Intervention: Democratising infrastructure

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ARTICLE INFO

Keywords:

Infrastructure
Democracy
Governance
Materiality
Temporality
Citizenship

ABSTRACT

This intervention seeks to revivify democratic thinking in political geography, through foregrounding and pluralising its material and temporal dimensions. At the same time, it speaks to a renewed centrality and relevance of infrastructure and infrastructural projects in political discourse. The contributions included here demonstrate how an infrastructural lens can offer new insights into democratic spaces, practices, and temporalities, offering more expansive versions of what it means to act politically. Specifically, these contributions intervene in existing geographical debates by bringing to the fore four underexplored dimensions of democratic governance: (im) materiality, connectivity, performativity, and temporality. In doing so, it develops a research agenda that broadens and regenerates thinking at the intersection of socio-spatial theory and democratic action and governance.

1. Introduction

The proliferation of civic demands for democratisation through material infrastructures, including those pertaining to energy, water, currency, and transport, indicates a desire to transform how societal needs are provided, and how technologies of provision might act as 'loci of hope' (Bernardo, 2010) for achieving a more desirable and equitable future (Dawson, 2020). However, while activists use the language of democracy to advocate for a transformation of the social, economic, and political relations enacted through infrastructures, neither they nor the academic community necessarily agree on the form or purpose of these new, material, forms of democracy. The aim of this intervention is to better equip political geographers and others to analyse calls for democratic practices rooted in (material) infrastructures.

Set against the 'infrastructure turn' (Appel & Kumar, 2015; Furlong, 2019), and amidst political demands to democratise basic service provision, this intervention connects analytical work on infrastructures with civic calls for (re)democratisation. It does so by developing a research agenda that broadens and regenerates thinking at the

intersection of socio-spatial theory and democratic action and governance. It builds on, but also departs from, existing geographical scholarship that has challenged the notion of democratic politics as 'fundamentally the same everywhere, [consisting of] a set of procedures and political forms that are to be reproduced in every successful instance of democratisation, in one variant or another, as though democracy occurs only as a carbon copy of itself' (Mitchell, 2011, p. 2).

To this key insight we wish to add infrastructure as a specific geographical lens through which to understand and analyse the spatiality and temporality of democracy. The contributions included here demonstrate how an infrastructural lens can offer new insights into democratic spaces, practices, and temporalities, offering more expansive versions of what it means to act politically (Von Schnitzler, 2018). Through brief analyses of the diverse and experimental engagements between infrastructures and their designers, funders, and users (Marres, 2014; Braun & Whatmore, 2010), the four contributions in this intervention provide new perspectives on democratic engagement that go beyond 'pregiven meanings, forms, and qualities of participation' (Chilvers & Kearnes, 2020, p. 349). Specifically, these contributions

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<https://doi.org/10.1016/j.polgeo.2021.102378>

Received 4 March 2021; Accepted 8 March 2021

Available online 31 March 2021

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intervene in extant geographical debates by bringing to the fore four underexplored dimensions of democratic governance: (im)materiality, connectivity, performativity, and temporality.

To begin, although of growing interest to geographers, infrastructures remain peculiarly slippery to define: as Edwards et al. (2009: 366) have it, 'How big, or deep, or old, or widespread does something have to get before it becomes infrastructure?'. One starting point is Star's definition of infrastructure as 'a system of substrates [...] by definition invisible, part of the background of other kinds of work' (1999: 380). Embedded in social practices, infrastructures become transparent in their use and are learned as part of a membership; they link with, and delimit the boundaries of, specific communities of practice, and they comprise multiple standards embodied in specific pieces of equipment (Schmid, 2021). They are 'grown' (Edwards et al., 2009) out of, and on top of, existing technical systems—repaired and retrofitted in a piecemeal way, more than designed and built *ex novo* (Howe et al., 2016; Jackson, 2015). Through these processes of making and remaking, infrastructure provides 'both the material foundations for social life and the imaginative resources through which political participation is structured' (Knox, 2017, p. 374). Cross (2015) expands on this latter point, remarking that infrastructures enable futurist orientations to converge, and in doing so, give shape to relationships of power, consent, and struggle.

It is therefore not surprising that as geographers have adopted an infrastructural lens, questions of politics and democracy have come to the fore. Earlier geographical thinking has demonstrated the importance of thinking about the spatialities of democracy, citizenship, and 'the public'. Challenging Habermas' normative conceptualisation of a universal, abstract, 'public realm' (Mitchell, 1995, 2017), geographical work has demonstrated the importance of considering the materialisation of public space in particular sites (Staeheli et al., 2002) and the ways these sites shape, and are shaped by, contestations around citizenship and democracy (McCann, 2002). Furthermore, this literature has shown the need for an analytical openness, recognising that citizenship and democratic politics are not static or complete, but unsettled, plural, and always in the making (Staeheli 2008, 2010; Marston & Mitchell, 2004). In recent years, further geographic contributions have yielded even more complex democratic imaginaries around ideas like polycentric democratic landscapes (Hendriks, 2009) and environmental citizenship (Pallett, 2017).

An infrastructure lens offers a challenge and an opportunity for democratic theorisation in political geography. It does so in particular by drawing attention to the 'agency, liveliness and unruly activity of materials' (Barry, 2013, p. 5) and to the political potential of these materials. By performing an 'infrastructural inversion'—that is, making infrastructure visible by acknowledging the 'interdependence of technical networks and standards, on one side, and the real work of politics and knowledge production, on the other'—it becomes possible to take materiality seriously in its direct and indirect political nature (Bowker & Star, 2000, p. 34; Braun & Whatmore, 2010; Larkin, 2013). A focus on materiality also has the potential to highlight new spatial and temporal dimensions of democracy.

