing entanglements with bodies and communities. Here, I write alongside the authors in this issue and ask: What fantasies are invested in infrastructures by its researchers? What desires animate these practices of knowing? I stitch together bits and pieces of the articles in this issue, experimenting with infrastructural meter. My intention is to produce an enmeshment, a thinking-with research on media infrastructure that, in Brodie’s words, operates from somewhere in the middle.

Infrastructure in most cases is demure.
Withdrawal is its modus operandi.
—John Durham Peters, 2015, p. 34

In media studies’ fantasy of infrastructure, it recedes. It withdraws. It is a train just about to vanish over the horizon. A turn toward infrastructure often embodies a desire to move toward the real.

Material registers as varied as salmon farming, mineral exploration, oil extraction,
papermaking,
emergency test signals,
and more.
—Aleksandra Kaminska and Rafico Ruiz,
“Materials and Media of Infrastructure”

Is seeking out infrastructures driven by a desire to uncover, to penetrate layers not only of the past but of the environment? If media archaeology pointed toward deep time, the study of media infrastructure extends the spatial boundaries of the field from salmon farms and pipelines to lives “on the ground” that can be woven into and across contentious settler realities rather than abstract and disconnected technological and communication “bubbles.”

—Aleksandra Kaminska and Rafico Ruiz,
“Materials and Media of Infrastructure”

The study of media infrastructure is not a unidirectional inquiry, the simple excavation of large-scale technical systems. It is a weaving, a movement back and forth between lives on the ground, global systems of exchange, technical substrates, and forms of knowledge production. Research on media infrastructure evidences a desire for integration, a bringing together of the economic, political, and cultural—a desire not only to bring disparate objects into contact but to fold these into a common language.

Indigenous critical infrastructures as parallel to and as vital as the tacit taken-for-granted understanding of industrial hardware as the backbone of what infrastructure is.

—Shirley Roburn, “Infrastructure that Sings: Kwawaka’wakw Social Media for Wild Salmon in the Broughton Archipelago”

The infrastructures that are taken-for-granted as such—roads, cables, towers, and other industrial hardware—could be (and have been) described in many other
ways. They are media technologies, sociotechnical forms, large technical systems, telecommunications systems, media environments, networks, platforms, architectures, distribution systems, materialities, and ongoing processes of mediation. Infrastructure’s many other “soft” forms, less taken-for-granted as such, could also be described using an array of concepts and languages. But “infrastructure,” as it envelopes substrates both hard and soft, foregrounds Roburn’s “parallel to and as vital as.”

Fur is rendered into fuel, transforming animals into energy infrastructures.

—Rachel Webb Jekanowski, “From Labrador to Leipzig: Film and Infrastructures along the Fur Trail”

A weaving back and forth, not only between economics, politics, and culture, or between bodies and towers—these studies offer transductions between nature and culture, non-human and human. Fuel transformed into food into energy through consumption into labour. Infrastructures afford researchers movement: travel to sites, excursions into archives, viewings from afar, and intimate conversations. And they prompt the development of new methods and approaches.

To approach an infrastructure through and as … is to shift analysis inward from the architecture that surrounds media signals and into the material, temporal, political action of signals themselves.


Infrastructures offer the possibility of redrawing not only media studies’ outward boundaries, but also its inward horizons. Where are the signal’s limits? Where are the field’s limits? What is the beyond opened up through pushing these limits?

Infrastructures assert a normalizing force, often inscribing hegemonic power into sociotechnical and spatially distributed systems, where it is reproduced in everyday acts, assumptions,
and forms of forgetting.
—Hannah Tollefson, “Staking a Claim: Mineral Mining, Prospecting Logics, and Settler Infrastructures”

It is not simply that infrastructures promise to move into the world beyond words—they promise to reveal the normative forces, political orientations, and forms of power that are reproduced in ways that short circuit language and discourse. They show how infrastructure does the same old things differently:

the potential of a politics of infrastructure understood as a politics without words.
—Darin Barney, “Infrastructure and the Form of Politics”

Exposures, then, are complicated.

If unjust energy infrastructures cannot become just either through intervention or distribution mechanisms outside of capitalism’s base impulses, and they continue to deepen social and ecological inequity at local and global scales despite progressive regulatory mechanisms within the context of a profit-driven market economy, what is to be done?
—Jordan B. Kinder, “Gaming Extractivism: Indigenous Resurgence, Unjust Infrastructures, and the Politics of Play in Elizabeth LaPensée’s Thunderbird Strike”

This is not a question of an individual’s motivation for pursuing infrastructural research but of collective interests and the sense of possibility distributed among many. In pursuit of the real, what fantasies are at play? Does this transduction between fields and forms allow us to move in unexpected directions? What does this focus on infrastructural re-generation allow us to repair? Do infrastructures let us ask—perhaps even demand—in new ways, “what is to be done?”

