Special issue conclusion: Smart cities between worlding and provincializing

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Worlding and provincialising smart cities: From individual case studies to a global comparative research agenda

Byron Miller
University of Calgary, Canada

Kevin Ward
University of Manchester, UK

Ryan Burns
University of Calgary, Canada

Victoria Fast
University of Calgary, Canada

Anthony Levenda
University of Oklahoma, USA

Abstract
The diversity of smart city case studies presented in this special issue demonstrates the need for provincialised understandings of smart cities that account for cities' worlding strategies. Case studies drawn from North America, South America, Europe, the Middle East and Asia show that 'the smart city' takes very diverse forms, serves very diverse objectives, and is embedded in complex power geometries that vary from city to city. Case studies are a critical strategy for understanding phenomena in context, yet they present their own epistemological and ontological limitations. We argue for a more-than-Global-North smart city research agenda focused on the comparative analysis of smart cities, an agenda that foregrounds the conjunctural geographies of relationships and processes shaping these cities.

Corresponding author:
Byron Miller, Department of Geography, University of Calgary, 2500 University Drive NW, Calgary, AB T2N 1N4, Canada.
Email: bavrmill@ucalgary.ca

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摘要
本期特刊中展示的智慧城市案例研究的多样性表明，需要对智慧城市进行本土化理解，以考虑城市的世界化策略。来自北美、南美、欧洲、中东和亚洲的案例研究表明，“智慧城市”有着非常多样的形式，服务于非常多样的目标，并嵌入到因城市而异的复杂权力结构中。案例研究是在语境中理解现象的重要策略，但它们也存在自身的认识论和本体论局限性。我们主张建立一个不限于全球北方的智慧城市研究议程，重点是智慧城市的比较分析，这样的议程能突出塑造了这些城市的关系和过程的决定性地理因素。

关键词
案例研究、比较分析、认识论、本体论、智慧城市

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> Everyone knows that comparative urbanism is difficult. (Dear, 2005: 247)

> So, to really understand and gain insight from smart city interventions, we need more than the paucity of comparative work upon which much of the smart city narrative currently rests. (Glasmeier and Christopherson, 2015: 8)

Introduction

This is certainly not the first special issue of an academic journal on the ‘smart city’. It is likely it will not be the last. Numbered amongst those academic disciplines with an interest in debates over the intellectual and practical issues associated with the smart city are anthropology, architecture, computer science, economics, engineering, geography, planning, political science and sociology. Additionally, inter-disciplinary disciplines, such as business studies, development studies, environmental studies and, of course, urban studies, are also home to a growing series of empirical, methodological and theoretical contributions. Some of these are more critical than others, even allowing for what constitutes being ‘critical’ varying from one discipline to another. Such has been the growth in the academic work on the ‘smart city’ over the last two decades that there is now a journal entitled, rather literally, *Smart Cities*. This situates itself as ‘an advanced forum for the dissemination of information on the science and technology of smart cities’ (available at: https://www.mdpi.com/journal/smartcities/about).

Drawing upon more critical urban studies work, this conclusion makes the case for a particular approach to comparing smart cities, one that acknowledges their assembled, conjunctural, relational and territorial nature. In the next section we discuss the object of the study in our papers – the smart city – and argue for a decentring of the notion and an appreciation of the various types of work done in the repeated use of the term. The third section turns to discuss the role of the case study in the generation of knowledge and what we can learn from the case studies of this special issue, while in the fourth section we move to discuss epistemological issues of individual case study analysis versus comparative case study analysis. Finally, we end the conclusion by

setting out a potential strategy for future comparative studies of smart cities, in the context of other, related, work that is seeking to generate a more inclusive, open and situated approach to studying cities in an urbanising world.

The object of the case study

Reviewing the case study contributions to this special issue, and in light of the plea from Glasmeier and Christopherson (2015) with which we began this paper, we observe that while all appear to analyse a common object – the emergence, development, refinement and promotion of something called 'smart cities' – there is also much that divides these 'cases' and how they are studied. We would argue that the emergence of an 'informational infrastructure' (McCann, 2008: 885) has encouraged and supported the repeated instances (Jacobs, 2012) of the smart city around the world. This 'nebulous topic' (Glasmeier and Christopherson, 2015: 5) makes definitions difficult, meaning it is hard – and ultimately perhaps unfruitful – to invest too much time in counting the number of 'smart cities' around the world. Indeed, there is an argument to be made that the notion might be best understood as a 'chaotic concept', in which uncritical abstractions 'arbitrarily [divide] the indivisible and/or [lump] together the unrelated and the inessential, thereby "carving up" the object of study with little or no regard for its structure and form' (Sayer, 1992: 138). It might even be said that 'smart city' is an empty signifier – a concept with no specific meaning, on which actors and authors alike impose their own meanings. That has not stopped the term being used on a regular basis by those in consultancy, governmental and think tank sectors. Indeed it might be argued that it is its conceptual ambiguity and promiscuity that has made it so attractive to city policymakers the world over. The infrastructures of circulation, comparison, education, exchange, mediation and translation have emerged incrementally and slowly to allow this policy – in all its variations – to appear and reappear across geographically distant but relationally proximate sites. These infrastructures bring some smart city projects and some bits of some of their strategies closer together, while also pushing some further apart (Amin and Graham, 1997; McCann, 2008; McCann and Ward, 2011). The work done by agencies of different sorts and of varying geographical reach in the form of funding schemes, knowledge banks, podcasts, presentations, online courses, policy directives, reports, study tours and webinars have established the parameterised preconditions for the repeated emergence we see outlined in the special issue papers. Perhaps the best and most high-profile incubator of this emergence is the Smart City Expo that began a decade ago and has been hosted by a range of cities that have used it to situate themselves vis-a-vis others in an emerging map of 'leading' smart cities (available at: http://www.smartcityexpo.com/en/the-event/past-editions).