At the same time, political geography has much to add to understandings of infrastructure. For Millington (2018) infrastructures are 'the material forms through which politics circulates, ...[Infrastructures] mediate and produce uneven effects' (2018: 31). Rather than just being conduits of already-existing state power and politics, Shlomo (2017) outlines how 'hard' infrastructural projects *act* as a form of 'soft-power' governmentality by shaping and reconstructing 'societal norms and human behaviour' (2017: 228). Infrastructure does not just reveal an unchanged governmental will, or deliver state effects, but actively participates in co-producing it. For Dalakoglou and Kallianos (2018), infrastructure projects are arenas where 'the political'—that is fundamental disagreement—reveals itself. In sum, a political-geographical take on infrastructure highlights that (1) infrastructure *reveals* and *materialises* already existing (un)democratic norms;

(2) infrastructure projects *produce* a more-or-less democratic politics and polity; and (3) infrastructure *provokes* democratic responses to hegemonic power and politics.

The first way in which the contributions here intervene in geographical thinking on questions of democracy is by foregrounding the agency of materials and the multiple ways in which this agency intersects with democracy. Directly, infrastructures have politics (Winner, 1980) because their material components shape, mediate, and control space. Infrastructures exert power by virtue of their disposition, i.e. the character or capacity of an infrastructure that results from all of its activity (Easterling, 2014). Within the present 'digital turn' (Ash et al., 2018; Richardson, 2016) across geography and cognate disciplines, this focus on material agency has resulted in a research agenda that seeks to make visible the multiple layers of digital infrastructures (Furlong, 2020). Digital infrastructures appear, then, as the material condition of possibility for digital global flows (Kinsley, 2014; Pickren, 2018), and they afford new tools for control and resistance alike. Contributors Rella and Judson further explore questions of materiality, illustrating how the ostensible dematerialisation of infrastructures through digitalisation changes how we might think about 'material' forms of democracy. In particular, they draw attention to the use of distributed technology for the management of energy storage and money and the potential these technologies afford for reinventing both infrastructure and 'the public'. At the same time, they caution against taking for granted this potential for democratisation, as the growing relevance of corporate and for-profit actors makes it unclear in whose interest these technologies will operate.

Second, this intervention considers how infrastructural materiality is increasingly the site of competing interests (Barry, 2013), with winners and losers, victims and 'orphans' (Edwards, 2010, p. 12). The geographic literature has been concerned with the democratic dimensions of contestation over material space. An infrastructural lens, with its attentiveness to networks and promises of seamless connectivity, offers the opportunity to delve further into questions of democratic governance and publics. Rather than functioning simply as a technical fix to the friction of distance, infrastructural connectivity has recast (geo)political relations (Gambino, 2018), engendered new subjectivities (Neilson, 2012) and transformed ecosystems worldwide (Arboleda, 2020). In their contribution, Gambino and Jenss build on these ideas, critically analysing how the pursuit of seamless connectivity can open up new understandings of the democratic (im)possibilities that travel across infrastructural networks. Drawing on insights from their fieldwork in the Caucasus and Central America, they demonstrate how the pegging of seamless connectivity to multiple scales produces political spaces where inclusion and accountability are alternately foreclosed and (re-)opened.

The third contribution of this intervention is on the performativity of large technical systems as 'concrete semiotic and aesthetic vehicles' (Larkin, 2013, p. 329) that convey modernist imaginaries and that shape (democratic) participation. Parashar explores this line of thinking through the case of the Shimla Water Crisis in the Indian Himalaya. This case refers to a contentious dam-building project, in which the state has worked to enchant modernist infrastructure in order to weaken and de-politicise the public and to defuse resistance to the project. This demonstrates how (anti)democratic politics both precede and work through infrastructure.

The fourth contribution of this intervention is in foregrounding questions of temporality in geographical theorisations of democracy. In their well-known 1996 article, Star and Ruhleder call for scholars to attend to the 'when', as well as the 'what', of infrastructures. In her contribution, Pinker answers this call to demonstrate how the unruly materialities of infrastructural projects disrupt and impede the temporal imaginary of linear progress, yet also create the conditions for distinctive and unexpected forms of political life. This temporal perspective, based on fieldwork in Ollantaytambo, Peru, highlights how an infrastructural lens shifts our focus from how particular democratic forms, practices, and promises are brought into being, to how these are

contested, maintained, and unravelling.

In summary, our intervention speaks to a revivification of democratic thinking in political geography, through foregrounding and pluralising its material and temporal dimensions. At the same time, it speaks to a renewed centrality and relevance of infrastructure and infrastructural projects in political discourse. Taken together, the contributions in this intervention open up a research agenda to explore the *demos* of large technical systems—the distant others they connect and the local communities they transform. This agenda also examines the seamless connectivity that infrastructure projects promise – or impose – and the multiple frictions they engender when they ‘hit the ground’. In convening this intervention, we seek to outline the ways that material infrastructures perform and embody competing and contradictory claims and generate opportunities for both legitimation and contestation. Together, the contributions urge us to fully consider the intangible, imagined components of large technical systems, and to recognise the significance of these as equal to the concrete, steel and cables that make up infrastructure. A democratic struggle for control over the materiality of infrastructure must also include a democratic struggle for control over the ‘infrastructural imagination’ (Bowker, 2014).

2. The stakes of im/materiality and the digitalisation of infrastructure (Rella and Judson)

Civic demands for infrastructure democratisation have largely focussed on the material components of infrastructures. This focus is now shifting with trends toward digitalisation, which, through ostensible tendencies towards dematerialisation, complicates infrastructural engagements (Shedroff & Lovins, 2009). Following Ash et al. (2018: 4), digitalisation can be understood as the transformation of ‘objects and artefacts’ in ways ‘that are ultimately compatible with or which arise from binary code and architectures, yet which produce further “proliferations” that exceed the binary logics and materialities of digital systems’. Digitalisation thus affords a new layer of ‘programmability’ to infrastructure, represented by software code (Kitchin & Dodge, 2011). This newly afforded programmability, and the unruliness of its consequences, represent a current gap in research that is worth filling. This contribution aims to open a new area of inquiry by asking, ‘What is at stake politically where digitalisation changes the materiality of infrastructure(s)?’

