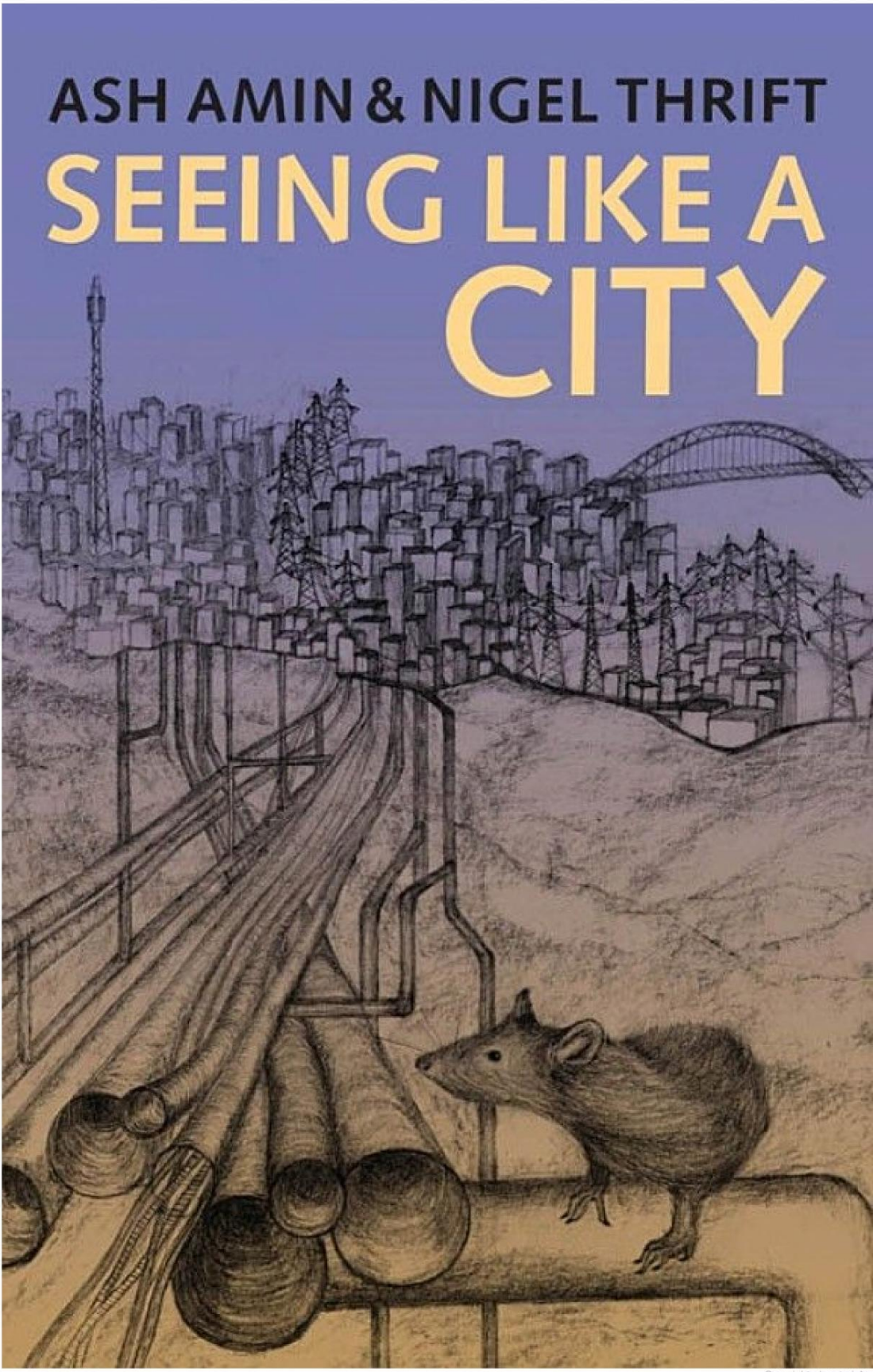
ASH AMIN & NIGEL THRIFT

SEEING LIKE A CITY



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Seeing Like a City