Yet, within these parameters are important differences. The papers in this special issue reveal differences in approach, design, dynamics, focus, objectives and outcomes. More abstractly, the cases begin to say something about the context-specific prehistories to the emergence of specific 'smart cities' and how they relate to other elements of policy frameworks. In some, the emergence in a particular city marks something different from what has come before while in others they are more combinatory, bringing together and building upon previous examples of the use of information and technology in the built environment and, more generally, of 'urban technological utopias' (Glasmeier and Christopherson, 2015: 5). In yet others, 'smart city'-labelled initiatives are purposed with creating something almost

entirely new, unhinged from grounding in historical and forms of localised urban development. This is particularly the case in green-field examples (Shelton et al., 2015) whether in cities of the Global North or Global South. Although even in these examples there is sometimes something that predates their emergence (Carvalho, 2015; Cugurullo, 2016): a lingering presence of past experiments and initiatives, for example. This might be something those who wield power may wish to see suppressed or erased, or amplified or celebrated.

Taken together, the places that are the empirical focus of this special issue – Annapolis Valley (Canada), Barcelona (Catalunya, Spain), Cape Town (South Africa), Chinese cities (generally), Dubai (United Arab Emirates), Iqaluit (Canada), Manila/New Clark City (Philippines), Medellín (Colombia), Nairobi (Kenya), Rio de Janeiro (Brazil), Santiago (Chile) and Taipei (Taiwan) – reveal the topographical and topological path-dependency, contingency and variegated outcomes of specific types of 'smart cities'. Smart city trajectories develop through the power-laden articulation of diverse processes constituted through territory, place, scale and networks (Jessop et al., 2008; Miller and Ponto, 2016).

In taking stock of the range of ways in which various relationships of differing geographical reach combine and contrast in conjunctural ways, we aim to decentre accounts of 'smart cities' that dominate the existing literature. And, as in the case of urban studies more generally, a more cosmopolitan set of case studies is about more than addition, however (Roy, 2009). They require confronting the taken-for-granted ontological and epistemological assumptions that underpin the (to-date) mostly Global North-centric foundations of the smart city literature, and all that goes with it. Ontological assumptions – what we take to exist – and epistemological assumptions – how we approach the construction of knowledge – underlie all research of course and case studies are no exception. While these assumptions are rarely explicitly stated they are nonetheless always present.

Conceptions of smart cities emerging out of the Global North usually make certain assumptions of processes and goals central to smart city formation: the driving role of technology; goals centred on improved efficiency; an optimal solution for every urban problem; information gathered for use by managerial decision-makers; managerial decision-makers kept in check through institutions of democratic governance, responsible to citizens; systems operate through and for formal institutions; key relevant institutions are municipal; and so on … These assumptions may be, for the most part, reasonable starting points for studies of Global North smart city initiatives. They may be considerably less reasonable when considering other locations around the world. To take an obvious example, cities of the Global South are often characterised by the prevalence of informal relationships – informal housing, informal services, informal mobility, and more. Or consider institutions of governance and the variety of characteristics they may exhibit, from democratic to authoritarian. Or the diversity of state structures and scalar relationships, which may produce cities with high degrees of capacity and autonomy, or cities that are primarily responsible for implementing central state directives. Definitions of citizenship, and the capacity of citizens to act, also show tremendous diversity around the world. How well do the smart city conceptions from the Global North work in other regions of the world, where the conditions and processes that are assumed to be dominant may not exist or, if they do, operate in highly variegated form? In most regards, not well (Datta, 2018; Leitner and Sheppard, 2016; Roy, 2009).

And here is where questions of ontology and epistemology intersect, for how we come to identify which relationships and processes exist has a great deal to do with how we construct knowledge about the world. A dual manoeuvre is required, one that leads us to rethink our ontological assumptions through a rethinking of our epistemology. And while we might reconsider many aspects of how we construct knowledge, one fundamental aspect of epistemology is crucial: the places we choose to study. There is increasingly widespread recognition across urban studies that we must move beyond the limited sites of the Global North where theoretical production currently occurs and the 'failure of imagination and epistemology … is thus engendered' (Roy, 2009: 820). New approaches to the construction of knowledge that do not assume universal process geographies but instead 'provincialise' the production of urban theory are needed (Leitner and Sheppard, 2016).