Through the mediation of the demand, the whole past opens up.
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What is a ghost? Georg Hegel's “Geist,” clumsily translated to “spirit,” is other to the self-consciousness that provides an outer world for the phenomenological inner world, a mystic mirror that proves our self exists (Sinnerbrink, 2007). In German, the phoneme “Geist” can attach itself to an epochal moment (Zeitgeist) or a people (Volksgeist) in a magical way that first emanates from and then transcends that moment or people (Sinnerbrink, 2007). The term “ghost” in English often refers to entities that act through mythos as a function of memory. A nineteenth-century religious sect of the Lakota Sioux danced the Ghost Dance to bring the world back into pre-colonial balance. A dead person’s ghost haunts the living so as not to be forgotten. Ghosts of soldiers haunt battlefields; ghost dogs guard their masters’ graves. In other contexts, the ghost is something that is theorized but unperceived. Physicists use ghosts to stand in for unmeasured or unproven phenomena in the place where the math says a phenomenon should be. People with amputations may feel an itch on a ghost limb.

Media theorists have long understood that it takes a medium to chase a ghost. An echo must travel in air; a shadow requires photons to scatter on the cave wall; a non-entity, ironically, must have a material effect by which to manifest its non-existence. Taking the term another way: a presence that has moved on can only linger in a substance. In Speaking into the Air, John Durham Peters (2012) uses his now-famous example of the dead-letter office, full of unopened envelopes and never-received engagement rings, to posit that “every new medium is a machine for the production of ghosts” (p. 143). If texts (or messages, or information) are media engaged with intention, ghosts may be media’s accidents. Both texts and ghosts are ontologically dependent on media, but where the text denotes a relation of necessity, the ghost denotes a relation of possibility.

In the spirit of the relation of possibility rather than necessity, my method for constructing this playlist was whimsical; I decided that the word “ghost” itself was a trace of ectoplasm. A simple search of the term in the Canadian Journal of Communication’s archive yields interesting, scattered results that do not speak to
the synthesis of a normal literature review. The freedom of a “playlist” as a framework, though, helps me come at a synthesis sideways and avoid a declarative claim. The ghost I find here is a concept at the crux of the perceivable and the imperceivable—one that media studies, with its deepening commitment to radical materialism, struggles to describe. The list divides its evidence into two broad themes. The first is a ghost that occupies our understanding of how ideas reside in and with media, and the second is a ghost that occupies our understanding of how identities linger in landscapes.

The first song and the last song on a playlist are important. The first song should set the scene. It also can’t be too heavy. And because my mother-medium for a playlist is the cassette tape, I hold that the last song on a playlist (essentially a mixtape) must somehow connect back to the first, so that when the car stereo automatically flips the tape over, the thematic transition is smooth. Jacques Godbout’s Southam Lecture, which functions as the first song, appears in the search for the term “ghost” because Godbout observes that the movie *Ghostbusters* topped box-office sales in the U.S. during a week in 1985 when Amadeus did the same in Europe. He uses this comparison to suggest that something about the media culture in Europe circa 1985 was more serious and adult than that of the U.S. and Canada at the same time. I would chuckle and reject the piece as an incidental mention of the word, except for the fact that, even in this illustration, Godbout is grappling with a Hegelian Geist as traced through what he calls “discourse on culture,” or the cultural aspect of communication, which the scholarship of the time labelled “media effects” (p. 342), in contrast to scholarship on media technology. The last song, Peter van Wyck’s search for “residues and other forms of leakage,” complete with real geiger counters, is a thematic echo of Godbout’s *Ghostbusters*, with their backpack ghost-traps powered by (fantastical) nuclear physics. Van Wyck travels with one identifiable ghost and names him in a sentence that is a direct reference to the Paul Simon (1986) song “Graceland.” In Simon’s song, the “travelling companions are ghosts in empty sockets.” Instead of “ghosts and empties,” van Wyck is travelling with the ghost of Harold Innis. Innis disappoints him as an interlocutor, though, because of what Innis’s colonial-cultured gaze fails to see: the empty landscape is not empty at all; it is full of Indigenous ghosts.

Though the other five texts are not woven together into a full synthesis, the potential to do so exists, and to multiple productive ends. These texts connect in delightful, ominous, and surprising ways. Van Wyck’s narrative, haunted by the smashing of a uranium atom, is echoed in the second article, by Donald Theall and Joan Theall, in James Joyce’s linguistic incorporation of nuclear science as he tries to “smash the etym” (p. 61). The privileging of poetics in both Joyce and van Wyck make me wonder if Joyce was a chorographer, as van Wyck is. There are less idiosyncratic, more overarching themes, as well. Godbout, Brian Osborne, van Wyck, and Alexa Conradi could be combined in a consideration of indigeneity and
Canadian identity, with van Wyck and Osborne both questioning a “mythopoetic Canadianness” and nordicity that occupies the Canadian North, especially. Other themes include the idea of non-identity or alienated identity (in Southern, Theall & Theall, van Wyck, Osborne, and Conradi), the theme of a landscape or space being open to contestation and possibility (in Thibault & Bardini, Southern, van Wyck, Osborne, and Conradi), and the potential for art as a modality for such contestations (in Southern, Theall & Theall, van Wyck, Osborne, and Conradi).