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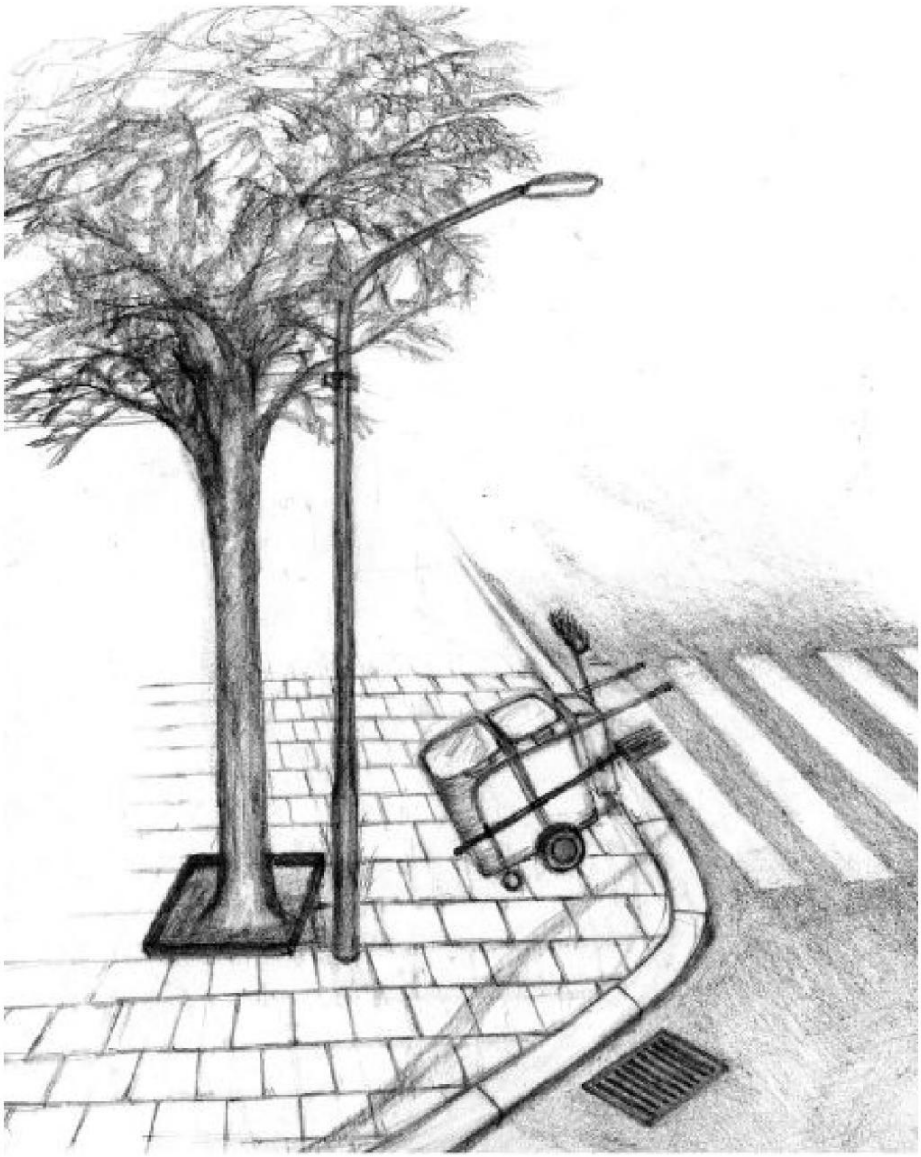
Prologue

> I want you to help me to find out what happened to us.
>
> Ballantyne, 2013, p. 15