Case studies distributed across a diversity of sites are critical if we are to decentre knowledge construction and recognise the diversity of possible relationships and processes around the world. The case studies of this special issue represent an important step in provincialising our understanding of smart city dynamics, while simultaneously recognising the worlding strategies and relational positioning of such projects. Our aim in the following section is not to identify the specific ontological and epistemological assumptions upon which each of the case studies rests; suffice it to say that all contributing authors have taken great care to interrogate their cases through frameworks that are sensitive to the dynamics of their sites. But we must also keep in mind that, as with all frameworks, certain forms of knowledge construction are enabled, while others lie outside the frame.

The role of the case study: Taking stock of smart city cases

Case studies provide an in-depth understanding of how phenomena develop in particular places and aid in identifying processes and lines of inquiry that may be fruitful to explore in other places. They do not typically assume that the processes that shape phenomena in a particular place are universal, however. Indeed, characteristics that distinguish most case study analysis include an emphasis on the contingency of relationships, the importance of context, and the situatedness of knowledge and practice (Flyvbjerg, 2006; Orum, 2015; Ragin, 2015; Yin, 2015). Implied in case study research is a core commitment to understanding processes as they evolve in context, and scepticism towards one-size-fits-all explanatory models.

The diverse case studies of this special issue illustrate just such a commitment. Very few of the case studies focus on the iconic cities of the smart city literature, with the possible exceptions of Barcelona and Dubai, and even those cities are noteworthy for their deviation from the prototypical smart city model, narrowly focused on the deployment of technology to achieve efficiency gains, although this is also present in both examples. So, there is more variation than is often acknowledged even within some of the much-cited models. The cases examined (Table 1) illustrate tremendous diversity, running the full gamut from emancipatory projects aimed at empowering citizens in the affairs of democratic municipal government (Barcelona), and empowering civil society organisations through enhanced communication capacity, to protect their rights and improve their living conditions (Cape Town, Nairobi), to examples of smart programmes deployed by central governments to survey

Table 1. Smart cities between worlding and provincialising: summary of articles.

Authors	Cities/settlements	Digital technology and infrastructure	Key institutions and actors	Governance implications	Subject making and public making	Key dimensions of worlding and provincialising
Breslow (2020)	Dubai	Surveillance cameras; Smartphone apps; RFID biometric cards	UAE central govt; Dubai city planning	Containment of informality; control through surveillance	Totalising neoliberal subjectivity	Totalising neoliberal governance to attract global capital; near total elimination of traditional local informal social relations
Chang et al. (2020)	Taipei	Free platform to facilitate cooperation of govt and tech industry	Taipei city govt and new regime	Veil of political neutrality for growth agenda	Targeting of a younger cohort	Using language of smart as means to attract global capital; using smart agenda to negotiate local priorities
Charnock et al. (2019)	Barcelona	ICT, Habitat Urban city department, 22@ innovation district	Barcelona city govt and civil society	Transformation from corporate to citizen focus	Empowered citizens, right to the smart city	Corporate dominated top-down smart prototype repurposed by new citizen-focused municipal govt
Curran and Smart (2020)	Chinese cities	City Brain global platform, facial recognition, social credit system	Chinese central govt; city govts	Algorithmic data-driven governance	Risk classes as fundamental social order, ranking	Chinese monitoring and programming of social, political and economic life distinguishes it from Global North; exporting its model
Irazábal and Jirón (2020)	Rio de Janeiro, Santiago de Chile, Medellín	ICT; Rio: IBM-based operations centre; health platform	Tech corps, city govts, universities	Efficiency focus, benefits distributed unevenly	Range from inclusive to elite publics	Programmes driven by global tech corps; programmes unevenly overlaid on pre-existing Global South cities
Jirón et al. (2020)	Santiago de Chile	Paseo Bandera SC: bike sharing, security cameras, smart lights	City govt, fed govt, tech corps	Fiction of urban progress: placebo	Continuation of neoliberal urban model	Smart agenda seeks to change perceptions through world-class city narrative; knowledge not situated
Mouton (2020)	Manila; New Clark City	New Clark City zone as smart infrastructure – exception to Manila	Fed govt, city govt, developers	Widening inequalities in infrastructure	Creation of foreign investor and elite enclave	Smart agenda as marketing strategy to attract global capital; continuing underdevelopment and splintering

(continued)