Finally, there is the original and persistent question of ghost ontology. Though ectoplasmic entities and hauntings may actively resist a theory of being, and though I support the spirit (ahem!) of that resistance, I will submit two tentative propositions: 1) The ghost is a certain kind of unmediated body. Joyce (via Theall & Theall) and van Wyck tell us that the ghost is not the trace it leaves; “cinders and pictures” (van Wyck p.174) are media’s evidence of the ghost. 2) The ghost is an unresolved memory, a memory that has not been fit into mythos; a lingering trace of cultural bad faith (and this may be a kind of unmediated body, tying proposition two to proposition one). Conradi is the only author here who uses the term “ghost” as a verb, by citing Elizabeth Povinelli. Povinelli uses it in its millennial coinage, saying that the Canadian state’s national reconciliation efforts ghost their own economic motives, thus producing bad faith between a Canadian nation-state and its Indigenous populations. The bad-faith ghost is the body forgotten by shared media, mediated merely in the body, often in many bodies, a primarily oral object of memory.

Playlist

The media-haunted concept


Jacques Godbout writes at one of many moments in which the future of public broadcasting was in question, and he makes an eloquent argument for publicly funded media as a way to preserve media that preserve culture. A few of his statements are outdated misfires— the aforementioned shade thrown at Ghostbusters, for example, and a prediction that computers will “never be anything more than message plumbing” (p. 343). But more of Godbout’s observations precisely tag cultural ghosts that haunt us to this day: capitalist media’s erasure of Indigenous cultural productions; a mass-media erasure of thoughtful cultural forms resulting in nihilism and mistrust in news reporting; and the prophetic diagnosis of Walter McDougall, whom Godbout cites as saying that U.S. democracy “has evolved into
technocracy ... [and Russian influence on] American liberal society has been greater than the Americanization of Russian society” (p. 349).

**Article 2**


In a 1989 special issue of the *Canadian Journal of Communication* devoted to the legacy of Marshall McLuhan in both literary and media studies, Donald and Joan Theall argue that McLuhan owes much of his conception of media, especially its relation to orality and the body, to the work of James Joyce. Specifically, they position Joyce as a media theorist preoccupied with the relation of possibility that occurs in embodied semiotic action—theatre, dance, song, drinking and talking in bars—and escapes the totalizing action of electronic media. Such media and their markets are recognized in Joyce’s *Finnegans Wake* as “a gain control of circumcentric megacycles” (p. 59). Theall and Theall see the working-class hero of *Finnegans Wake*, the most modern of Joyce’s texts, as “mechano-electric man” described with “medleys of media metaphors” (p. 59). A media studies, myth-infused nostalgia emerges for the body (Joyce’s mother as “flesh-without-word” contrasts neatly with Friedrich Kittler’s (1990) *mother tongue*, for example, though Theall and Theall do not note this particular connection) alongside a gleeful reaching for more ways with which to destroy and recreate modes of language.

**Article 3**


Ghislain Thibault and Thierry Bardini directly address mythos (via Barthes) as they extend the history of wireless technology, especially the history of discourse about the wireless myths of redemption and immateriality, further back than what is commonly considered the “wireless revolution.” They trace two myths, “the oracle” and “the ether,” that preoccupy discourse around electronic communication technologies during two historical epochs. Thibault and Bardini posit “two revolutions,” one in the mid-to-late nineteenth century and the other at the end of the twentieth century. The ghost manifests here in two ways. The first ghost is the haunting bad faith of both of these mythos. The authors assert that a myth such as the oracle can promise to redeem without ever delivering redemption; technology will never provide a solution to the problems it causes, and wireless technology is not immaterial (no technology is). The second is the nineteenth-century idea of the ether and ethereal bodies. Nikola Tesla articulates this idea by saying that the problem of electronic leakage from wires and walls will end when
we access the ether: “the ghost will vanish with the wireless dawn” (p. 366). These authors maintain that now, after the second wireless revolution, we still fear “leaving our bodies into the wireless network through disembodied limbs” (p. 359).

The identity-haunted landscape

Article 4


Alexa Conradi treats the Oka Crisis of 1990, a punctuating event in Canadian history that resulted in a “before” and “after” in Canadian Indigenous-settler relations, as an event of ontological opening with the potential to produce new forms of rhetorical listening and silence, possibility-oriented spaces of non-identification, and movement toward a Mohawk rhetoric. Conradi’s ghost is of the bad-faith kind; it is an unsolved problem produced in the discursive space of bad translation. Specifically, Conradi points out the popular perception that Canadian government military forces behaved well, managed the situation, and kept the peace. She points out that in Mohawk languages, the word for “warriors” translates to “those who carry the [spiritual] burden of peace” (p. 548) and by labelling the Canadian military “peacekeepers,” the public steals that spiritual burden from the Mohawk warriors. Further, to the Mohawk, “peace” does not equal “order,” whereas the two notions are equated in the colonial/settler imaginary. The Oka conflict has never been resolved, and the larger Canadian colonial conflict goes unresolved: a bad-faith ghost that haunts the national mythos. Conradi notes, though, that the protests around Oka produced “gaps where the ground belongs to no one” (p. 552) to re-negotiate these myths and identities, and that the witnessing public is in a space of non-identification (*pagus*) and can judge from that place. Conradi explores the potential implications to Canadian public rhetoric, the conventions of behaviour and presence, and even laws and governance, should such spaces be used to advantage.