To explore this question, this contribution will provide brief illustrative examples of two infrastructures at different stages of digitalisation: energy and money. In the energy sector, programmability and information exchange brought by digitalisation potentially challenge a dominant form of democratic praxis based on localised contestations, by producing more geographically fluid ‘materialised publics’ (McCann, 2002; Staeheli et al., 2002). This is especially evident with Community Energy Storage, which challenges existing approaches to Energy Democracy. With money, which has only recently come to the attention of the ‘infrastructural turn’ in the social sciences (Bernards & Campbell-Verduyn, 2019; Maurer, 2017), the emergence of cryptocurrencies and blockchain technologies provide fertile ground for democratisation through ‘alternative’ and ‘grassroot’ monetary networks (North, 2007).

Community Energy Storage is a model in which battery capacity in individual building units is shared between members of a networked smart energy community that can either be geographically local or distributed (Barbour et al., 2018). It generally requires a digitally enabled intermediary to connect and remotely manage energy flows between programmable battery assets – for example, by running a trading platform or automation software to manage charge/discharge cycles. Currently, digital intermediary services in Community Energy Storage are most commonly provided on a commercial basis. However, the potential to develop ‘democratised’ alternatives is being explored. Some nascent models, for instance, incorporate community ownership, governance and equitable benefit distribution models (Koirala et al.,

2019). Features such as increased data transparency, enabling community scrutiny of the network’s operation, are also starting to emerge.

These developments prompt us to evaluate existing accounts of Energy Democracy in a fresh light. Interpretations of Energy Democracy, as with democracy in general (e.g., Mitchell, 2011; Pallett, 2017), have become highly pluralistic (Chilvers & Pallett, 2018). Within the energy sector, ‘democratisation’ is variously interpreted as a process (e.g. participatory governance), outcome (e.g. justice), or an aspirational ideal in itself (Szulecki and Overland, 2020). However, Energy Democracy praxis remains largely focussed on a specific democratic imaginary – embodied in projects such as community wind turbines – in which electricity generation assets are owned and/or managed by ‘ideal-type’ small-scale, localised delivery bodies (Van Veelen, 2018). This perhaps reflects the strong activist history of Energy Democracy (Burke & Stephens, 2018) and its ties to other environmental movements advocating grassroots democratic imaginaries such as ‘small is beautiful’. However, by introducing new ‘coded’ publics that are geographically slippery (due to widespread data flows, remote control and automation possibilities) and constituted both by material and coded resources (e.g. batteries, processors, data and software), Community Energy Storage challenges this dominant organisational form of Energy Democracy praxis.

Community Energy Storage prompts us to consider how different democratic goals may be served as digitalisation re-shapes energy infrastructures. Literature on resource and infrastructure governance within technologically complex, multi-scalar systems provides some helpful insights on this issue. For example, scholarship on commons governance (Hess & Ostrom, 2007) offers a democratic imaginary that accommodates collective governance of mixed material and coded infrastructures. Such approaches may signpost models for democratic participation in new parts of digital energy infrastructures by engaging more materially and geographically complex publics than those implicated in locally focussed forms of Energy Democracy. Commons-based approaches, likewise, could help address data governance challenges emerging from new energy data monopolies (Judson et al., 2020), or offer collective strategies for coordinating between localised energy grids (Giotitsas et al., 2020). However, this is not to advocate any simple replacement or ‘update’ of the dominant Energy Democracy model. Whichever pathways are explored in future, the plurality of Energy Democracy traditions is likely to remain a strength in responding critically to new politics and political needs that are embedded in, and acted out through, infrastructure digitalisation.

Within the field of money, cryptocurrencies are digital representations of value that circulate in decentralised payment infrastructures. Instead of using a third party (such as a financial institution) to mediate transactions, transactions are recorded, following rules called ‘consensus algorithms’ or ‘consensus mechanisms’, in unalterable databases that are simultaneously kept on all the member nodes within a decentralised network called blockchains (Rella, 2020). This enables the running of a monetary network without central banks or other intermediaries. Cryptocurrencies were born in 2008 with the introduction of Bitcoin, which was deeply connected with a critique of the financial institutions and practices that led to the 2007–08 Financial Crisis (Nakamoto, 2019). Since then, cryptocurrencies have exploded in number, presently counting 7000 such applications (Coinmarketcap, 2019). Some of these applications include decentralised, anonymous, and censorship-resistant payments such as Bitcoin, Monero, and ZCash; others, like Ethereum, feature distributed computation; still others, like Faircoin, provide a techno-economic infrastructure for activist projects oriented to social justice (DuPont, 2019).

Cryptocurrencies have opened up a space to think about money’s publics and *demos*. The blockchain is, in fact, ‘an engine of alterity: an opportunity to imagine a different world and imagine the mechanics of how that different world might be run’ (Swartz, 2017, p. 83). The peer-to-peer architecture of cryptocurrencies allows for the creation of monetary networks among distant and unknown others across borders,

and it 'evokes a flattening of hierarchies and an unmediated directness in transactions' (Nelms et al., 2018, p. 23). This allows for the design of incentives, rewards, and distributive outcomes that are consistent with agreed-upon values (Brekke, 2020).

However, the affordances for money's democratisation provided by blockchain technologies and cryptocurrencies should not be overestimated. In particular, the emergence of corporate blockchain platforms presents the possibility of new risks and geopolitical conflicts within wholly private monetary spaces. An instructive case is Facebook Libra, which was launched in June 2019 (Libra, 2020). In two distinct US Congress hearings, Facebook executives had to reply to concerns about data privacy and about the potential impacts of a private cryptocurrency on financial stability. Facebook's defence of the project heavily relied on geopolitical arguments supporting American economic and political hegemony against external – mainly Chinese – threats. As Facebook CEO Mark Zuckerberg himself put it in front of a US Congressional hearing,

China is moving quickly to launch a similar idea in the coming months. We can't sit here and assume that because America is today the leader that it will always get to be the leader if we don't innovate. Libra will be backed mostly by dollars and I believe it will extend America's financial leadership as well as our democratic values and oversight around the world (Cant, 2019).

