

**ARTICLE**

# From problematisation to propositionality: Advancing southern urban infrastructure debates

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**Abstract**

In this article, we explore the notion of propositionality to advance southern urban infrastructure debates towards more anticipatory forms of scholarship. By propositionality, we mean a research sensibility that engages, first and foremost, with propositions for infrastructure futures on their own terms. While scholarship on infrastructures in southern cities has contributed to very fruitful conceptual and methodological innovations, we argue that the current mode of problematisation does not lend itself to this propositional intent. Conceptually focused on deconstruction and critique and methodologically tied to heterogeneity at the community scale, this form of problematisation tends to produce localised knowledge about what is, but offers limited avenues for articulating what could be. After a brief introduction, the article provides a review of the main conceptual and methodological contributions and limitations of the dominant modes of researching southern urban infrastructure. We then explore a different mode of problematisation as the first step towards a propositional research sensibility, followed by an overview of a preliminary propositional skill set covering three aspects: mobilising technical knowledge more effectively; appreciating sectoral and scalar specificity; and addressing the challenges of normativity. Our arguments draw on literature from southern scholarship, science and technology studies (STS), and pragmatism, as well as empirical work conducted by ourselves and others. We conclude the article with a call for further reflection among southern urban scholars on ways to move us into a propositional space that better engages with the people and things we speak for and care about.

**KEYWORDS**

global south, infrastructure, problematisation, propositionality, southern urbanism

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## 1 | INTRODUCTION

Urban scholars are increasingly compelled to articulate the importance of their work beyond the academy. This is particularly the case for scholars who work on infrastructures in southern cities—be they geographers (and other social scientists) or engineers, whether they are based in the global south or global north.<sup>1</sup> This not only reflects the arguably neoliberal—and neo-colonial—demands of funding bodies for “policy-relevant” or “impact-driven” knowledge production (Eichhorn, 2020; Noxolo, 2017). It also reflects scholars’ own intentions to use their scholarship to enact or support meaningful change in urban contexts awash with different forms of injustice, violence, and deprivation. Within this, some scholars may aim to produce work that can be picked up by different actors, such as community groups or public officials, and used for their own agendas. Other scholars may want to be more directive in their insights, answering the question, “What does my work say about what could or should happen?” Both, of course, have risks. The former leaves the work of translation and relevance-seeking largely up to non-academics to be deployed circumstantially, selectively, and often in service of particular political projects. The latter, in contrast, risks aggrandising expert knowledge as defining what *ought to be done* in ways long critiqued by urban scholars. Some of these risks are predictable, others are unavoidable. With sound reflection of the ways in which knowledge has been produced, “failing forward” may be circumvented. For instance, postcolonial critique and decolonial thought have made significant strides towards resisting the imposition of decontextualised solutions by decentring and decolonising the production of knowledge on and for southern cities (Jazeel & McFarlane, 2007, 2010; Lawhon et al., 2016; Noxolo et al., 2012; Radcliffe, 2017). However, it remains impossible to “know everything” about a place or context, particularly as urbanisation processes evolve at unprecedented speed in the global south, much of which we can only make sense of after it has materialised.

Despite the unpredictability of how knowledge lands in complex urban systems, southern thinkers from across the world compel scholarship to engage directly with both the challenging conditions of southern cities and the possibilities for better and more just urban futures (Barnett & Parnell, 2016; Bhan, 2019; Harrison, 2014; Parnell & Pieterse, 2016). As Pieterse reflected in a public lecture at the University of Cape Town (African Centre for Cities, 2018), “being both critical and propositional is not a choice, but a necessity”. Drawing on their extensive and engaged work in Africa and Asia, Simone and Pieterse (2017, p. 10) substantiate this requisite arguing for “a way of thinking that might come up with workable plans and practices that transpire through experimentation, pedagogy, failure, exchange and persistence”.

As we see it, this call does not suggest that propositional research is the *only* worthwhile academic project. Nor does it encourage a sort of utilitarian or neo-colonial burden on the scholar to help those most affected by injustice and deprivation. Instead, it is a call for anticipatory scholarship which not only critiques (Duminy & Parnell, 2020), but also experiments, imagines, and inspires (Mbembe & Nuttall, 2004).

In this article, we respond to Pieterse and Simone’s call by substantiating the notion of *propositionality* specifically in the context of the southern urban infrastructure debates. By propositionality, we mean a research sensibility that engages, first and foremost, with propositions for infrastructure futures on their own terms, for what *could be* (as opposed to what ought to be). In general terms, a proposition is an argument which is put on the table for consideration. Propositions, by definition, are not necessarily right or true. Unlike concrete proposals, which elicit imaginations of fleshed out blueprint schemes and plans, propositions are conversation-starters about concrete, and often difficult, situations. To adopt a propositional sensibility to research in the infrastructure space is thus to centre inquiry on the process through which arguments are generated, discussed, dissected, and debated for what could be done as a response to infrastructure challenges, needs, imaginaries, and aspirations.