Article 5


Brian Osborne takes on Canada’s emergent globally diverse identity as it conflicts with the modern mythos of colonial national identity. Ghosts appear as “shadows” here, the failures of attempted inclusivity that must be atoned for if a nation that considers itself a liberal democracy is to call itself such. In keeping with emerging themes in ghost ethics evidenced in this playlist, Osborne points to the arts as a
space for relations of possibility in symbolic landscapes from which new national identities can emerge. He deems Canada a “nationalizing-state” that needs to allow identical hybridity by “negotiating different concepts of the nation ... [and] re-imagin[ing] the standard mechanisms of a social solidarity” (p. 161). This article is rich and useful as a consideration of memorial and public mythos/memory and a thorough theorization of the difference between “space” and “place.” The difference is a kind of ghost; place is the emotive answer to space’s geometry because place is linked to identity over time.

**Article 6**


Jen Southern offers a case study of locative media producing “comobility,” “an awareness of others’ movement at a distance” (p. 76), through “Comob,” an app used for open-ended comobile play. Put simply, players use a mapping app to take walks together, separately, through urban and rural landscapes. The group awareness of each other through the app creates an “absent presence,” a ghostly group identity. Comob was designed after other comobile games of chase, but whereas those had a necessity-oriented aim of chasing and finding a body, Southern’s exploration presents possibility-oriented play, which asks players to explore space as members of a dispersed group. Southern details the networked media apparatus involved in producing the body in a symbolic reality: group members have to stay in the “line of sight” of a satellite and become frustrated when they are disconnected from the mediated group awareness. Ultimately Southern theorizes comobility as a combination of “location presence, temporal presence, [and] virtual co-presence” (p. 85).

**Article 7**


Perhaps because his approach to his subject is the least well-defined, Peter van Wyck comes the closest to explicitly defining a ghost out of all the writers featured in this list. Van Wyck’s 2010 book, *The Highway of the Atom*, pieces together the story of Canada’s involvement in the Manhattan Project. This article comprises bits of his field notes from his trip to Great Bear Lake, the site of a uranium mine that fuelled the bombs detonated over Japan during World War II. The notes are an exercise in poetics as semiotic method, what van Wyck calls the “field work of words” (p. 174). He “seek[s] a different world [that] might help invent a different and critical language” (p. 175). When an elder at a wedding tells him not to swim
in the lake because it is too full of ghosts (hundreds of Inuit dead and dumped after an ancient raid), van Wyck briefly glimpses the aspects of the landscape that are impossible for him to see. “The territory asserts a non-conformity with its representations” (p. 182), he writes. The places he visits are “marked by a radical non-registration of the ontic and the epistemic” (p. 182). The stories he seeks, ghost stories, are ironically inarticulable, dwelling in “the abyss and the silence of no language game” (p. 183).

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References
Review


In A History of Women Cartoonists, originally published in 2014 as Femmes et Humour, Mira Falardeau counters the question, “why are there so few women cartoonists?” (p. 22), by paying tribute to the legacies of fifty women cartoonists and animators from the United States, Canada, Francophone Europe (France, Belgium, and Switzerland), and the Middle East and Maghreb. In so doing, this work demonstrates the breadth of contributions and achievements women cartoonists made in the twentieth and twenty-first centuries, revealing how and why visual humour and second-wave feminism are key to their creative expression and work. Although the book does not specifically include webcomics, Japanese manga, and women mangaka, Falardeau’s historical survey does acknowledge the artistic and creative influences manga has had on younger women cartoonists in the West.

Organized according to their respective countries of origin, each set of profiled cartoonists is prefaced with a historical overview that contextualizes the cultural, social, and political context within which these women were situated and engaged with through their work. The fifty women profiled were chosen because, “they are the most iconic by the extent of their work, the recognition associated with it, the originality of style and the strength of their work” (p. 23). In making this determination, Falardeau draws extensively from databases and award organization records, cartoonist associations and societies, and artists collectives such as the American National Cartoonists Society (NCS), the Canadian Association of Editorial Cartoonists (CELA), and the Oscars. American cartoonists profiled include: Trina Robbins, Liza Donnelly, and Lynda Barry. Canadian cartoonists and animators profiled include both Anglophone and Francophone women: Caroline Leaf, Lynn Johnston, Kate Beaton, and Julie Doucet. Some of the women cartoonists and animators profiled from Francophone Europe are Nicole Van Goethem, Chantal Montellier, and Pénélope Bagieu. And lastly, some of the women cartoonists profiled in the chapter on the Middle East and Maghreb include Marjane Satrapi, Riham El-Hour, and Zeina Abirached. Each profile highlights the critical success of the cartoonist, the themes of their works, their artistic style, and their

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contribution to cartooning or animation. Each profile is organized in an editorial fashion that includes an illustration by the cartoonist, a highlight of their visual humour, and concludes with an excerpt from a press interview about their perspective on women's position in cartooning.