Cryptocurrencies 'provoke questions about the intersections of payments and publics [...] linking together infrastructure and the communities built on top and mediated by them, while also foregrounding the politics of that relation' (Nelms et al., 2018, pp. 13, 19). The democratising potential of grassroots cryptocurrencies and the corporate, centralised example of Libra illustrate radically different articulations of money's public. The promise of disintermediation and decentralisation can turn into its opposite, signified by tech companies' ubiquitous End-User License and Terms of Service agreements (Ibid: 27).

In summary, digitalisation complicates infrastructural materiality by enabling, through software code, the programmability of new objects and spaces. In energy and money infrastructures, this has led to the development of decentralised networks such as Community Energy Storage and cryptocurrencies. These networks highlight two shared themes with respect to democratisation. First, digital networks, such as Community Energy Storage and cryptocurrencies, can generate new publics within infrastructures that may hold democratising potential. Secondly, programmability can open doors to new infrastructural imaginaries that serve emerging material and democratic-political needs. However, while shifts in political power surrounding infrastructure digitalisation *can* make space for democratic activity, this outcome is not guaranteed. Rather, careful choices in governance are required to ensure change meets its social, technical, and environmental promises.

3. The politics of seamless connectivity (Gambino and Jentsch)

During the presentation of the masterplan for Anaklia City, a planned smart city and logistics hub at the border between Georgia and the de facto state of Abkhazia, the project CEO, Ketil Bochorishvili, highlighted her commitment to the elimination of all barriers that inhibit the smooth flow of investments and commodities and the free movement of those engaged in trading. After all, she stated, 'Cargo is like water: if it encounters any obstacles, it simply changes direction'. Thus, in this future hub, connectivity is at once a condition of existence and an ambition. As such, the pursuit of seamlessness is both naturalised – like the spontaneous movement of water away from obstacles – and manufactured through a series of complex infrastructural arrangements. The latter, however, is presented as the logical consequence of the former. That is, the making of infrastructure becomes the product of supposedly natural forces and is thereby rendered apolitical.

In this intervention we urge an against-the-grain reading of

seamlessness-as-nature. Through illustrations from our work in Georgia and Mexico we argue that research needs to ask, first, how the pursuit of seamlessness can become political, and second, whether democratic possibilities can materialise through the infrastructures of connectivity.

Buzzwords like 'seamless connectivity' and a 'frictionless world' have become prominent in commentaries on infrastructure and logistics in the past several years. Across different territories, smart city projects, pipelines, ports, and energy corridors are justified by virtue of their ability to manufacture a smoother experience of the world for businesses and their clients (Easterling, 2014). While the achievement of frictionless environments is mostly presented as a matter of 'techno-economical organisation' (Nancy, 1991, p. 23), critical scholarship has identified the uninterrupted circulation of commodities, materials, people and services, and the transit infrastructure that makes it possible, as the axis around which relations of extraction, exploitation and accumulation are (re)produced on a global scale (Chua et al., 2018; Mezzadra & Neilson, 2019). Across this diverse body of works, references to democracy relate mainly to realities of exclusion and dispossession. Critical inquiries from geography and beyond, however, have shown that the circulation of people and materials, and the infrastructure that enables it, can reconfigure democratic possibilities and create new publics. For instance, in "Carbon Democracy" (2011), Timothy Mitchell shows how the properties of different fossil fuels have engendered or disrupted political arenas. Focusing firstly on coal, Mitchell argues coal's material properties enabled the aggregation of large groups of workers, who could leverage their strategic position within energy supply chains to demand democratic inclusion and rights. The shift to crude oil – a fluid easily transported through transnational pipelines and extracted by a small, isolated labour force – radically disrupted these arenas. Despite such dispersal, however, as Barry (2013) argues, oil infrastructures can act as catalysts for new forms of politics. This is because the construction of this infrastructure can give rise to new publics locally and internationally and can provide a platform for the elaboration of new alliances and grievances.

Building on these literatures, our understanding of democracy foregrounds the simultaneity of justice claims, consent (which may ultimately limit radical egalitarianism), and coercion (Gramsci, 1971, notebook 6, § 88). Illustrative of this perspective is the case of Mexico, where the implementation of consultation processes on large-scale infrastructure projects co-exists with repression against protestors. By shedding light on the ways that practices of exclusion and claims for justice travel across different scales, this threefold understanding allows us to interrogate the democratic (im)possibilities presented by infrastructural connectivity.

We contend that the pursuit of connectivity at all costs is a deeply political affair (Easterling, 2014). Specifically, seamlessness derives its politics from two interconnected factors. First, its pursuit is the expression of a concerted – and indeed increasingly global – strategy to prioritise the needs of capitalist enterprises in the environments where they operate and from which they extract their profits (Mezzadra & Neilson, 2019). Secondly, however, the networks that underwrite connectivity may also establish novel connections between subjects, spaces, and practices that offer new political possibilities (Neilson, 2012, p. 329). Accordingly, the networks that enable connectivity are sites where different actors converge to negotiate forms of violence, control, and political power. On the one hand, connectivity implies a constant adapting to contingencies, which, in turn, requires an extension of surveillance in the name of seamlessness (Kangieser, 2013; TSS, 2019). On the other, the linking together of what were once loosely connected spaces can increase the potential for transnational solidarity (Bernes, 2013; Curcio, 2015). It is in light of these conflicting impulses or tendencies that we call for more attention to be paid to the democratic (im)possibilities that travel across infrastructural networks.