While scholarship on infrastructures in southern cities has contributed to very fruitful conceptual and methodological innovations, we argue that the current mode of problematisation does not lend itself to this propositional intent. Conceptually focused on deconstruction and critique and methodologically tied to heterogeneity at the community scale, this mode of problematisation tends to produce very localised knowledge about what *is*, offering few avenues for articulating what could be. Scholars who wish to act in service of wider projects of urban change may benefit from engaging with an enhanced conceptual and methodological skill set to better make sense of, or even advance, infrastructure propositions, as well as engaging in critical normative assessments of their socio-spatial effects.

To substantiate the notion of propositionality, the article is divided in five sections. Section 1 is this introduction, where we have set out the basis for the article and the agenda we hope to animate with this work. Section 2 provides a framing for the piece. In this section, we examine the innovations achieved by southern urban infrastructure scholarship and unpick several limitations connected with the dominant mode of problematisation. Section 3 explores a different mode of problematisation as the first step towards a propositional intent. We also begin to substantiate our notion of propositionality by emphasising a subtle but crucial reorientation of research inquiry towards understanding a challenging

infrastructural situation and ensuing action(s) on their own terms. In section 4, we outline a preliminary propositional skill set that addresses some of the methodological limitations of southern urban infrastructure debates. Specifically, we look at three aspects: mobilising technical knowledge more effectively; appreciating sectoral and scalar specificity; and addressing the challenges of normativity. Section 5 closes the article by engaging with potential critiques to our argument and with an invitation for further conversations on how southern urban infrastructure debates may contribute “to bridge the divide between the precarious now and possible futures” (Simone & Pieterse, 2017, p. 56). Our arguments draw on literature from southern scholarship, science and technology studies (STS), and pragmatism. We make use of empirical work conducted by ourselves and others to illustrate both contributions and limitations. Therefore, we write not in the spirit of confrontation, but with a view to finding ways to advance southern urban infrastructure debates through collaborative reflection and imagination.

## 2 | SOUTHERN URBAN INFRASTRUCTURE DEBATES: INNOVATIONS AND LIMITATIONS

In this section we explore the dynamic scholarship on southern urban infrastructure, in terms of both its innovations and limitations. Here, we are specifically looking at work which positions itself to be either southern or, in some cases, postcolonial. In this sense, it is not only about its geographical focus, but work animated by a southern orientation (Bhan, 2019; Lawhon & Truelove, 2020). Southern urban infrastructure debates are part of a wider infrastructure turn in the social sciences and humanities, which has been well documented elsewhere (Anand et al., 2018; Coutard & Rutherford, 2016; Furlong, 2011; Graham & Marvin, 2001; Harvey et al., 2016; Larkin, 2013; McFarlane & Rutherford, 2008). Drawing on an eclectic range of literatures (e.g., STS, anthropological, historical, postcolonial, feminist, and political ecology), this turn has been immensely productive, conceptually and methodologically, especially in the southern infrastructure space. Simultaneously, it has struggled to venture into more propositional registers. In this section, we unpack issues around: conceptual openness; deconstruction and critique as dominant modes of problematisation; empirical particularism; and a methodological overcommitment to heterogeneity.

### 2.1 | Conceptual innovations and limitations

Southern urban infrastructure debates have engaged in substantive conceptual openness around the nature of infrastructure. While the wider infrastructure turn undoubtedly conceived of it in more generous terms than academic counterparts in engineering or finance (Amin, 2014), southern scholarship has further expanded the conceptual vectors. For example, where the infrastructure turn looked at the agency of human–nonhuman hybrids and cyborgs in the production of large networked systems (e.g., the electricity network), southern scholarship reflects an analytical centring of the labour, needs, hopes, and desires of those who use infrastructure (Gastrow, 2017).

This scholarship has paid attention to the ways in which people value infrastructure for the services it affords them and the actual and existing ways it interfaces with urban life (De Boeck, 2012; Simone, 2004). In doing so, scholars have demonstrated that, in fact, urban service delivery systems are highly differentiated, hybrid, and heterogeneous, especially in contexts of precarity, informality, and uncertainty. In the absence of a universal, integrated, networked infrastructure, a diversity of providers (e.g., communities, mafias, piracy, and various micro-enterprises) emerge to satisfy unmet needs (Button, 2017; Ranganathan, 2014; Rizzo, 2017; Simone, 2006).<sup>2</sup> Some colleagues prefer to refer to this diversity as “heterogeneity” (Lawhon et al., 2018), others as “service delivery configurations” (Coutard & Rutherford, 2016; Jaglin, 2014). Others still, emphasise practices of accretion (Anand, 2017), incrementalism (Silver, 2014), gap-filling (Goodfellow, 2020), or infrastructure “always-in-the-making” (Baptista, 2019). Overall, southern scholarship extends further what infrastructure is by raising awareness of the complex forms of ownership and the diversity of actors involved in planning, delivering, governing, and owning infrastructure.