Corner

It takes satellite images and maps of flows to convey a sense of the world significance of cities. They light up and map out

the densities of settlement, the traffic of inter-urban flow, and the dependencies of hinterlands near and far on cities. Meanwhile, less graphic scholarship reveals that a small number of urban titans now drive world economic prosperity and creativity, that their elites possess formidable national and transnational power, that states and militias increasingly target cities for geopolitical advantage, that human behaviour is shaped in the habits of metropolitan dwelling, and that the history of the Anthropocene is predominantly the history of urbanization. This research and scholarship presents cities as forcing houses: centres of creativity, competitive advantage and human fulfilment (Glaeser, 2011), as sites of democracy or revolution rekindled (Harvey, 2012; Merrifield, 2013; Douzinas, 2013), and as 'worldling' sites that set a standard (Roy, 2014). It finds the urban everywhere, the tentacles of cities sustaining a new era of 'planetary urbanization' (Brenner, 2014) and inter-urban networks and alliances driving global geopolitics and political economy (Taylor, 2013).

This book locates itself in this same genre of writing. But it is also a reconsideration to compensate for a tendency in this genre to erase the territorial in its keenness to emphasize urban globality, or to reduce the new urban centrality to foundational forces such as capital accumulation (Brenner, 2014; Brenner and Schmid, 2015), or the spatial agglomeration of firms, skills and institutions (Storper, 2013; Scott and Storper, 2015; Storper and Scott, 2016). Instead, as a counterweight, the book looks to the agency of another kind of urban assemblage – the effects of things massed together that furnish the world through closely jaxtaposed or interwoven concentrations of humans, technologies and infrastructures providing much of the push. Our argument is that more than just spatial concentration is involved. It is the coming together of overlapping sociotechnical systems that gives cities their world-making power.

Our aim is to get to the 'citiness' of cities; admittedly, a concept as elusive as the 'humanness' of humans, with many possible configurations and arrangements. Cities are spatial radiations that gather worlds of atoms, atmospheres, symbols, bodies, buildings, plants, animals, technologies,

infrastructures, and institutions, each with its own mixes, moorings and motilities, each with its own means of trading living, and dying. What form of distillation is possible without violating the character of cities as 'pluriverses', to borrow William James's (1977) phrase? It certainly cannot be one that reduces these pluriverses to systemic imperatives or spatial essences.

Instead, the distillation has to get close to the combinational machinery itself, for example, the summative force of many entities, networks and sociotechnical networks intersecting and colliding with each other (Farias and Bender, 2011; McFarlane, 2011; Lancione 2014; Batty, 2013; Sennett, 2013). This is the kind of synthesis we attempt in this book, focusing in particular on the agency of sociotechnical systems. Building on our earlier book (Amin and Thrift, 2002), we see the city as a machine whose surge comes from the liveliness of various bodies, materials, symbols, and intelligences held in relation within specific networks of calculation and allocation, undergirded by diverse regimes and rituals of organization and operation. We distil 'citiness' down to the combined vitality and political economy of urban sociotechnical systems, which we believe define the modern city. Together, the arrangements of water, electricity, logistics, communication, circulation and the like, instantiate and sustain life within and beyond cities in all sorts of ways: allocating resource and reward, enabling collective action, shaping social dispositions and affects, marking time, space and map, maintaining order and discipline, sustaining transactions, moulding the environmental footprint. These arrangements are more than a mere 'infrastructural' background, the silent stage on which other powers perform. The mangle of sociotechnical systems in a city is formative in every respect, regardless of its state of sophistication. This, at least, is our thesis.

The project we want to begin in this book is to think again about urban vitality, but this time by understanding both its machinic qualities and the way in which it constantly creates new publics, publics that are new forms of here and there. So, for example, in addressing why and how some cities can be thought of as growth engines, we will decentre familiar accounts that privilege the presence of particular assets such

as the concentration of skills and intelligence, firms and institutions, or untraded interdependencies, by focusing on supply infrastructures – the urban machinery that keeps stocks up and moving, capabilities replenished, and services flowing (Chapter 4). Similarly, we will explain the experience and mediation of mass poverty, ever more an urban phenomenon, as a problem of access to the means of survival, regulated by the terms of supply of basic public goods and by the very infrastructures of thought currently in place framing world urban poverty (Chapter 5). In turn, to explain urban social dispositions and affects, we will examine the formative power of hybrids of urban aesthetic, technological intelligence and human dwelling, reworking the meaning of human being (Chapter 3). Finally, we will argue that the energy budgets of city sociotechnical systems and the other metabolisms they sustain lie at the heart of the urban ecological footprint, and the stresses of the Anthropocene in general (Chapter 2).