By using historical and cultural analysis, Falardeau's examination illustrates the origins and developments of cartooning in each country with respect to second-wave feminism. Her analysis of Canadian cartooning, for instance, highlights the influences of American and European cartooning traditions, as reflected in Anglophone and Francophone comics and bande dessinée respectively, and the impact of second-wave feminism on cartoonists and their professional development. More importantly, Falardeau's examination draws attention and visibility to the often overlooked, or erased, experiences and work of women in cartooning and the creative industries. She provides three short case studies on the National Film Board of Canada, The New Yorker, and Cartooning for Peace as examples of affirmative action programs that have resulted in very positive outcomes in the fight against sexism. By emphasizing women's visibility, autonomy, and voices in relation to the second-wave feminist movement, Falardeau illustrates how women cartoonists have worked tirelessly to challenge sexism and advocate for equality and freedom of expression.

In addition to addressing the visibility of women cartoonists, Falardeau's analysis also focuses on the importance of visual humour used by women to represent their voice in cartoons and comics. She defines women's use of humour as a demonstration of revolt against male domination, thus connecting it with feminist political protest movements such as speaking out against the lack of women cartoonists nominated for awards and the hypersexualization of women characters in comic publications. In so doing, Falardeau demonstrates how, through the use of humour, women cartoonists communicate contradictions, isolation in their workplaces, and tokenization in their industries.

However, Falardeau's analysis of younger women cartoonists' feminist politics and cartoons is overly general. She claims younger cartoonists' works are not situated in a feminist framework, and are instead post-feminist and reproduce men's vision. This overly general contention essentializes feminism to the experiences and politics of white cisgender women, thereby negating the intersectional feminist politics reflected by younger women cartoonists such as Aminder Dhaliwal, Malaka Gharib, Gemma Correll, and Bianca Xunise. The works of these younger cartoonists explore the intersections of race, gender, sexuality, and class and have achieved success online, in print, and, in Xunise's case, have reached national syndication. As coined by Kimberlé Crenshaw (1991), intersectionality focuses on overlapping forms of marginalization that are mutually reinforcing. In other words, examining inequality in cartooning only through gender reinforces other forms of dominant power. Put simply, by employing an analytical framework rooted in
second-wave feminism, Falardeau’s analysis of visual humour and feminism centres whiteness and cisgender identity at the expense of not considering the intersecting marginalization that persists.

Overall, *A History of Women Cartoonists* provides a much-needed survey and recognition of women cartoonists and animators. The historical survey across North America, Europe, and the Middle East and Maghreb demonstrates how women cartoonists have always had an active role in the cartooning and animation industries. More importantly, Falardeau’s analysis generates insight into how women cartoonists and animators have navigated their positionality as artistic professionals and feminists in spaces dominated by men. Falardeau maintains how critical it is for women to have space to express their views and to defend their ideas through humour. In doing so, Falardeau marks the social, cultural, and political progress women cartoonists and animators have collectively made through their work and advocacy for equality and freedom of expression. *A History of Women Cartoonists* is an accessible text appropriate for non-specialists and undergraduate students interested in the social and cultural context of cartooning and the field of comic studies. It is a celebration of women and encourages them to create their own narratives.

**Reference**

Erika Chung, Ryerson University
Review


Eli Noam is Professor of Economics and Finance at the Columbia Business School where he initiated the MBA concentration in the Management of Media, Communications, and Information. His work focuses on strategy, management, and policy issues in telecommunications, computing, and electronic mass media. As such, Professor Noam is well positioned to have authored Managing Media and Digital Organizations. It could serve as the textbook for the MBA concentration he developed, and that may well be its intention. Noam notes in his introduction that it intentionally follows the curriculum for an MBA, with subject matter and case studies adapted for the media and information sector (p. 6). It is written in accessible, engaging language, with no assumption of a deep understanding of economics.

Two audiences can benefit from the text: graduate students of media who require an education in management principles; and professionals in the media and information sector to whom no such course of study was available during their own postsecondary education. And professionals of this kind are not hard to find: a senior publisher at a major Canadian media company once claimed he could closely estimate the gross revenue of one of his publications by weighing it in his hand. This is the kind of gut feel, seat-of-our-pants management that Managing Media and Digital Organizations is attempting to make a thing of the past.