Broadly aligned with the infrastructure turn, southern scholarship has productively engaged in the problematisation of taken-for-granted assumptions about individual technologies, desirable infrastructure solutions, and related urban imaginaries (Aurigi & Odendaal, 2021; Datta, 2018; Watson, 2014). Rather than imposing standards of good or bad infrastructure, southern infrastructure scholars reject the inherited normativity of the “modern infrastructure ideal” and its formal, centralised, integrated, and universally accessible networked systems (Graham & Marvin, 2001; Guma, 2020). They push back against developmentalist and technicist discourses that remain dedicated to the desirability and

appropriateness of this ideal by foregrounding places which have always had partial networks and fractured governance systems, and which are unlikely to benefit from attempting to impose such centralisation and uniformity at this point in their development trajectory (Coutard & Rutherford, 2016). In this way, southern scholars provide critique which builds on a nuanced questioning of normativity within the infrastructure turn (Bhan, 2019).

This problematisation extends beyond issues of normativity to include a critique of the ways in which infrastructure is intimately connected with unequal geographies, the production of subaltern subjectivities, or environmental exploitation and degradation. For instance, a concern with the emergence of “slum urbanism” (Pieterse, 2011) and the enclaves of access in seas of deprivation (Bakker, 2003) critically historicises and deconstructs the persistent inequality associated with the political economy of capitalist accumulation in southern cities. Focusing on the ways in which southern cities experience particular expressions of inequality, scholars examine racialised infrastructures and their intimate connections to the politics of colonial projects, and of empire more broadly (Kale, 2014; Kimari & Ernstson, 2020; Kooy & Bakker, 2008; McFarlane & Rutherford, 2008). Other scholars use infrastructure to nuance a diversity of social and political processes (Fredericks, 2018; Goodfellow & Huang, 2021; Lemanski, 2019). Others, still, engage with the metabolism and commodification of nature associated with infrastructural provision (Arboleda, 2016). Overall, these authors share a commitment to problematise infrastructure as a way of seeing, and studying, broader social processes in southern cities, leveraging it for wider theorisation, not just as a topic of study.

However, conceptual openness comes with its own limitations. At its extreme, the fuzzy boundaries of what infrastructure is (and is not) can become unhelpful in concretising imaginative proposals for how services could be provided. For instance, the notion of “heterogeneous infrastructure configurations” (Lawhon et al., 2018), which seemingly includes actors, networks, relationships, discourses, modes of regulation, and much more, is undoubtedly helpful in analysing relational complexity. Notwithstanding, it is arguably paralysing in practice, thus foreclosing possibilities for thinking about what infrastructure could be.

Moreover, the ways of problematising infrastructure through deconstruction and critique of taken-for-granted assumptions tend to arrive at the pertinent, but unsurprising, conclusion that infrastructural arrangements are imbued with complex, unequal, and unjust power relations (Amin, 2014; Ferguson, 2011). Many scholars based in the global south appreciate this insight, for it provides at least some cracks through which concrete experiences may be taken more seriously within international policy debates (Datta & Odendaal, 2019). However, shedding light on the injustices that underpin technical systems is a necessary but insufficient condition for thinking infrastructure otherwise. For instance, exposing a technical device as disciplining, neoliberal, or neo-colonial, offers little to the user who wants electricity or water, or to the local governments which endeavour to provide services under extreme strains on their budgets (Baptista, 2015). Overall, deconstruction and critique of technical ways of thinking runs the risk of simplifying (or simply overlooking) the difficult trade-offs, moral challenges, and ambivalent takes a household, engineer, accountant, planner, health worker, or community provider make routinely about what really matters to them.

It is not so much that we question the relevance of deconstruction and critique as modes of problematisation; it is, instead, that these insights may not be where the stakes are highest for those involved in actual infrastructure processes and practices, be it from the side of the user or the provider. As we explain in section 3, a mode of problematisation that starts from the critical scrutiny of how different actors engage with the problems they face and the solutions they arrive at may be more conducive to the form of anticipatory scholarship we advocate here.

## 2.2 | Methodological trends and limitations

While southern urban infrastructure debates have been animated by scholars who work across a range of disciplines within the social sciences and humanities, they have been drawing on several important methodological trends. One important trend has been the practice of “following the infrastructure” common across the wider infrastructure turn. Informed by a combination of strands from within STS (from large technical systems to actor-network theory), this approach has included selecting a particular “technology”, such as a water meter in Soweto (von Schnitzler, 2008) or mapping instrument in Kibera (Odendaal, 2021), and understanding its “social and political life” (e.g., Angelo & Hentschel, 2015). In southern scholarship, this trend has often focused on a particular geographical community, such as an informal settlement or public housing estate (Silver, 2015) or users of prepaid meters in specific neighbourhoods (Baptista, 2015). In practice, the strategy of “following the infrastructure” is complemented with the strategy of “following the community”, that is, to explore the lived experiences of users, especially in more deprived communities. In other cases, scholars concentrate on the production of service delivery

configurations by “following the providers” in interaction with communities, whether municipal engineers, planners, technical staff, financiers, or “mafias” (Anand, 2015; Baptista, 2019; Cirolia, 2020; Pilo, 2021; Ranganathan, 2014).