Table 1. Continued

Authors	Cities/settlements	Digital technology and infrastructure	Key institutions and actors	Governance implications	Subject making and public making	Key dimensions of worlding and provincialising
Odendaal (2020)	Cape Town; Nairobi	Digital mapping, publications, new relations of people and tech	Civil society MapKibera ReclaimCity	Empowerment of civil society organisations	Tech mediated and augmented social interaction	Local civil society organisations use online digital documentation to improve local living conditions
Spicer et al. (2019)	Annapolis Valley, Iqaluit	ICT, govt service apps, smart and open govt, smart mobility	Local, provincial and fed govt	Improved collaboration and development	Better connected and served remote regions	Improved connection to the rest of Canada and the world and improved local opportunities and services

and algorithmically govern everyday life in the interest of minimising risk (Chinese cities) or eliminating informal economic activity and creating a pervasive neoliberal subjectivity (Dubai). Between these seemingly utopian and dystopian extremes exists a host of other smart city projects. Perhaps most commonly, the smart city is being harnessed as part of wider economic development agendas, albeit with significant variations in form and function. In the case of Taipei for example, smart city discourses become a means to negotiate local political priorities by cloaking sensitive issues in the ostensibly value-neutral language of technology, in the context of a progressively democratising society that nonetheless seeks to steer clear of overt conflict. In Manila, a new smart infrastructure district – New Clark City – is being developed to create conditions conducive to attracting foreign investment, all the while leaving the rest of Manila with substandard infrastructure. The result is a further splintering of the urban fabric and an exacerbation of inequality across the metropolitan region (Graham and Marvin, 2001). In the Annapolis Valley and Iqaluit, two communities in remote rural regions of Canada, smart agendas garner considerable support for their potential to facilitate collaboration, create economic opportunities and improve connections to the rest of Canada and the world. Here the worlding element of smart city strategies takes a particularly territorial form, an agenda built upon overcoming physical remoteness through the returns promised by new technologies. In the South American case studies – Rio de Janeiro, Santiago de Chile and Medellín – the problematic nature of overlaying smart city programmes on already-existing cities is vividly demonstrated. In some cases smart programmes bring substantial benefits to those who can access them; in others smart city programmes are nothing more than 'placebo

urban interventions' – highly visible initiatives that give the appearance of significant action but fail to address the most pressing urban problems on which limited government resources should be, but are not, expended. In many of the case studies, smart city programmes are not what they are marketed as but rather serve as 'Trojan horses' for pursuing other more conventional – and otherwise more controversial – agendas.

These cases demonstrate not only that the smart city exhibits great variegation, but that it must always be understood in context. Indeed, it is impossible to understand how and why these particular cases have played out the way they have without understanding their historical and geographical constitution and those processes present and absent. The very meaning of the term 'smart' can only be understood contextually (Chandler, 2020; McGuire, 2018; Sterling, 2018). In some cases, what is presumed to make an initiative 'smart' lies in the technology itself – for instance in the use of ICT, surveillance cameras, RFID (radio-frequency identification) biometric cards, smartphones, big data processing operation centres, and more – and the capacity it creates for instrumental manipulation, with little regard for the role or agency of citizens. In other cases, 'smart' represents a branding of new socio-technical relationships in which social capacity, flows of information and communication are acknowledged as altered, presumably for the better but perhaps not. And in still other cases 'smart' lies first and foremost in the increased capacity of citizens to communicate, coordinate and meet social needs, evidence that not always does the technology tail wag the social dog.

Relevant agencies and institutions also vary widely across cases. The smart city is usually conceived as the domain of municipal governments but in most cases a multiplicity of other actors come into play for reasons relating to the scalar structure of the state, governance frameworks ranging from the democratic-participatory to the authoritarian, the role of specific interest groups and the regimes they form, and the strength of civil society institutions. Central governments, provincial governments, municipal governments, business lobbies, technology firms, universities, and civil society organisations and social movements, depending upon circumstances, may all have a hand in shaping smart city agendas and outcomes.

This diversity of actors, institutions, structured power relations, local economic circumstances and social inequalities forms the petri dish from which 'smart' emerges. Diverse articulating relationships mean that in a fundamental sense, all smart city formation must be considered provincial. There is no one-size-fits-all model of the smart city, marketing narratives notwithstanding.

But at the same time, no city exists in isolation. Flows of information, capital, resources and people bring the distant world near, and literally into, the city. The city and the policies that shape and structure its future are always being made and remade through its relationships with the world (McCann and Ward, 2011; Roy and Ong, 2011). Not surprisingly, urban politics and policies are struck with an eye towards these relationships. In virtually all of the case studies considered here – Cape Town and Nairobi being the sole exceptions – urban actors have shaped smart city policy, at least in part, with reference to the world beyond the bounded city. In some cases the key external reference has been the central state (Dubai and Chinese cities), in others flows of foreign investment capital (Manila/New Clark City, Taipei, Dubai), in others the international reputation of the city (Rio de Janeiro, Santiago de Chile, Manila/New Clark City, Taipei, Barcelona), and in still others simply a need to connect to more extensive networks (Annapolis Valley and Iqaluit). The multitude of characteristics

cities may exhibit is strongly related to the multitude of relationships they build around the world. The diverse worlding strategies of cities are simultaneously a component of their provincial qualities: there is no contradiction between worlding and provincialising (McCann et al., 2013).