The text succeeds admirably, both as course material and as a reference work for the profession. Questions for discussion and quizzes added to each chapter provide thorough teaching materials. Case studies using well-known media companies assist both audiences in understanding and absorbing the theory in the text. A single case study is woven through each chapter, allowing readers to deepen their understanding of the concept and its application. The chapter on “Pricing of Media and Information” follows the media evolution and accompanying pricing management of the Encyclopaedia Britannica, tracing its history from a set of leatherbound volumes to a subscription-based online-only product, illustrating the related pricing theory through 14 separate case discussions of what the encyclopaedia’s publishers did or might have done.

Central to Noam’s approach to the study of media and information management is the identification of twelve economic characteristics that shape it. Not all are unique to the sector, but organizations within the sector cannot be managed effectively without an understanding of them:

- **Characteristic #1**: High Fixed Costs, Low Marginal Costs—Very High Economies of Scale
- **Characteristic #2**: Network Effects
- **Characteristic #3**: Radically Divergent Cost Trends in the Value Chain
- **Characteristic #4**: Information as a Cumulative Asset
- **Characteristic #5**: Excess Supply
- **Characteristic #6**: Price Deflation
- **Characteristic #7**: Convergence of Technology
- **Characteristic #8**: Non-Normal Distribution of Success
- **Characteristic #9**: Importance of Intangible Assets
- **Characteristic #10**: The Presence of Non-Maximizers of Profit
- **Characteristic #11**: Information as a Public Good
- **Characteristic #12**: High Government Involvement

Once introduced, these twelve characteristics do not provide the outline for the text. Rather, Noam proceeds through the MBA curriculum studying media organizations through one or more of these twelve lenses. For readers well versed in economic theory, mathematical models are presented to illustrate characteristics, but it is not necessary to use the formulae to understand the concepts. The case studies may be the most valuable illustrations.

The text includes chapters for major organizational functions (production, marketing, human resources, finance, distribution, strategic planning) and some of particular importance to media and information (intellectual assets, technology). The work offers enough detail in each subject area to support a graduate survey course. Perhaps of greater value, each is an accessible introduction to other areas that the professional may be less familiar with: marketers can learn about technology management; human resource professionals about financial management. Use of footnotes within each chapter as opposed to an exhaustive bibliography make each chapter a self-contained textbook.

Examples and case studies are drawn from international markets including Brazil, France, Britain, and Japan but rely most heavily on the United States. Multinational, integrated firms (Sony, Time Warner, Condé Nast, Comcast) constitute almost all of the cases. Examples drawn from startups and boutique firms would be useful given how influential these organizations are in the sector, especially in introducing the disruption that is so characteristic of its evolution. Despite
the book’s encyclopaedic coverage of management techniques, coverage of some parts of the sector seem thin or nonexistent. The chapter on research and development, in addition to summarizing industry structures common to the broader technology sectors, highlights models specific to the media industry: developer-based innovation through APIs and user-generated innovation (although examples given are both industrial companies, BMW and Electrolux), and open innovation by a community of users, like the Linux operating system. This chapter provided an excellent opportunity to explore business models unique to information companies, including crowdsourcing and wikis, but this form of product innovation is not considered.

Most textbooks, and especially books in the media and information sector, risk being out of date before they are distributed. Noam says, “Perhaps the main factor for strategy [in media and information organizations] is rapid technological change in this sector. The media and information sector is subject to radical disruption” (p. 631). This is the case at any time, of course, but even more so since the COVID-19 pandemic. A future edition of Noam’s textbook, which even in this first edition should serve as an indispensable resource for both students and professionals, will benefit from revisions to reflect how human resource management, distribution systems, intellectual property, and information technology will adapt to a world of distributed workplaces and disruptive entertainment technologies. There are multiple references to Netflix apropos the legalities of intellectual assets and information pricing but no references at all to Zoom or Microsoft Teams, both of which have become standard tools for organizational management. The chapter on human resources recognizes that “companies cannot generate profit without the ideas, skills and talent of knowledge workers. An information-sector firm’s productivity greatly depends on the success of managing its HR” (p. 133). A new part of that management is ensuring effective collaboration among work teams that are likely to remain distributed, and supporting their mental wellness. The disruption that was the year 2020 may well affect many of the management practices explored in this text. For now, Managing Media and Digital Organizations remains a very solid and reliable text.

Maria Borkowski, Digital and Marketing Manager, Ontario Ministry of Colleges and Universities
Did lesbians invent the internet? The author facetiously raises this question in the first chapter of *Information Activism: A Queer History of Lesbian Media Technologies*. The answer is an emphatic “no,” and an acknowledgement that the lesbian-feminist archivists and activists who are the subject of this book would probably take umbrage with the patriarchal notion of invention. Nonetheless, and as McKinney argues, this question does point to the digitally-oriented thinking of lesbian feminists long before paper archives were scanned and put online. The author’s second, more serious opening question is: Who is a lesbian? In tackling this question, McKinney examines how racism and transphobia shaped both exclusionary practices and the challenging of these practices among the lesbian feminist organizations and activities at the core of the author’s investigation. McKinney posits that lesbian feminist activist organizations have simultaneously functioned as counter-publics seeking to share and collate information that remained excluded or difficult to find due to heteronormative archiving practices, and as gatekeepers that barred, and were continually challenged by, trans lesbians and lesbians of colour.