What makes seamlessness political is its unique relation to the radical transformation of place through infrastructural expansion. For instance, in the context of the SIEPAC transmission line, running across six Central

American nations, indigenous initiatives like the Land and Territory Defence Assembly (APITDIT) have continuously claimed that increased violence on the Mexican Isthmus are due to land conflicts around wind energy projects (APITDIT, 2018). Even if not directly induced by infrastructure planners, the violence surrounding the projects precludes democratic inclusion. Establishing new connections requires land and transforms landscapes and social relations; in some contexts, these changes may lead to conflict or violence (Cowen, 2014; Jenss, 2020, p. 102113). It is imperative to recognise how infrastructures are reproductive of inequalities (Tonkiss, 2015), and indeed are political from their inception, while still on the drawing board (Bridge et al., 2018; Hecht, 2011). Different controversies may surround different types of infrastructure (Hönke and Cuesta Fernández, 2018; Sovacool & Cooper, 2013), and communities may organise to demand access to new infrastructure, such as electricity grids (García & Farrell, 2019).

Appeals against transnational projects are, however, complicated. Often, multiple scalar relations brought together in the making of infrastructure facilitate the avoidance of democratic claims by shifting responsibilities between different agents. Yet as our fieldwork shows, the multiplication of actors, time-spaces, and connections that make up infrastructural networks can also expand the arenas for making claims of democratic inclusion, thereby fostering new connections. The case of the SIEPAC transmission line illustrates well the visibility of tension across different infrastructural networks. On the Mexican Isthmus, the most globally visible node of resistance is the APIIDTT, which carries local communities' claims beyond the regional scale. APIIDTT has successfully knitted a network of alliances around the defence of territory; through the Congreso Nacional Indígena (CNI), communities are able to reach beyond unresponsive, and sometimes violent, local institutions (Durn áDurán Matute, 2018). Some communities have been able to scale up their protest through strategic litigation in cooperation with the non-governmental organisation PRODESC. In the case of such resistance networks, the attempt to generate a single energy territory is turned on itself by communities turning connectivity and its multiscalarity to their own vantage. A connectivity of solidarity is thus staked upon logistical networks that sabotage and repurpose seamless connections.

Thousands of miles away, similar multiscalar entanglements mark the construction of the logistical hub of Anaklia, which aims to serve the middle corridor of the Belt and Road Initiative (BRI). Georgia's leaders, echoing the official BRI discourse, promote a commitment to seamless logistical connectivity as the key to a fairer society, where market competition will replace geopolitical rivalries (Gambino, 2019). The making of this logistical hub sees the cooperation between the government, international funding institutions and a transnational company. In the effort to bridge the local to the global scale, the pursuit of seamless connectivity entails synchronising a regulatory infrastructure designed to govern and smooth flows. In the case of Georgia, the necessity to comply with state-of-the-art standards regulating the transparency, inclusivity and due process of infrastructural developments has created forums where limited claims towards democratic inclusion can be fulfilled, reversing the violent exclusion of local populations sanctioned by earlier infrastructures in Anaklia. Specifically, Georgia's former President Saakashvili - ousted in 2013 following protests against his increasing authoritarianism - had sanctioned the expropriation of land belonging to local populations in order to clear the territory for his own vision of the village's development. Several households had been dispossessed without any possibility of appeal.

Within the new multi-scalar arena of which Anaklia is part, international and local NGOs and civil society groups have gained a space for action where previously unlawfully expropriated citizens have been able eventually to secure compensation and relocation. Often, however, the limited inclusion achieved through international standards naturalises the multiple forms of exclusion sustaining infrastructural projects. In and around the infrastructural developments taking place in Anaklia, the crafting of a space for civil society groups to claim their rights exists in parallel with the removal of all barriers to free trade - including

provisions such as minimum wage, and other forms of workers' protection. This has been sanctioned by the local government and international institutions alike in the name of seamlessness and fast development. This constitutes new forms of exclusion as the local population's lack of employment alternatives is effectively harnessed toward the creation of docile labour power for the benefit of businesses. If what we see around the SIEPAC transmission line is the routine displacement of more radical attempts at democratic organisation, what we see in Anaklia with the pursuit of infrastructural seamlessness is the circulation of both limited forms of democratic inclusion and practices of exclusion.

A critical attention to the pursuit of seamless connectivity can at once detect the kind of politics informing global infrastructural networks and expose the democratic (im)possibilities that travel across these spaces. Rather than merely a set of technical solutions to the contingencies of global supply chains, the pursuit of seamless connectivity is a political effort geared to bending complex and frictional environments to the needs of global capital. The infrastructural zones through which seamless connectivity operates, such the future smart city and logistics hub in Anaklia, produce potential spaces where inclusion is simultaneously negotiated and limited. Across the globe, a very different infrastructural project, the SIEPAC transmission line, is turning Central America into a single energy territory. The seamless connection of actors involved in the project across different scales and continents in many cases has foreclosed demands for accountability. However, political possibilities, often unexpected, also travel across the very lines they seek to challenge. A renewed attention to these networks, we hope, can allow for the strengthening of these 'political infrastructures' against seamless accumulation (TSS 2017).

4. Infrastructure as performed: A case of water governance in Shimla (Parashar)

When and how does an infrastructure project begin? Does an infrastructure project start with the construction of the project looking from the point of view of an engineer? Does it begin with the operationalising of the project looking from the point of view of a manager? Does it start with the needs of ordinary people and the state's response to those needs? These questions bring infrastructure within debates around the democratic processes. My contribution to this intervention adds another layer to understandings of infrastructure and democracy by arguing that infrastructure, and its (anti)democratic politics, exists even before its physical manifestation: in fact, while infrastructure currently might not exist as a material reality in all places, it does exist everywhere as an imagined construct. It exists as the modernist imaginary of the large technical project as a saviour of the crisis. Mrázek (1997: 166) describes this experience of infrastructure as an 'enthusiasm of the imagination'. Even if the project ultimately fails to deliver on the promise, this imagined infrastructure is used to curb any form of dissent and any demands for the broader democratic rights associated with access to the services. Here, I argue that the state creates this 'collective fantasy' through project announcements while simultaneously pitting aspirational publics against infrastructural publics, thereby weakening the power of democratic mobilisation. Through the case of the Shimla water crisis, I will show how uneven distribution of water infrastructure means consistent deprivation of vital resources for some regions. This illustrates how some infrastructural practices may lead to de-democratisation by weakening democratic movements through the power of the infrastructural imaginary.