From individual case study analysis to comparative case study analysis: Epistemological issues

The case studies in this special issue convincingly illustrate the contingency of relationships, the importance of context, and the situatedness of knowledge and practice. Perhaps the highest-level conclusion we can draw from them is that 'smart cities' exhibit great variation around the world and that, therefore, smart city research must be provincialised. By this we mean not only that research must be designed to capture the nuances and dynamics of specific contexts and relationships, rather than reducing specific cities' smart initiatives to decontextualised data points, but that we must also entertain the possibility that processes and dynamics present in one city may not be present in another. In other words, we must acknowledge and respect the fact that forms of social, political, economic and cultural organisation are themselves geographically differentiated.

This proposition, however, raises a thorny question: how do we account for, and understand, smart city differences? Do the *empirical* differences we observe across individual cases always indicate *processes* that are unique to those specific cities and societies? Or are there ways to account for diverse empirical outcomes that *do not necessarily* rely on the notion that each city, or society, or world region is characterised by processes exclusive to it? In other words, might common processes lead to variegated empirical outcomes? Might some processes extend across multiple sites, while others do not? And, given complex process geographies, how do processes articulate and what are the geographies of articulation? These are questions that are difficult to answer through individual case studies.

Individual case study analysis can pose its own epistemological challenges by portraying processes and empirical outcomes as place-specific and idiosyncratic. After all, a case study typically focuses on a *particular* case; that researchers might look to explain case study findings in terms exclusive to that case is a risk of the method. Castree (2005) calls attention to this problem, situating it within the history of philosophical debates in geography around nomothetic versus ideographic knowledge. Nomothetic knowledge, he summarises, 'presumes an ontological regularity in both pattern and process between otherwise different contexts', while 'an ideographic worldview accents the contingent and enduring differences that make "context" no mere "modifier" of ostensibly general processes' (p. 541). This conflict over knowledge of the processes that shape our world has been with us at least since the Hartshorne-Schaefer debate of the 1950s, which pitted geography's older descriptive regionalising practices against an emerging positivist, law-seeking and systems-oriented discipline. Yet it is important to remember that while this debate counter-posed a regionally grounded empiricism (and exceptionalism) to a systemic-universalist positivism, these very different philosophical positions nonetheless shared important commonalities: an ontological atomism (objects exist unto themselves, rather than being constituted through relations), and an epistemological empiricism that rules unobservable relationships out of bounds. These commonalities meant that knowledge was to be formed based on what could be observed,

and where it could be observed. The notion that processes and forces beyond the sites of observation – relationships over time and space – could play a significant role in producing what was observed was largely absent from both positions.

While contemporary case study research typically does not share philosophical commitments to atomism or empiricism, it nonetheless leaves unresolved questions of how we might deal with processes extending beyond the boundaries of the case. In a widely cited article on case study research, Flyvbjerg (2006) addresses the question of whether generalisation through case studies is possible. While he acknowledges that under some circumstances – the so-called 'critical cases' – broadly generalisable knowledge can be developed, he provides no clear justification or basis for this. In contrast, his central argument centres on the assertion that 'in the study of human affairs, there appears to exist only context-dependent knowledge' which, for him, 'rules out the possibility of epistemic theoretical construction' (p. 221). Flyvbjerg's extreme anti-theoretical position, combined with his silence on the construction of case boundaries and the implications of processes extending beyond those boundaries, echoes the ideographic stance towards knowledge construction.

Orum (2015), in a largely compatible essay, lays out three common logics of case study research in which the 'contents and boundaries of a particular case study' (1) are determined at the outset. The 'Typical Case' is taken 'as typical [representative] of the larger population to which [the researcher] hope[s] to generalise'. The 'Prototypical Case' 'represents a case that is not merely the average or typical instance of a phenomenon but is one that … furnishes a model of how a particular phenomenon might develop in the future in a range of cases whose character is similar to that of the prototypical case' (2). And the 'Deviant Case' is taken as special, its analysis 'proceed[ing] on the assumption that its unique qualities will help to shed light on a broader set of cases and instances in the population' (3). All three of these case study logics echo the debate around nomothetic versus ideographic knowledge – the long-standing tension over the construction of broadly generalisable knowledge versus the particular and unique – based on knowledge developed within the bounded case. In all three case study logics the central epistemological question is the extent to which the case is representative of the 'larger population', and to what extent the findings of the case are generalisable beyond the boundaries of the case. Indeed, both Orum and Flyvbjerg leave us with questions of (1) how – on what basis – we might generalise, and (2) how we might think about processes that extend beyond the boundaries of the case, that is, what is the geography of 'context'?

Interestingly, an earlier classic article by Mitchell (1983) on 'Case and Situation Analysis' sheds substantial light on these questions. Mitchell's central concerns are with the notion of generalisation, how to think about context, and how we might make inferences from case studies. Mitchell builds from a recounting of Eckstein's (1975) classification scheme for case studies including configurative-ideographic studies (largely descriptive, stressing the unique), disciplined-configurative studies (seeking to interpret patterns in theoretical terms), heuristic studies (chosen to develop theory), plausibility probes (used to test theoretical interpretations), and crucial case studies (chosen to enable the rejection of theoretical propositions, similar to crucial experiments in the natural sciences). This scheme recognises a range of epistemological objectives in case study research, without making claims for one preferred approach to case study design and purpose. What is especially

compelling in Mitchell's account, however, is his explanation of how we are able to make inferences ('generalise') from case studies, rooted in a *relational and process-oriented* approach to social inquiry. This chimes with much of the contemporary work in urban studies.