In this book, McKinney examines a range of media over a number of decades— including a newsletter, paper index cards, and a helpline—to develop a media history of the work of self-identified lesbian-feminist activists in the United States and, to a lesser degree, in Canada. The chapter titles—”The Internet that Lesbians Built: Newsletter Networks”; “Calling to Talk and Listening Well: Information as Care at Telephone Hotlines”; “The Indexers: Dreaming of Computers while Shuffling Paper Cards”; “Feminist Digitization Practices at the Lesbian Herstory Archives”; and the epilogue, “Doing Lesbian Feminism in an Age of Information Abundance”—demonstrate the breadth of technologies and spaces investigated.

The variety of media McKinney examines speaks to the author’s interest in breaking away from the “rubric of print culture studies” (p. 4) that has, in their view, dominated studies of women’s activism in the 20th century. McKinney combines historiographic methods with key informant interviews and document analysis to examine moments of negotiation by activists over the meaning and uses...
of media, and processes by which information is conveyed. In so doing, McKinney compellingly argues against strict and discrete definitions of print and digital, drawing instead a through-line between current pressing questions of ethics, access, and search retrieval on the one hand and past archiving practices of lesbian feminist activists on the other.

Chapter 1 connects the notion of networks and network-thinking to newsletters. Here, McKinney focuses mainly on the lesbian feminist newsletter Matrices, the product of a self-described network that operated from the early 1970s to the mid-1990s that enabled interconnections between researchers studying lesbian feminism. McKinney’s investigation of the ways in which participant lesbian feminist activists and researchers developed a networked counter-public to share information, resources, and primary sources that previously were difficult or impossible to access, serves as a basis for challenging the notion of a stable pre-internet age.

With its focus on lesbian telephone hotlines, the second chapter stands out from the others in this book in terms of demonstrating McKinney’s interest in affect and the intensely interpersonal, embodied, and emotional elements of activist work, and for illustrating the complexities of media archeology scholarship. Lesbian telephone hotlines emerged in the 1970s as alternatives to hotlines providing information, company, and/or emotional support to straight callers and to those for, and mainly staffed by, gay men. McKinney excavates the paper logs, handwritten notes, and print resources filed away by volunteers at New York City’s Lesbian Switchboard (which operated from 1972 to 1997), in order to illustrate how telephone hotlines “drew on a combination of print and electronic technologies, troubling the telephone’s position as a quintessentially ‘electronic’ medium” (p. 28). Today, the only remains of the use of this electronic medium are the volunteers’ paper ledgers. McKinney’s approach to reading these logs for patterns and answers, while having to contend with both gaps in the written logs and the absence of actual voice recordings, provides a helpful guide for researchers who might find themselves with a similar abundance of archival documents and no proverbial decoder ring.

In Chapter 3, McKinney looks to the Circle of Lesbian Indexers (1979–1986) and JR Roberts’ 1981 Black Lesbians: An Annotated Bibliography project, to problematize reductionist divisions between media. Here too, McKinney deliberately uses “digital” language to argue that these indexers engaged in a “lengthy and deliberate process of classification and compression” (p. 108). The discussion in this chapter traces lesbian feminist activists’ indexing work and the Circle of Lesbian Indexers’ struggle with learning the WYLBUR text editor and word processor program, an opaque indexing software designed in the late 1960s for users with established knowledge of programming. For McKinney, these lesbian activists and indexers’ openness to editing and change in their careful analogue indexing prac-
tices exemplifies the historical continuity of a feminist ethic of archiving across different time periods and media.

In the final portion of the book, McKinney looks at the digitization practices associated with the Lesbian Herstory Archives (LHA). Noting the ways that lesbian feminists at the LHA contend with digitizing work by donors who specify that their work would be for lesbian eyes only, McKinney speaks to the work of digitization and archiving scholars such as T.L. Cowan and Jas Rault (2018), who assert that the ethos of universal access online raises risks for marginalized communities. According to McKinney, the lesbian feminist killjoy counters contemporary digital media rhetoric of open access and transparency by “supplanting fantasies of the digital with attention to everyday operations and uses that matter” (p. 216). In so doing, McKinney dispels notions of digital media as new or ahistorical, tracing the ways in which contemporary lesbian feminists continue to bring the same ethic of care and carefulness to their technological practices.