The sociotechnical systems we wish to consider include first, the metabolic systems that service the city in ways without which collective life would be impossible – water, energy, sanitation, food and so on, each of which forms its own system of provisioning. Second, we want to consider the ways in which the city produces a sense of direction, both as a means of finding a way around an increasingly complex spatial order, and in the way that the city literally directs its inhabitants' lives, allowing them access to, and egress from, some spaces, while simultaneously banning them from others. Third, we want to show how human identities and affects in the city are both coproduced and pumped around, with much of the work done by an urban landscape that has become increasingly sentient. Finally, we want to show how all of this infrastructural activity produces even larger effects. Over time, it mixes all manner of beings together in a way that can genuinely be regarded as evolutionary. The increasing evidence for an Anthropocene bears out the way in which humanity has stamped its footprints on the planet by constructing urban forms that act as carriers for life.

Most books on the city, except those that involve ethnography, tend to start from the outside in; that is, they want to see the city as a whole and map aspects of it, or they

want to see the city as an expression of a larger force. In contrast, we want to see the city from the inside out, not because we are looking for a false sense of intimacy but because cities work from the ground up. No matter how open and stretched the city may be, the combination of elements in each city varies in ways that are themselves constitutive, with the many elements of 'infrastructure', without which a city does not exist, becoming not just incidental, but central to how and what cities are: a rough analogy might be that infrastructure is now the urban equivalent of the machinery of breathing. The 'machinic' quality of infrastructure, we wish to argue, drags in all manner of actors, only some of whom are what we might conventionally call human. Without an understanding of this ground-level hum, the city is shorn of a large part of its existence, and the central part of how it is able to reproduce itself as a place. Without this knowledge, we cannot understand the importance that cities have gained in our times, an importance that can only grow as infrastructure becomes ever more pervasive.

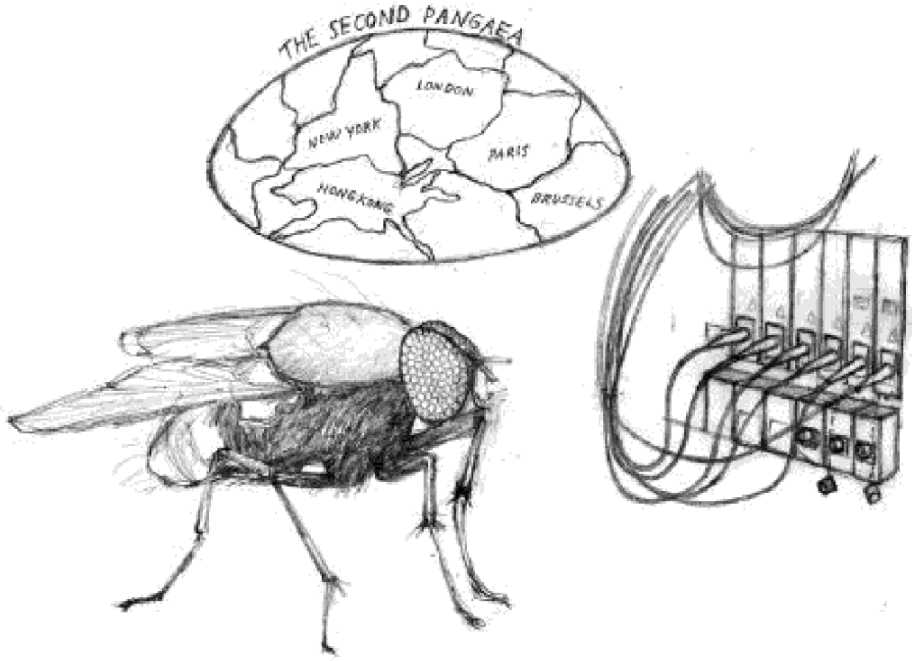
Acquiring this knowledge requires making sense of the collectives formed and maintained by sociotechnical networks. It involves following these networks, rather than forcing the variegations at ground level into the received categories of theory or discipline. Generalizations have to derive from the reconstruction of the visible and hidden machinery of urban metabolism and organization, while accepting that they can only be provisional, given that the sociotechnical networks are themselves constantly reworked by their in-built technical and human intelligences. Thinking about the city in this aggregative and experimental way requires intellectual honesty, as we argue in Chapter 1, so that plural methods, intelligences and sensibilities can all be indexed, with the sciences and arts, and designated and lay experts, allowed equal opportunity to narrate the facts and stories of the sociotechnical city. Reconstructing the city ground-up requires making visible its hidden-in-plain-sight infrastructures and disclosing their force and performativity.