One of the most common critiques of case study research is that cases are not representative, in the sense of an unbiased sampling of society, therefore making it impossible to generalise from them. While case study researchers often counter with the claim that one can indeed generalise from case studies, this usually rests on how 'typical' the case is without delving into what it means, both ontologically and epistemologically, to 'generalise'. That a case might be considered 'typical' or 'representative' is a concept grounded in positivist epistemology, where the validity of our knowledge depends on it being empirically representative and replicable (Sayer, 1992).

The notion of empirical typicality or representativeness becomes particularly problematic when prototypical cases are identified in one region of the world, for example, the 'Global North', and then knowledge derived from them is transposed to another, for example, the 'Global South', where relationships and processes may differ substantially. Moreover, this is often not a neutral transposing. Rather, it has disciplining and potentially damaging consequences for cases (Roy, 2009). Mitchell's position, however, is decidedly post-positivist. He draws a crucial distinction between statistical inference (based on empirical regularity) and logical inference (based on the plausibility or 'logicality' of the relationships amongst characteristics), expressing a clear preference for knowledge rooted in the latter. In other words, generalisation need not be understood at the level of empirics, and the extension of knowledge from one context to another does not necessarily imply the replication of empirical patterns. Indeed, our central concern should not be whether a case is empirically typical or unique – after all, every city is empirically unique in some, if not most, senses. Our central concern should be, rather, with whether relationships and processes are shared across cases and contexts.

Comparative analysis can be a means of examining the geographies of relationships and processes, tracing those that may be more extensive, those that may be more localised and those that result from complex articulations. It allows us to move beyond the focus on processes present in individual case studies to consider processes and relationships shared amongst cases, ways in which shared processes and relationships may manifest in different ways in different contexts, and instances in which processes and relationships may actually be place-specific. It can also shed light on the conditions and processes that give rise to a range of smart city formations, from the utopian to the dystopian, and the ways in which elements of both extremes combine. Based on what we have learned from the case studies of this special issue, we begin to sketch out a research agenda for a more consciously comparative global analysis of smart cities, an agenda that may inform the comparative analysis of other phenomena as well.

Modes and strategies of comparison

What does it mean to imagine or think 'comparatively' about smart cities? While it has been argued that during the 1990s 'comparative methodologies largely disappeared from view' (Nijman, 2007: 1), the last 15 years have seen a growth in work in this vein to the point that a decade ago McFarlane (2010) argued we 'may, indeed, be witnessing the beginning of an upsurge in comparative urban research that is global in its scope' (p.

730). The 2010s could reasonably be argued to have delivered such an 'upsurge' (Hart, 2018; Krehl and Weck, 2020; Lees, 2012; McFarlane and Robinson, 2012; Peck, 2015; Pierre, 2014; Robinson, 2016; Tuvikene, 2016; Wolff and Haase, 2020). Of course, there is a reasonably long intellectual history to comparing cities, where much of urban studies 'divided … different kinds of cities as developed or undeveloped' (Robinson, 2006: 41).

Walton's (1973) 'standardised case comparison' lay behind much of the earliest comparative urban studies. In this approach the selection of the cases was based on the findings and results of previous studies. Whole cities were chosen on the basis of what was already known about them. So cities needed to be rendered knowable before they were considered comparable. Data on cities needed to be collected, analysed, and rendered accessible and publishable in a form that created the pre-conditions for comparison. Where this revealed certain shared features or similarities then cases – the cities in question – were deemed appropriate for comparison.

Of course, as Robinson (2006), Roy (2009), Watson (2009) and many others have argued, this strategy had the effect of limiting those cities that were compared. It tended to stifle the comparative imagination, as only cities that were understood to be known, knowable and similar tended to be compared. While this generated a series of useful and fruitful insights, there were a number of cities that for the most part were 'off the map' (Robinson, 2002). In particular, the experiences of a large and growing number of cities failed to register in the comparative studies of cities (Abu-Lughod, 1975). Where cities from elsewhere were selected as cases, they were often compared against more known cities that were deemed the norm, rendering the less-known cities as 'abnormal', 'backward' or 'under-developed'. This was often both intellectually and politically debilitating.

Tilly's (1984) subsequent four-fold typology of comparative strategies – 'individualising', 'universalising', 'variation-finding' and 'encompassing' – injected a more nuanced reasoning into the selection of cases (Brenner, 2003). However, notions of 'similarity' remained present in the formulation, as did the emphasis on empirical patterns and regularities.