Throughout this book, McKinney challenges the commonplace notion of feminist waves—with successive waves becoming more open to difference, such that the second wave is defined by cis white women—and attends to the ways that women of colour and trans women are always confronting (white cis) lesbian information infrastructures. This work is a fascinating read for scholars of media and information, archives, queer histories, and activism. It raises a number of important questions about medium-specific affordances, privacy, and access that merit further study. This said, it is worth noting that, given the author’s interest in the ways that digital thinking can be read back into practices that some might consider pre-digital, Information Activism stops short of asking how the affordances of specific mediums might shape the ways in which contemporary activists and archivists approach their work. How digital and analogue archives might manage the privacy wishes of those featured in them—and how digital and analogue concerns might differ despite the continuities in practice across media—thus remains an important question for further research.

References

Nelanthi Hewa, University of Toronto
Review


What does “open development” mean, and how does “openness” work? How might open systems operate where there are pervasive inequalities? Can open development increase and promote equitable participation in the collection, production, and distribution of knowledge? These are some of the important questions addressed in Matthew L. Smith and Ruhiya Kristine Seward’s edited collection Making Open Development Inclusive: Lessons from IDRC Research.

Open development is often regarded for its potential to “support broader human development objectives” (p. 4), for instance, to amplify voices from the margin, foster inclusive research, and transform global ecologies of access to the outputs of research. The corollary is the movement toward developing open systems and institutions. However, this process seldom critically questions the viability for developing countries to adopt open development practices.

Recognizing this gap, the International Development Research Centre (IDRC) investigated these questions for nearly ten years by examining how open development is operationalized in the global South. Making Open Development Inclusive synthesizes this research and offers a new perspective about open development by considering how “innovations in openness are contributing to and exacerbating existing inequalities” (p. 8).

Through a series of concise, informative, and innovative case studies, Making Open Development Inclusive successfully offers a nuanced analysis of open systems and their potential for inclusivity. The central thesis is that openness should not be conflated with inclusion or neutrality. Open systems, including education, health, data, science, and telecommunications, have the potential to be more inclusive, though inclusion can only occur “when institutional and hierarchical barriers to knowledge and participation are removed or lessened, as well as when diversity is enhanced” (p. 440). For open systems to be truly inclusive, they argue, the development process must include the values, perspectives, and knowledge frameworks of marginalized groups and incorporate these factors into the design, implementation, and outcomes of development projects from their inception.

This argument is carried throughout the book’s 15 contributions, written by scholars and practitioners. The text is organized into three main sections—Defining Open Development, Governing the Open Development Ecosystem, and Governing Open Development Applications. The first section imparts the foundational knowledge in the topic area and defines open practices in inclusive development. The second section assesses the implications of governance in open systems from a variety of people-centric perspectives about gender, geography, ecology, development provision, and information and communications technology (ICT) access and use. This section examines pervasive inequalities in knowledge production practices, and considers how open development is affected by social differences and power relations. The final section interrogates the viability of governing open applications and infrastructures including open government data, open health data, educational resources, science, inclusive crowdsourcing, and open innovation. The claims, recommendations, and conclusions advanced in each contribution are supported with empirical evidence and case studies from the South.

The book does have limitations. First, the text’s primary focus is on how open development might reinforce inequalities. As such, the contributors tend to overlook, albeit to varying degrees, the potential benefits of open development. For instance, ICTs and open source platforms have enabled innovative and important research, inquiry, and science that previously were unheard of, including citizen science, crowdsourcing, crowdseeding, microwork, and grassroots policymaking. Although not always optimally representative, the significance of these achievements should not be understated, especially when considering that such innovations have only emerged within the last two decades.

Second, the book does not engage with important research management issues. For instance, and despite the strong focus on information networks and data production, issues of data governance in the global South are left largely unaddressed. Data governance, or the ability for communities to manage and govern their own data individually or collectively, is particularly important in the context of historically marginalized populations especially in terms of agency and data sovereignty. Likewise, there is no discussion of whether and/or how the goals of data governance can coexist with the goals of open development and information management. This is an unfortunate oversight. Issues of surveillance and ICT adoption are also absent. In the current geopolitical climate, where the politics of surveillance of subgroups in cities persists in the global North, it is important that the potential implications of technological surveillance in the context of developing countries also be addressed by researchers. This is especially so, given the emphasis Smith and Seward place on critically examining existing power imbalances within the global South, lest open development serve to reinforce and/or escalate these inequalities.
In sum, *Making Open Development Inclusive: Lessons from IDRC Research* provides an important critique of open development, foregrounding important considerations that challenge equating open development with inclusion. In their attempt to bridge the gap between theory and practice, the contributors are largely successful in providing readers with empirically informed investigations about the co-functioning of open development and digital network infrastructures, and in offering evidence-based recommendations aimed at advancing human rights and confronting ecologies of inequality. The book is structured and written in a manner that is accessible for scholars, practitioners, and civil society alike, including those who are not versed in open development. The breadth of its scope, which spans feminist theory, gender-based analysis, telecommunications, public policy, economics, and public health, makes this work a welcome addition to ongoing open development research that is likely to have cross-disciplinary and multisectoral appeal. This said, it is likely to be of particular interest to researchers, professionals, and academics in the fields of international development, political science, communication, critical data studies, social science, urban planning, and anthropology.

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