This is an important political project. Why? First, because the mix of actors the infrastructure enables is itself an

important part of human history, since it is through this mixing that different connections and possibilities become apparent, that different visibilities hove into view, and that different kinds of being can be invented. Second, because each of the tramlines of infrastructure contains its own peculiar forms of cruelty as well as promise. We use the word cruelty knowingly, since we are talking here about machines that legislate who and what lives and who and what dies, and who and what lives in what form. Of course, the city has many infrastructural components, and we will touch on only some of them in this book. But we need to be clear that, in the final analysis, cities are systems for directing and for provisioning life in ways that produce immense combinatorial power and immense constraint. We are convinced that each of these infrastructures has its own pinch points, which themselves constitute political arenas. In other words, the understudied republic that is the infrastructure of the modern city can become the main focus of political action. This is our core argument.

We are talking here about a politics of leverage, a politics of small interventions with large effects, a politics of locating pinch points, and a politics of urban life as a trickster assemblage of like and unlike. Matters of infrastructural tuning and adjustment turn out to be key, whatever the arena. We are talking about what we can make of the commons that we have built ourselves, but continue to reserve for just a few human and nonhuman elites (Heise 2008). In other words, we conclude in favour of an urban politics of fair access to infrastructure – and fair infrastructure – in this book. Other kinds of politics exist, of course, none of which we are devaluing. Instead, we attempt to set out a politics true to the machine that the city is, which is able to convert often quite small interventions into very large gains for the many, without necessarily touching on what some have come to regard as the only available levers of change, whether planning or political party or revolution. We believe that major shifts in life chance really can come from the proto-political stuff of infrastructure, when it is, however briefly, switched into being as a political force. The city is brimful of these moments of opportunity.