Implicit in a relational mode of comparison, in contrast, is a manoeuvre that acknowledges the reconfiguring of what is understood as 'the urban'. That is holding onto cities as bounded territorial expressions while also understanding contemporary cities as 'multiplex', comprised of elements of relationships that stretch far beyond their boundaries (Amin and Graham, 1997: 418), understanding the city as 'a set of spaces where diverse ranges of relational webs coalesce, interconnect and fragment'. This notion of 'horizontal' or 'distended' relationships (Peck and Theodore, 2012) must be complemented with consideration of 'vertical' relationships – scalar relationships of the state and other institutions that are co-implicated in the production and characteristics of networks (Leitner and Miller, 2007; Ward, 2010). This approach to theorising the urban holds in productive tension the inter-relationship between relational and territorial geographies in a way that is generative (Jessop et al., 2008) and that recognises that relationships are not given but are dynamic achievements that can be made and unmade (Miller, 2013; Miller and Ponto, 2016). It produces an understanding of the city that acknowledges that 'all contemporary expressions of territory … are, to varying degrees, punctuated by and orchestrated through a myriad of trans-territorial networks and relational webs of connectivity' (MacLeod and Jones, 2007: 1186).

Over 30 years ago Cox and Mair (1989) provided a nuanced example of the conceptualisation of context that might be of use in thinking through the emergence of smart city programmes in a growing number of cities around the world today. They argued that one can think about context in terms of processes specific to a place or territory that can be conceptually isolated and that context is necessarily multi-scalar, not reducible to processes within a bounded territory. The local is not the only scale at which multiple enduring and contingent phenomena come together – we might also think through the national and the global as 'context' under certain conditions. This notion of extensive processes running through cities has implications for comparative urban studies.

As Jacobs (2012) has so eloquently written regarding the previous era of comparative urban studies, the selection of cases 'from above' (p. 905):

> has been put to work in a model of sampling that, by dint of there being more than one case, the scientist is able to understand something more singular in character: a unitary cause, a common trajectory, and a shared logic. This singularity is often built around the qualities of commonality between the cases, what is referred to as the *tertium comparationis* or the 'third part' of comparison. The comparative method's third part often goes under the name 'pattern,' and sometimes pattern can be taken as evidence for understanding connection and even causality.

That conventional comparative methods are not able to fully articulate, and to be open to, a world of cities has been already convincingly and persuasively made (McFarlane, 2010; Robinson, 2006, 2011; Roy, 2009). We argue that another manoeuvre is also necessary. In the context of the trends in 'smart cities' a more imaginative and perhaps cosmopolitan comparison of cities would not be one 'from above' as has traditionally been the way. Rather it would be one based on a significant revising of the ontological basis of comparison. Here we are thinking of fragmentation and splintering as the sorts of activities and practices associated with the smart city as a mode of development articulating with other, more traditional, modes.

Instead of thinking 'from above' about 'smart cities,' comparative analysis in the 21st century might require comparisons *from below* and *through*. *From below* in the sense of being open to the diversity and the multiplicity of either specific elements or whole cities against which other cities, or bits of them, compare themselves. This involves uncovering the processes and practices in and through which certain cities or bits thereof are brought forward as places against which other cities should benchmark themselves, sometimes quite literally. And this, of course, means that some cities or bits thereof are pushed back. Implicit in this mode of comparison is a set of power geometries in which some cities are situated as places from which others should learn through comparison – Barcelona and San Francisco, for example – while others are located as those for which comparison should involve seeking to learn, and often emulate, others. Here we are to understand learning in its broadest sense, as a diverse and internally heterogeneous field in which a variety of policy expertise, knowledge and understanding is manifest fully and partly formed, complete and incomplete (McFarlane, 2011).

Through in the sense of being open to the diversity and the multiplicity of ways – the actual practices – in and through which comparison occurs involving a variety of sites and spaces. This means uncovering the comparative infrastructure comprising the circulations, connections, networks, webs and structures which shape how smart cities are

imagined and planned, financed and governed and the diversity of urban contexts – current, past and in the future – upon which those making urban policy draw. This is particularly important given that the future is being made now, pre-figured, through the sort of smart city projects introduced and discussed in this special issue.

This multiplex conjunctural understanding (Hart, 2018; Leitner and Sheppard, 2020; Sheppard et al., 2020) and what it means to think through 'comparison from below and through' matters methodologically. Specifically, it involves considering how to *trace* and *re-trace* people, policies and even places, focusing not only on relationships but also on the contexts that enable the formation of those relationships. That is, to go back over and revisit the ways in which these different elements of comparison are enabled and enacted, as both 'after effects (patterns of repetition) *and* as situated and contingent processes and practices' (Jacobs, 2012: 911, emphasis added). The emphasis on the ways in which smart cities compare themselves and the means through which they seek to compare and learn from one another requires an understanding of the activities and broader contexts of those involved. In addition to tracing and re-tracing the work of actors and policies in the work done in the comparing of smart cities, we can also identify how places, institutions and associated meanings have figured in the circulations and connections that shape cities. Of course this is not literal movement but, rather, the figurative uprooting and making-mobile of certain smart cities, and bits thereof, in relation to particular policies-cum-models. Leading examples include Amsterdam, Barcelona and San Francisco (Bakici et al., 2013; March and Ribera-Fumaz, 2016; Yigitcanlar et al., 2019).