On the one hand, infrastructure is considered a technical system that comes into being by the specialists trying to solve a problem. In this view, it is a technocratic, apolitical object—the large-scale technical system (Graham & Marvin, 1996) that has defined modern life. In the language of the sociology of technology, such infrastructures have become 'black-boxed' not just for their users, who do not have a choice when it comes to the planning and placement of networked projects, but

also for the state, which acts according to a narrative that large-scale infrastructure is the only option.

This technocratic whitewashing, however, hides the politics behind their governance processes. Hughes (1987) conceptualises infrastructures as large technological, political, legal, and environmental resources. Likewise, Ferguson (1990) describes infrastructure (and 'development' more broadly) as an 'anti-politics' machine. When infrastructure projects close the space of resistance and reduce policy a technocratic exercise, anti-political effects are inevitable (Barry, 2002). For example, in India, we see slum dwellers exercising a form of 'hydraulic citizenship' by claiming access to municipal water in Mumbai. But the state, connecting large infrastructure with nation-building, can seek to counter these newly formed infrastructure publics (Aung, 2016) in an exercise of anti-politics. This anti-politics can take multiple forms; in this case, it is about pre-empting the political movement for broader water rights through the infrastructural imaginary.

Butler (2011) expands the notion of linguistic performativity to include 'acts, gestures, and desires.' Butler also uses Derrida's notion of iterability (Derrida, 1988) as a form of performance, treating performativity not as an act but as a ritual (Butler, 2011). Performativity, furthermore, provides agency as the subjects are formed through action by the ritualised repetition of acts and gestures in the bound of the norms. In the context of infrastructure creation, the norm is the modernist imagination, which, as Appadurai (1996: 31) argues, 'is now central to all forms of agency, is itself a social fact, and is the key component of the new global order.' This discourse arose in the colonial period, on a wave of new infrastructural intervention in British cities (Halliday, 2001). This flurry of infrastructural development was soon seen in the new colonial cities, leading to a condition of simultaneous modernisation and underdevelopment (Kaika, 2006). The infrastructural imagination in post-colonial Indian cities has followed a similar trajectory, and the case of the Shimla water crisis demonstrates how the state uses infrastructural imagery to manage public demand without dealing with the fundamental issue of water access.

Water shortage has been a part of the history of Shimla, which was created as a small military outpost in the Himalayan region of India in 1819 and later became prominent as the summer capital of British India. With each crisis, the state (and international development agencies) conceived of a new infrastructural project. The problem further increased with the dry season in 2017–18, leading to the drying of the Gumma scheme developed by the British in 1925 to meet the demand of India's ever-growing summer capital. Local newspapers suggested that excessive urbanisation and increasing tourism had led to the construction activities in and around the city's water catchment area, ultimately leading to the drying of the water sources. However, experts from the municipal body blamed it on climate change, which is causing the variation in the weather patterns. This was at least partly an attempt to shift responsibility away from the local government.

This water shortage led to protests from the residents demanding a solution to the ongoing water crisis. Many residents saw this crisis as the sudden culmination of the continual water scarcity problem in the hill town. Still, there was a groundswell of support for the protest, as some argued that the national coverage of the crisis was an opportune moment to solve the water shortage issue once and for all. People's response included both mass mobilisation in the form of protest marches and demands for judicial intervention on behalf of the public. The spaces for resistance emerged within the technocratic regime in the form of new political communities. Protests in the state capital put significant pressure on the government to respond. The state's response included some immediate face-saving measures, like the suspension of some officials and the ordering of an immediate supply of water using tankers. A more significant step was the announcement of the Kol dam lift scheme. This scheme has since emerged as the saviour of the water crisis for the state. As the protest increased due to the unavailability of water tanks, which were there as a stop-gap arrangement, the Kol dam project was announced, allowing the state to control the situation. The World Bank

is funding this project with a loan of Rs 1000 crore (Approx \$150 million), which will ultimately be recovered from the end-users. The project is expected to solve the water needs of the city until 2050. The expected date of completion is 2024. Despite the long completion window of the project, it has solved the state's immediate goal—that is, to satisfy the angry residents and to show itself to be responsive. Due to this large infrastructural project, other incremental projects focused on rejuvenating the city's traditional water sources have been shelved. One such project envisaged by the municipal body attempted to rejuvenate the local streams within the city, so as to localise the city's water supply. This would have increased the potential for a more democratic space for public participation. In the event, it was replaced with a highly modernist imaginary of the large dam.

The state, through the performativity of the large infrastructural projects, influences people's movement and their right to participate in the planning and execution of the municipal services. Cancellation of smaller infrastructure projects where the civic participation would have been a crucial component detaches the people from the infrastructure. By removing active participation and relegating people solely to the role of end-use customers, the state and large funding institutions like the World Bank reduce any potential scope of democratic participation. In this way, infrastructure's (anti)democratic politics exists even before its physical manifestation.

5. 'Project Time' and unruly ruins: the temporal politics of a peruvian road bypass scheme (Pinker)

In their 1996 article, Star and Ruhleder call for scholars to attend to the 'when', as well as the 'what', of infrastructures. Recent literatures have taken up this call to explore the multiple temporalities enacted through infrastructures, addressing for example, the deferrals (Appel, 2018); promises (Harvey & Knox, 2015; Hetherington, 2016) and forms of ongoingness (Harvey, 2018) and ruination (Gordillo, 2014; Gupta, 2018; Stoler, 2008) that are implicated in the emergence of infrastructural systems.