Overall, southern urban infrastructure scholarship has privileged a fruitful combination between the case method, infrastructure visualisations (e.g., including images or maps), and rich narratives and ethnographic accounts (Cirolia & Scheba, 2019). The emphasis on ethnographic methods, both tied to particular technologies or places, reflects a necessary and common tendency within the southern urban infrastructure debates to focus on the human, everyday, and social “lives” of urban infrastructure arrangements (Doherty, 2020). It attends to the lack of data in many southern urban contexts about how infrastructures operate at the community level, contributing valuable knowledge to our collective database of urban experiences (see Robinson, 2006). This methodological focus stands in remarkable contrast to studies of large socio-technical systems in the global north, which had long emphasised network builders, technology entrepreneurs, and policy-makers (Hughes, 1983). It is a useful corrective to the often national and city-scale plans and policies that dominate developmentalist discourses on infrastructure, and which erase the lived experience of the people that infrastructure systems are intended to benefit.

Simultaneously, a focus on thick description of individual cases has some limits. When thick description fails to identify key analytical abstractions (e.g., key elements underpinning a specific process) that facilitate comparisons across cases,<sup>3</sup> they are open to charges of empirical particularism and theoretical irrelevance (Scott & Storper, 2015). Notwithstanding, thick descriptions that attend to the multi-scalar dynamics of community, state, or private actors can offer very useful insights into how different actors arrive at specific infrastructure propositions and the broader processual patterns that underpin infrastructure arrangements (see section 4.2).

At the same time, these methodological approaches appear to affirm particular normative assumptions about what infrastructure is and how it works, if only implicitly, instead of opening them to empirical scrutiny. For example, it is important to add empirical specificity to the notion of heterogeneity, not presume it as a given, considering the diversity of infrastructure arrangements observed across southern regions. Moreover, to assess infrastructure arrangements on their own terms, it is necessary to move beyond simply describing contemporary arrangements and their problems. It is also necessary to critically assess, in normative terms, why people locally favour having a certain solution and with what risks and consequences (see section 4.3).

The methodological (over)commitment to the community scale or the lived experiences of infrastructure also risks becoming a sort of methodological reductionism, whereby other aspects of infrastructure production and consumption are overlooked. For example, if we focus too much on how a particular community uses motorcycle taxis, then we may miss the multi-scalar realities of national import policies, which shape which sort of vehicles come to be affordable to small-scale paratransit operators and which do not. Getting a full picture of the systems which support infrastructure delivery can be more difficult and time consuming, especially when confronted with the opacity of many local organisations and institutions in southern contexts (Auriol & Blanc, 2009). It also requires a certain familiarity with the technical knowledge underpinning infrastructure planning, financing, delivery, maintenance and repair, and overall governance. At any rate, engaging with these methodological challenges is of essence if scholars want to adopt a propositional sensibility to research (see section 4).

### 3 | FROM PROBLEMATISATION TO PROPOSITIONALITY

In this section we tackle one of the conceptual limitations of southern urban infrastructure scholarship as a way of opening avenues for thinking propositionally about infrastructure futures in southern cities. Deconstruction and critique, we argued above, are useful when scholars use infrastructure as a lens to problematise socio-technical, techno-natural, and techno-political processes and relations. However, this mode of problematisation often provides few gestures towards what infrastructure itself might be, or how it might be otherwise. To move us into this anticipatory space, in our view, it is necessary to explore first how we may problematise infrastructure differently.

One way to go about it is to abandon deconstruction and critique altogether. After all, as Ferguson (2011, pp. 62 and 68) incisively notes, these dominant tactics of problematisation, largely rooted in the work of Michel Foucault and other poststructuralist thinkers, have become little more than “moralistic denunciation” and “dismissive critique” that lead to “a rather sterile form of political engagement”. Ferguson (2011) suggests that many social scientists seem to misunderstand how Foucault used deconstruction and critique in his study of the state’s exercise of power, not as ends in themselves, but as means to understand how the state made sense of concrete difficult situations and how it searched for, and experimented with, possible responses to them—that is, how the state problematised difficult situations with a view to addressing them.<sup>4</sup>

Barnett and Bridge (2016, p. 1191) draw on a similar reading of Foucault to emphasise how problematisation should be interpreted as “one element in the process of calculated, strategic interventions through which problems are defined in ways that enrol various partners and shape subsequent pathways of action, decision and inquiry”. Their view of problematisation draws on the pragmatism of John Dewey, for whom we adjudicate a situation as problematic by considering its difficulty and assessing what can be done about it.<sup>5</sup> In this sense, problematisation is not about questioning taken-for-granted assumptions, the denaturalisation of concepts, or the denunciation of the unjust difficult situation people find themselves in. It is something somewhat different: it is a process of critical, reflexive, and pragmatic examination of how people understand a situation and translate it into action.