There are numerous ways in which smart cities in all their complexity are reduced to a particularly one-dimensional 'model' that is then rendered mobile by the work of various actors. Here we can think of the examples of certain cities' approaches to being something called 'smart', maybe New York, or Seoul. These are stylised, packaged understandings of complex 'local' approaches to urban planning, design and redevelopment, where the partial is invoked on behalf of the whole. This is reflective of the issue of generalisation that courses through what Amin and Graham (1997) term 'the new urbanism', and specifically, of synecdoche (Beauregard, 2003; Brenner, 2003; Dear, 2003). This involves 'the danger of overemphasising particular spaces, senses of time and partial representations within the city' (Amin and Graham, 1997: 416).

Compared with what?

In this penultimate section we begin to outline a set of guiding principles for the comparing of cases of smart cities. Drawing upon an extensive and growing set of contributions on comparative urbanism in general, and the comparing of smart cities specifically, our work takes its intellectual cue from Massey's (1991, 2005) foundational notion of a global sense of place. We pivot between seeing and stating sameness on the one hand and seeing and stating singularity on the other. Through a critical conjunctural approach we argue that rarely are smart cities actualised as coherently and as completely as envisaged by those who design, finance and plan them, in large measure because smart city programmes are always bound up with bits of other projects, processes and agendas. This challenging and decentring of coherence and determinacy allows for the acknowledgement of difference within repetition as common processes produce diverse outcomes. For example, a number of the cases in this special issue reveal the topological and topographical struggles over notions of community,

inclusion, justice and subjectivity within the process of smart city making in ways that echo the earlier work of Massey.

For us, a framework that attends to the assembled, conjunctural and relational constitution of a territorially expressed 'smart city' could usefully be conceived with the following five ideas in mind:

(1) All such policy emerges and is made up out of particular time-space 'sites', understood conjuncturally and relationally. Attempts to arrive at territorial outcomes are constituted through the absences and presences of connections and relationship.
(2) The 'repeated instances' of certain policies are only partially revealing of how and where these have emerged and were made. As Jacobs (2012) argues, '[i]n repetition, there is always differentiation and innovation that emerges from inside the repeated instance and gives rise to the effect of repetition' (p. 908).
(3) 'Common' frameworks need to be attuned to whose commonalities are being universalised, and out of where, and when 'common' elements have appeared. The incorporation of multiple and diversely situated perspectives is critically important in the process of comparative framework formulation. 'Global South' and 'Global North' frameworks, for example, should both be incorporated in any global project, recognising the diversity of processes found not only across world regions but also contained within them. 'Common' frameworks, accordingly, must eschew essentialism and be attentive both to the presence of specific processes and phenomena and to their absence, considering why they may be present or absent. We would argue that this demands sensitivity to particulars as well as to the universals that are often front and centre in comparative urban studies.
(4) Attention should be paid not only to the processes at play, but to their specific conjunctures. Relationships may form in ways that lead to variegated social and material manifestations, shaped by a host of historical precedents and relations, that themselves draw from 'outside' as well as 'inside'.
(5) Formal equivalence is of limited use in comparing 'smart cities'. A more fruitful way forward is through the use of 'functional equivalence' where the focus is less on what something is called and more on the connections, processes, relationships and spatialities that demand comparison. Meaning itself is formed in place, shaped through diverse relationships.

Conclusion

The final paper in this special issue builds upon and moves beyond the contributions of each individual paper. While these are numerous, around notions of citizenship, economic development governance, infrastructure, empowerment and subjectivity, for example, the focus here has been to reflect upon some of the wider epistemological and ontological issues that emerge across the papers. For one of the many so-called 'turns' in urban studies over the last decade or so has been that involving the re-emergence of the explicitly comparative study of cities. This takes its leave from earlier work in the field, most notably that undertaken in the late 1970s and 1980s but which had, by the 1990s, begun to taper off. However, this return to comparison (McFarlane, 2011; Robinson, 2011; Ward, 2008, 2010) has occurred in a manner that reflects several wider contemporary currents in human

geography. Most obviously this centres on an attention to the relational nature of space and a sensitivity to geographies of knowledge production and the aspiring to a more-than-Global-North urban studies. Rather than focusing on territorially defined case studies, tracing the geographies of relationships and processes across cases, attending to the broader contexts that enable such relationships and processes to come into being, and examining relational conjunctures and their implications will be critical. Empirical manifestations of relationships and processes will always be unique but our focus should be on understanding the nature of relationships. Only once we have done that can we begin to change them for the better.

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ORCID iDs

Byron Miller https://orcid.org/0000-0001-7310-2962
Kevin Ward https://orcid.org/0000-0002-3810-0889
Ryan Burns https://orcid.org/0000-0001-5025-4947
Victoria Fast https://orcid.org/0000-0002-7093-3864
Anthony Levenda https://orcid.org/0000-0002-3325-8804

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