Here, I build on this literature to consider – via ethnographic fieldwork on a controversial road project in Peru – how the temporal effects of material processes enact the political life of infrastructure projects. In particular, I ask how lively materialities refigure and disrupt what I call Project Time, the 'future perfect' (Hetherington, 2016) temporality of infrastructural engineering. I argue that the unstable materialities implied by infrastructural projects and the 'unruly' actions of their associated publics can upend the promise of technical certainty and smooth futures that underpin Project Time. Whilst promising integration, infrastructural projects frequently expose the frictions between material actors, human interests, and their associated temporalities (see Pinker & Harvey, 2015). Yet, such disjunctures – the failure to harmonise the material possibilities, temporal uncertainties, and limits presented by new infrastructures – may open up new and unexpected forms of political life.

Ethnographic fieldwork I carried out on a highly contested road bypass project in Peru in 2011 attests to such dynamics. The bypass – proposed for the highland town of Ollantaytambo, the principal embarkation point for the train that takes tourists to Machu Picchu – had first been mooted some twenty years previously due to concerns that lorries passing through the town were damaging the Incan-built platform that supports its famed archaeological complex. A bypass was needed to divert traffic around the platform. Its advocates argued that it would resolve the town's most intractable problem: how to integrate its position as a strategic commercial hub with the preservation of the archaeological sites that – along with the railway station – promised to maintain tourism.

However, its long-term failure to materialise was a testament to the topographical and political complexities of the scheme. Any bypass would be constrained by the town's extensive Inca remains, its position in a narrow valley at the confluence of two rivers, the railway that

skirted the archaeological platform, and the complex political interests that fractured around the project. Engineers suggested that the most viable site for the bypass was on the town's southern flank, where a sliver of land lay between the edge of the platform and the Vilcanota River. However, this area already hosted the railway to Machu Picchu, and there was scant space alongside it to install a road without impinging on the river or on the lower terraces of the platform.

In July 2009, initially as part of a wider World Bank project, the Lima-based Tourism Ministry selected a Peruvian–Spanish consortium to prepare a technical study for the bypass. However, when the consortium presented the study in Ollantaytambo in 2010, it was poorly received, proposing as it did not only to pull down several terraces supporting the town's Incan platform, but to cut the new road straight through its railway station. Locals feared that the consortium's plan to build a new station 3 km outside Ollantaytambo would lead to the creation of a competing 'satellite city' of investor-owned hotels and restaurants, leaving Ollantinos excluded from the income generated by the hundreds of tourists travelling daily to Machu Picchu. A new mayor took office in January 2011. His campaign had been supported by market traders and hotel owners whose businesses relied on keeping the station where it was. He duly made it his priority to contest the consortium's proposal, arguing that both the terraces and the station could be preserved if the bypass were constructed not between the platform and the railway, but rather between the railway and the river.

What I call Project Time (see also [Carse & Kneas, 2019](#)) is evoked by the linear trajectories inscribed in the regulatory and technical logics that structure engineering projects like the Ollantaytambo bypass. Project documents jostle with slick images that conjure the compelling prospect of neat future solutions to infrastructural problems. Such material implies that engineering is capable of forging streamlined new sociotechnical systems from a heterogeneous cast of actors, materialities, and interests, integrating the competing scales and temporalities of the diverse players involved. Project Time may also promise not only to subordinate the past through the promise of a 'better' future, but also to conserve – even improve – those pasts, whilst controlling nature's excesses. In Ollantaytambo, for example, it was suggested that the bypass project would both protect and restore the town's archaeological remains, whilst preventing the river's destructive force from damaging the new road. In this sense, whilst Project Time may cast the present as a flawed and expectant time-space, awaiting improvement, it can also emerge as 'more than merely chronological', assembling pasts and futures into new configurations ([Hetherington, 2016](#)).

Such temporal reconfigurations set in motion through Project Time shape, and frequently foreclose, political spaces. Project Time is enacted through documentation practices (see [Pinker, 2015](#)) and carefully stage-managed consultation processes. These frequently prescribe the availability, nature, and timing of political spaces with respect to infrastructural schemes, opening up, and also placing limits on, public contestation (and constituting them as legitimate or otherwise) as engineering studies move through various stages of elaboration. In Ollantaytambo, for example, municipal politicians feared that local expressions of resistance to the bypass plans – not commensurate with Project Time – would be suppressed by it. Thus, the mayor noted that local people were only permitted to express dissent during the first, consultation phase of the project; the next phase, when the study would be formalised, would exclude these voices.

Yet, multiple material actors, each with specific temporalities, participate in infrastructure schemes; these co-emerge with, disrupt, and refigure Project Time, generating unexpected spaces of political contestation and negotiation. Ollantaytambo's ruins exemplify this. What was seen as the town's historical and political 'uniqueness' was closely tied up with its ruins, which were cited as a reason why cost-benefit economic stipulations and standardised engineering regulations governing the construction of new public infrastructures – also manifestations of Project Time – should be suspended or loosened. Accordingly, the ruins played a key role in rendering the bypass project a

site of regulatory experimentation that tested the political limits of municipal agency – in turn creating new spaces of democratic possibility – amidst the unstable institutional landscape of Peru's unfolding process of state decentralisation.

Three terraces supporting the Incan platform, which were threatened by the consortium's plans, became a particularly charged locus of political and technical wrangling. The terraces' potential for the municipality's position lay initially in the argument that their proposed removal dishonoured their unique archaeology, which should not be limited by standard road engineering regulations. Consortium engineers meanwhile constituted the municipality's resistance to their proposal as out-of-sync with Project Time, linking it with rural intransigence and backwardness in the face of the future perfect envisaged by modern engineering. This reflected a larger tendency to map Peru's Andean region as geographically, racially, economically, and temporally at odds with Lima, the central hub of the Peruvian state. The mayor would sometimes play on this view, noting that Ollantinos' wrath about the project would lead them 'to strike, close the road, close the railway ... take up the rails, fight against central government ... 1000 campesinos will take out the engineers ... with stones'. If the road and railway were emblems of efficiency, mobility, and flows of capital, the striking *indígenas* were identified with the obduracy of stone. Similarly, in their bid to persuade the consortium to alter their proposal, the municipality invoked the ruins at stake in the proposed bypass as forms of unyielding materiality that – like the Ollantinos that defended them – could not be co-opted by the temporalities of modern capital, engineering, or the centralised state.