This different mode of problematisation already has some traction among southern urban scholars—including Simone and Pieterse (2017)—for it better elucidates how a constellation of actors goes about their everyday lives, while navigating a variety of epistemologies, practices, and ethical dilemmas. In one case, Bhan (2019) problematises the practices of urban dwellers in Indian cities. In contrast to stereotypical descriptors like slums, he proposes the vocabulary of “squat, repair, and consolidate” to capture agency and pragmatism. In another case, Baptista (2015) problematises electricity prepaid meters in Maputo. Eschewing dominant interpretations of these as unpopular, disciplining technologies, she shows how and why they are pragmatically preferred by low-income residents. Finally, Niranjana (2021) problematises the work of water engineers in Chennai. She shows how engineers craft solutions through ambivalent and contingent assessments of technical, bureaucratic, and localised forms of knowledge, often learning how to solve problems from local plumbers and contractors. In all three examples, scholars set their analytical lens, not on dominant interpretations of infrastructural processes, but on how different actors navigate difficult situations and arrive at solutions that meet their needs and aspirations.

Instead of “throwing the baby out with the bathwater”, we argue that southern urban infrastructure scholarship should engage with this different mode of problematisation as a first step towards adopting a propositional research sensibility. This requires that infrastructure scholars turn inquiry and knowledge production towards understanding a challenging infrastructural situation and ensuing action(s) on their own terms (see Barnett, 2020). In doing so, scholars should identify not just techno-scientific or even political concerns, but also what Castree (2016, p. 335) calls “vital “human dimensions” (...) things like faith, hope, charity, justice, rights, entitlements, obligations, conceptions of nature and so on”. This work of “representing” (both in terms of “speaking of” and “speaking for”) what matters to a community (in its widest sense) and why problems should be solved requires as much an ethics of responsibility (Jazeel & McFarlane, 2010) as an ethics of care (Middleton & Samanani, 2021).

This reorientation of the purpose of inquiry is a subtle but crucial difference to dominant modes of research in southern infrastructure studies. A propositional sensibility requires many of the same analytical skills of critical urban scholarship, including: attention to context and situated histories; relational forms of interpretation and translation; consideration of actors’ various—and often conflicting—ontologies, ways of seeing/thinking, ways of doing, and attachments; or a sharp, critical ethos regarding injustice and inequality. However, scholars adopting a propositional sensibility deploy these skills to ask grounded questions about how actors articulate what is at stake, the different knowledges deployed to devise pathways to action, the evaluative claims made about these, and the organisational arrangements, policies, or practices mobilised to deliver them. Propositional scholars may also use those skills to engage in experimentation and anticipatory thinking alongside actors on the ground about possible futures that may inch them closer to desired futures, even if only temporarily and in contradictory, contentious, and unpredictable ways.

Because these pathways for action are often experimental, experiential, and infused with trade-offs, thus seldom definitive, the outcome of propositional inquiry is always tentative, revisable, and infused with normative assessments (see section 4.3). Therefore, researchers following a propositional sensibility must feel at ease with uncertainty and provisionality, be willing to experience a certain dose of vulnerability, to muddle through and adapt in motion, and even to let go of the positions of authority (and risk of peer critique) that come with academic trappings. In this vein, scholars from the University Eduardo Mondlane in Maputo have been working with households in one of the city’s self-built neighbourhoods, as part of the ongoing project *Kaya Clinica* (the Home Clinic) (Lage & Lage, 2017). Their role is to develop technical solutions to housing and infrastructure problems identified by individual households, but not by imposing predefined architectural or technical standards. They respond instead to residents’ perceived needs and aspirations by muddling through pre-existing material conditions and conflicting legal and administrative requirements, and by striking complex trade-offs between the technical feasibility and the affordability of each solution.

As this example suggests, another trait of a propositional sensibility is that researchers place themselves on the “inside”, side-by-side southern actors, instead of looking from the outside. It compels researchers to see their audience as including not just their academic peers but also those who feel the issues at hand more acutely. This positioning shares

in part the ethos of traditional forms of applied or action research, as well as of translational research (e.g., Parnell & Pieterse, 2016), or other decolonial, self-organised, and emergent experiments with a plurality of local communities (e.g., Escobar, 2018). A case in point is the Cape Town Knowledge Transfer Programme reported by Patel et al. (2015), whereby doctoral researchers were placed within City of Cape Town departments, becoming embedded in the everyday workings of these departments for two years. Scholars were forced to develop responses to real and everyday challenges which city officials faced, while also bringing reflective and rigorous academic tools that the pace and politics of city management seldom allowed.

In this vein, propositional researchers are engaged in different forms of intellectual, political, and emotional labour that involves knowledge co-production through listening, learning, dialogue, writing, speaking, and doing with those “on the ground”. It also requires adopting a further propositional skill set that addresses some of the methodological limitations of ongoing research in the infrastructure space. We turn to these next.

## 4 | FURTHER STEPS TOWARDS A PROPOSITIONAL SKILL SET

In the previous section we suggested that a first step towards a propositional sensibility is to problematise differently while reorienting inquiry towards making a challenging infrastructural situation legible. In this section we push further, outlining a propositional skill set for southern urban infrastructure scholarship that addresses some current methodological shortcomings. Specifically, we look at three aspects: mobilising technical knowledge more effectively; appreciating sectoral and scalar specificity; and addressing the challenges of normativity.<sup>6</sup> Notably, there are other ways that a propositional sensibility might be developed; however, we suggest these as a starting point for building a more robust repertoire.

### 4.1 | Mobilising technical knowledge: Ambivalence, language, and practice

The first area of expansion relates to how southern urban infrastructure scholars engage with technical knowledge and technologies. In order to examine infrastructure propositions advanced by different actors, it is important to engage with technical knowledge and discourses on their own terms. Understanding the technical dimensions of the infrastructure in question—e.g., how water quality is measured, how system flows are monitored, how maintenance is scheduled—is essential to making sense of how it is configured, what the stakes of that configuration are, and what possibilities exist to reconfigure it (Niranjana, 2021). In short, if one is studying “poo” as a site of political activism, and such work also aims to intervene in the ways of doing sanitation in the city, then the propositional scholar must engage with technical knowledge of how the wider sanitation and ecological systems of a city operate—materially, fiscally, institutionally, and politically (McFarlane & Silver, 2017). One of the best examples of this thinking in practice is the work of the Indian Institute for Human Settlements (IIHS) in Bangalore. Here, scholars have worked alongside both local communities and urban practitioners to develop infrastructural interventions in Indian cities, training programmes for practitioners, and financing instruments for south–south collaborative work.

There are important conceptual and pragmatic implications to this approach to technical knowledge. Conceptually, it requires seeing technology as ambivalent, rather than (pre)determined (Feenberg, 1991).<sup>7</sup> For example, South African infrastructure scholars—many of whom have been instrumental in the ongoing reform of the policy landscape for urban development (e.g., Harrison & Todes, 2013)—have shown how the national low-income housing delivery programme, aggressively critiqued and deconstructed within international debates, cannot be reduced to a story of state-driven neoliberalism (e.g., Butcher, 2020; Parnell & Robinson, 2012). They have argued that rich engagement with avenues of refiguration and radical reform requires understanding and intervening in the multi-scalar complexities and intricacies of the state apparatus (from fiscal cycles to supply chain management). Pragmatically, there is no context, particularly in the global south, where intervention into infrastructure systems will be able to circumvent engineers, planners, and accountants. It is vital that the everyday—and very real—concerns of these actors are not trivialised or overlooked.

Concurrently, it is also important to understand the implications of using language which straddles social and technical disciplines. The use of technical terms such as “risk”, “interoperability”, or “calculability” requires attention to how they are used or matter in technical contexts. For example, using the case of sanitation in an informal settlement in Kampala, scholars have suggested that the redundancy built into heterogeneous infrastructure systems makes them seemingly more resilient than large networked systems (Lawhon et al., 2018). While it may be true that heterogeneous systems are resilient for

a range of interesting reasons, there is also redundancy built into most networked systems, from electricity to public transport. While technical terms are not owned by a particular discipline, their robust deployment by social science researchers requires a committed understanding of their technical roots, even if these are being challenged in fundamental ways.

Methodologically, deeper engagement with technology and the technical is, of course, difficult. It requires scholars to invest considerable time and energy into understanding infrastructure and technical discourses. A good example of this methodological investment is the detailed work on risk in the context of Colombian infrastructure by Zeiderman (2012). It may also require learning how to analyse different forms of data, much of which is heavily quantitative or technically obscure. Notably, this is not a suggestion that social science scholars should try to become engineers or economists. Rather, it is to suggest that engaging with these disciplines requires a basic understanding and a willingness to work across methods and data types.

## 4.2 | Sectoral and scalar specificity: Theorising difference across cases

A second important area of expansion of the propositional skill set is to be more attuned to key differences across urban infrastructure sectors, such as water, sanitation, energy, waste, transport, ICT, or health.<sup>8</sup> As we discussed in section 2, it is possible and very fruitful to use sector-based urban infrastructure insights to reflect on wider social processes and complex power-dynamics (e.g., structural inequalities, violence, agency, democracy, or the state) (Datta & Odendaal, 2019). However, when scholars adopt a propositional sensibility in the infrastructure space, cross-sectoral claims are trickier due to sectoral differences. Concepts often deployed to describe southern infrastructure, such as hybridity or incrementalism (as discussed in section 2.1) have very different expressions and implications across different infrastructures. In short, the material, fiscal, financial, and political diversity which exists across infrastructures means that claims made about one infrastructural sector can be extrapolated to theory, but not directly to other infrastructures.

Linked to sector, scale is also vitally important. For each sector, what takes place at the scale of the household, community, the suburb, the city, the region, the national, and even the transnational scale is unique; insights garnered at a particular scale may not easily scale up or down (Cirolia & Scheba, 2019). What is meant by bulk, connections, distribution, production, storage, and the like are also distinctive (with implications for finance, material lock-ins, and institutional arrangements for management, politics, etc.).