Ultimately, the consortium refused to change their proposal, and the municipality began to focus instead on producing its own technical study, with a view to building the bypass according to its own parameters, using municipal and regional funds. This unusual move meant confronting regulatory complexities, requiring negotiations with governmental and non-governmental actors. With this changed target, the politics of the terraces shifted. The mayor acknowledged that one terrace might have to 'move backwards' in order to accommodate both the bypass and the railway. He began courting the support of Cusco's Culture Ministry to achieve this. The Ministry had originally disagreed with both the municipal and consortium proposals. By August, however, the newly installed Ministry director, with whom the mayor had worked in the past, threw his weight behind the municipal proposal.

By 2014, the municipal engineers had dismantled the offending terrace. They had also cut through or moved Inca stones elsewhere on the bypass route without consulting the Culture Ministry. At around the same time, the Ministry removed the sympathetic director, brought legal charges against the municipality, and demanded that it halt the bypass works. The Municipality carried on regardless: in asserting local sovereignty over the ruins, it made a bid for greater autonomy from central state dictates in the name of the futures it was crafting. 'This is my road', said the mayor. 'They shouldn't meddle with my project'.

Ruins could be done away with. Yet, the effects of their participation in the unfolding political drama could not necessarily be foreseen. In 2016, an Incan altar, presumed destroyed during the construction of the bypass, was discovered deep in river water near the building site. Press images of the huge carved rock emerging out of the Vilcanota spectacularly denoted the hubris and destructiveness of infrastructural developments, whilst pointing to the stubborn persistence of remains. Moreover, since ruins were not simply material artefacts, but archaeologies of affects, nature, and legal and political processes, they also endured in other forms – not least in the legal charges laid by the Culture Ministry. Thus, whilst ruins appeared governable, the effects of their past intersections with political and material trajectories could come alive in the present in unpredictable ways.

In short, ruins – ambivalent and partially manipulable – upended Project Time and became a key site for the contestation of state power. They were couched as unchanging emissaries from the past, or from a utopian future that proposes itself, but can now never be. Yet, they also

emerged as relational and fragile. Their combination of resolute materiality and vanishing ineffability made them effective players in mediating claims for new spaces of power relative to Peru's central state. Faisal Devji describes ruins as an 'ungraspable *moment*, a vanishing point that can never come into clear view' (2006, cited in Stoler, 2013, p. 28). He might as well be talking about the state: the ruins' tangible yet ephemeral quality evokes the ambivalence of governing power, which is never continuous with the institutions that embody it, and the political projects that unfold in its interstices. Not quite graspable, ruins can be variously devalued and normalised, lauded as priceless, or sacrificed for a higher good, thereby becoming useful sites for the refiguration of the state, 'animat [ing] new possibilities, bids for entitlement, and unexpected political projects' (Stoler, 2008).

Infrastructures constitute an "asynchronic timescape", a fragile assemblage of asynchronous temporal relations (Joniak-Lüthi, 2019: 5). Here I have addressed the interaction between three temporal forces: Project Time, the ambivalent temporalities inscribed by 'the ruin', and the cycles of municipal politics. The temporalities of ruins and human actors, the everyday livelihoods of local people who live in and among – not simply alongside – archaeological remains, and the uncertainties they inscribe as they cross paths, disrupt the promised order of Project Time. In infrastructural terms, the ensuing slippages between these temporal modes are a problem; engineering relies on the successful synchronisation of the distinct temporal scales enacted by such differentiated actors (Harvey, 2018; Joniak-Lüthi, 2019). In political terms, however, such slippages may be generative: new forms of political and democratic practice may emerge precisely in and through those moments when infrastructures do not hang together.

Declaration of competing interest

No conflict of interest.

Acknowledgements

This intervention is inspired by a workshop on the theme Democratising Infrastructures – held in Durham (UK) in January 2020. The contributors would like to thank the other participants at the workshop for the opportunity to share and discuss their ideas. Funding for the workshop was kindly provided by the Department of Geography and the Institute of Advanced Study at Durham University. We would also like to thank Caroline Nagel for her helpful feedback and guidance during the publication process.

The work of individual authors also has specific funding acknowledgements

Gambino would like to acknowledge the generous support of the ESRC that funded her PhD through the UCL, Bloomsbury and East London Doctoral Training Partnership.

Parashar: The research was made possible by the Institute PhD fellowship provided by the IISER Mohali. I would like to thank the participants of the Democratising Infrastructure workshop at the Durham University for their feedback on this paper.

Pinker would like to thank the many people from Ollantaytambo, Cusco and Lima that generously participated in her research. She owes an enormous debt of gratitude to her co-researchers, Penny Harvey, Jimena Lynch Cisneros, Deborah Poole, Jhon Tairo Puma, and Teresa Tupayachi Mar. The Economic and Social Research Council (ESRC), Wenner-Gren Foundation, Arts and Humanities Research Council (AHRC), National Science Foundation (NSF), and the American Council for Learned Societies (ACLS) supported the research project. A Leverhulme Trust Early Career Fellowship (ECF-2015-239) supported the writing of this piece.

Judson would like to acknowledge the funding support of Engineering and Physical Sciences Research Council (EPSRC).

Rella would like to acknowledge the generous support of ESRC grant ES/J500081/1

van Veelen: The writing of this piece was supported by Formas, the Swedish research council for Sustainable Development, grant nr 2019-01627.

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