These insights are particularly relevant due to southern infrastructure's scholarship focus on the end-user of a specific service (i.e., infrastructure sector) and the community scale. Despite the richness of insight obtained at this micro scale, the experiences and desires articulated by communities or individuals may have little purchase (or in fact be incredibly problematic) at the city scale or in the national context. Likewise, what might be best at a city scale (and indeed what interviews with city officials might suggest is a good approach) often have fundamental contradictions with national imperatives or community benefits. An example of careful scalar consideration in Addis Ababa's decentralised sanitation systems, Cirolia et al. (2021) show that high-tech and compact systems make a lot of sense at the local level where users get to experience a high-quality service which is also "greener" than many local alternatives. However, city officials dislike this technology for solid reasons. Not only does it sit outside of the routine management of the city operations, hollowing out resources from this wider apparatus; there are also many unknown risks associated with relying on technologies which require foreign consultants (and currencies) to maintain them.

Methodologically, this approach requires research that engages with the full process of infrastructure provision and the particularity of each infrastructure system. It takes the infrastructure, and its multi-scalar implications, as a starting point. It situates lived experiences and community demands within wider flows, regulatory frameworks, material fixities, and value chains. This is, of course, difficult work, particularly for those scholars who have been trained to conduct research focused on local communities or who can only engage short stints of fieldwork to collect data in particular geographies. However, acknowledging sectoral and scalar difference is vital for a propositional sensibility.

## 4.3 | Challenges of normativity: Innovative metrics for assessment

A final and fundamental issue for a propositional sensibility relates to the question of normativity. It is common for scholars within the urban infrastructure space either to make implicit normative judgements with reference to abstract principles defined a priori (e.g., justice or democracy) or to avoid making judgements at all. We suggest that propositional scholars cannot afford being anything but explicit about the normative judgements their work both depends on and



makes. Nor can they afford to reject imported normative standards, such as the “modern infrastructure ideal”, without considering what the alternatives might be. As Mulgan (2020) points out in a compelling piece, a range of social benefits are engendered from diversifying imaginaries about plausible and desired futures.

As propositional scholars, significant conceptual and creative work is necessary to articulate the various normativities—moral, ethical, aesthetic, fiscal, political, etc.—that permeate infrastructural imaginaries. A starting point, particularly for those who feel their conceptual apparatus is ill equipped for normative positioning, is to compassionately articulate southern actors’ agonistic, fraught, and contested compromises inherent to advancing propositions for action and change in southern cities. In doing so, the aim is to avoid making one-dimensional assessments of actors’ values, worldviews, or actions in relation to pre-given ideals. Scholars such as Jaglin (2014) and Furlong et al. (2017) have offered possible pathways for how to consider normative issues in the infrastructure space in line with what we suggest here.

Returning to the issue of imaginaries, it is not the job of the researcher to determine what infrastructural futures are more ideal (or desirable) than others. However, it is possible to explore the progress (or regress) being made when southern actors put various normative and imagine propositions on the table. This takes us to the question of assessment, and the possible and diverse metrics tools which we might use to ascertain and discern what sorts of infrastructural configurations and reconfigurations move the needle towards particular urban imaginaries. The development of these criteria, in its widest sense, for things like justice, emancipation, or sustainability cannot be an afterthought in the propositional study of southern urban infrastructure. They are important to make sense of which opportunities are being opened and which are being closed by infrastructure propositions and to assess their potential socio-spatial effects. Assessment requires a situated understanding of the sorts of normativities which make sense in a particular context, made explicit for critique and engagement.

The work of developing these tools cannot be left to the researcher alone. Being a propositional researcher means to partake, with local actors, in the process of defining how we make sense of progress towards (or away from) imagined infrastructural futures. Ultimately, the purpose of adopting propositionality as a research sensibility, as we see it, is to be anticipatory, prefigurative, and unleashing of creative possibilities for dreaming up the impossible.

## 5 | PROPOSITIONALITY: A RESEARCH SENSIBILITY FOR INFRASTRUCTURAL FUTURES

We began this article with the aim of answering calls for engaging directly with the challenging conditions of southern cities and the possibilities for better and more just urban futures. We interpreted this call as a plea for more anticipatory forms of scholarship on southern urban infrastructure; in other words, for adopting propositionality as a research sensibility. We then explored the ways in which southern urban infrastructure debates have made various innovative contributions, conceptually and methodologically, to our understanding of the infrastructural challenges faced by southern cities. These contributions, we argued, also entail limitations that pertain to a dominant mode of problematisation and methodological reductionism. We suggested we could do problematisation differently as a first step to adopting a propositional sensibility. Finally, we identified several ways in which scholars can strengthen their propositional register. We drew attention to the types of labour involved in knowledge production, as well as to the need to better engage with technical knowledge, sectors, scale, and normativity for a diverse understanding of what infrastructure is and what it could be. We do not do this with the intention of “teaching” scholars how to understand infrastructure better, but rather to begin to build a shared vocabulary which expands southern urban scholarship’s engagement with infrastructure propositions on the ground.

Some scholars are bound to feel it is not their job to be propositional, to come up with ideas that provide concrete solutions to infrastructure problems in southern cities. Our aim is not to convince them that they should. Indeed, it is not the job of social scientists to advise on how to build bridges or fix sewerage networks. Nor should scholars be expected to only develop research that is relevant to the communities they work with. However, as Jazeel and McFarlane (2010, p. 110) have alluded to, opposing intellectual freedom to relevance “to those ‘on the ground’” is a false dichotomy, because “[t]ailoring research to different audiences is a crucial part of intellectual work”. Moreover, they continue, “any research project that takes its cue from the challenge to postcolonialise knowledge production”, as southern urban infrastructure scholarship does, “must take seriously the ways in which we speak to/with the different constituencies involved in the transnational research process” (Jazeel & McFarlane, 2010, p. 110). They speak of the importance of exercising responsibility in academic knowledge production as inherently challenging and suggest a practice of “learning differently” that requires us “to experiment, to let go, to try to unlearn habits of thought and practice” and “to think with, talk with, and immerse ourselves in these different ways of knowing” of the communities we work with (Jazeel & McFarlane, 2010,

pp. 120–1). Arguably, their notion of “learning differently” is akin to the different mode of problematisation we place at the root of propositionality. Therefore, we suggest that being propositional is another form of practising responsible knowledge production.<sup>9</sup>

To other scholars, our argument for propositionality may come across as naïve techno/policy-optimism, when southern cities are awash in poverty and despair. We are all too aware that the condition of infrastructure in southern cities is the source of much pessimism. Therefore, scholars may want to reconsider the ways in which they produce knowledge about the urgency of the situation and engage with those addressing it on the ground. Decisions are being made every day about what should (and will) happen, where, and whom to serve. Far too many governments have no economic or technical capacity to implement the more just and sustainable futures that southern scholarship espouses. Instead, decisions are being informed by logics that often respond to the interests of investors, while forgetting the needs of the most deprived communities or the imperatives to address mounting ecological degradation. A failure to infuse these decision-making processes with a diversity of possibilities for action grounded on situated knowledges and practices only helps to perpetuate the status quo. In scrutinising infrastructural propositions, it may be possible to engage various actors in reflecting pragmatically about what is at stake in each challenging infrastructural situation and how best to find complementarities in competing demands amidst scarce resources.

Finally, many scholars may find propositionality strangely oblivious to power dynamics. They will argue that there are real limits to who can partake in propositionality; that power dynamics between researchers and communities are bound to shape interactions and outcomes; that some worldviews and interests are irreconcilable; and so on. We acknowledge these critiques and partake in their doubts. We do not take for granted any part of developing or adopting propositionality as a research sensibility and suggest neither should our readers. Adopting a propositional sensibility is hard work—intellectually, politically, emotionally—and may actually fail. Yet, we find it helpful to conceptualise a mode of scholarship that stays with problems, that is full of care in its practices, and is responsibly engaged in crafting propositions for ways out of the poverty and despair experienced in southern cities. The alternative has been not just inconsequential, but a bit too grim to bear. We call on our colleagues to join us in this provisional, propositional exercise about how we may move into a space that better engages with the people and things we speak for and care about.

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## DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no new data were created or analysed in this study.

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## ENDNOTES

- <sup>1</sup> Arguably, southern scholars (i.e., those who work on southern cities and are based in these cities) have always been asked to ensure their research is applicable to wider societal issues. However, the push to ensure that scholars based in the global north are creating more relevant knowledge on the global south has been amplified in recent years, although not without problems.
- <sup>2</sup> This complexity of arrangements reflects histories of structural adjustment programmes, messy state fragmentation, and different forms of privatisation and corporatisation (see Cirolia, 2020).
- <sup>3</sup> For a postcolonial take on comparative methods in urban studies, see Robinson (2016).
- <sup>4</sup> We encourage colleagues to (re-)read the nuances of Ferguson’s critique on his own terms, as there is more to it than what we can realistically cover here. We also encourage colleagues to (re-)read Foucault himself on the purpose of problematisation (e.g., Foucault, 1984).
- <sup>5</sup> Alongside other works by the late Clive Barnett and Gary Bridge on pragmatism and Dewey’s relevance to geography, see the recent edited volume by Wills and Lake (2020).
- <sup>6</sup> These three aspects are, of course, only a point of departure for debate and engagement, and not a final say on how to improve scholars’ propositional capacity.

- <sup>7</sup> This is a compelling framework that STS scholars have long deployed as a corrective to technicist and depoliticised readings of technological solutions.
- <sup>8</sup> In providing these examples, we make no claims of which infrastructures form part of the urban infrastructure package and which are excluded. As what makes something urban is hotly contested (see the debates within geography regarding planetary urbanism), the idea that a particular piece of technology would be inherently *urban* infrastructure (or an infrastructure at all) is equally up for debate.
- <sup>9</sup> Unfortunately, we have no space here to engage with valid critiques of responsible research, which suggest the possibility that communities may remain silent, refuse, or withdraw from the dialogues we seek to establish (Noxolo et al., 2012).

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