1
Looking through the City

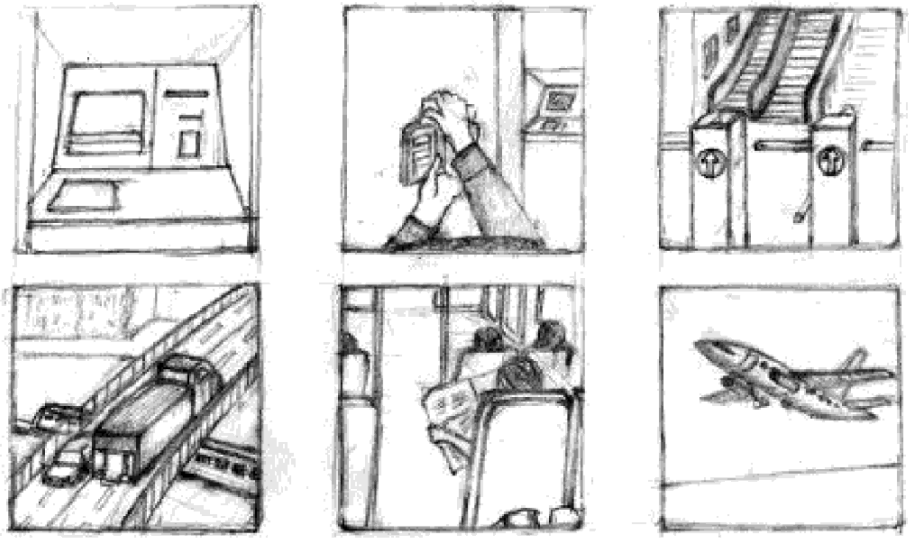


Facet

We can begin by asking what and where the city is. If cities exist as physical entities, they do so as sprawling miasmas giving rise to all kinds of influence radiating around the world. It is ill conceived to think of them as simply territorial formations, though the instinct to do so remains prevalent. Then, whatever their geography, they remain extraordinarily complex entities – a mangle of machines, infrastructures, humans, nonhumans, institutions, networks, metabolisms, matter and nature – where the coming together is itself constitutive of urbanity and its radiated effects. So, if cities have become world-making, striding out across the world, defining the character of human settlement, giving shape to the transformed nature of the Anthropocene, and providing the main impetus behind political economy (as we argue in this and the next

two chapters), how and why this is so is not self-evident. The tendency endures to count factors – the presence or absence of key attributes – rather than to focus on the nature of the combinatorial ecology and how it forces reconsideration of the staples of urban agency and analysis (as explored in this chapter), the dynamic and vulnerabilities of the unfolding 'Anthropocene' (Chapter 2), and the meaning of what it is to be sentient (Chapter 3).

How, then, to assess the character of the city and its generative powers, which we see as world-making, sociotechnical, and a challenge to a disciplinary heritage when urban analysis is confined to specialist sub-disciplines such as urban studies, town and country planning, and architecture or urban design? Or this heritage barely alters its precepts in light of the hybrid urban processes remaking economy, society, nature, politics and culture. If the world significance of cities is increasingly acknowledged in scholarship and policy practice, it has yet to lead to any rethinking of the fundamentals of core disciplines in the social sciences. Economics, political science, sociology, anthropology, and even geography – the most spatial of these disciplines – have yet to consider how an ontology formed by urban specificities might require new intra- and inter-disciplinary composites of thought and method. In this chapter we argue that understanding cities requires knowledge practices that are distributed and combinatorial, thus calling into question established disciplinary and professional legacies. The proposition that knowing the world might require knowing the city in this way has barely altered thinking in the mainstream social sciences.



Business trip

Urban World

Let us begin with an audit of the world significance of cities.

First, only a small number of cities drive world economic growth (McKinsey Global Institute, 2012). According to the McKinsey Global Institute, by 2010, six hundred cities, accounting for no more than one fifth of the world's population, were generating 60 per cent of global GDP (Dobbs et al., 2011). They were largely from the North, with 380 of its cities responsible for half of global output. McKinsey calculates that, by 2025, the same number of cities will generate the same volume of GDP, but a third of the constituents from the North will have dropped out, replaced by 136 cities from the emerging economies, primarily from China (100), as well as a dozen or more from India. The top one hundred cities are expected to account for 35 per cent of GDP growth, a group composed of 'middleweight' cities (rather than today's 'megacities'), many again from China and elsewhere in the South, propped up by the know-how and purchasing power of a sizeable new middle class. With the next four hundred cities expected to add only 6 per cent to growth, the world economy will depend on the state of six hundred cities: their quality of infrastructure and services, their ability to manage largely unplanned urban expansion and related problems of

congestion, environmental stress and urban maintenance,[1] and their capacity to sustain growth, meet demand and satisfy needs. In other words, the economics of world prosperity will pivot around the supply and distributional conditions that make cities competitive.

Second, this economic might is shored up by other urban concentrations of power. The top-ranking cities, or, more accurately, their central business districts, are massive collections of knowledge, creativity and innovation, political and elite power, cultural and symbolic influence, and financial and infrastructural might. Together, they drive national and international life. Though the exact measure of this power remains elusive (due to nation-biased statistical limitations and because much of it courses under the radar in informal deals, closed boardroom decisions and hidden transactions), rankings of the global influence of individual cities are beginning to circulate. One of these is the A. T. Kearney (2012) Global Cities Index, which measures a city's engagement in business activity (e.g. corporate HQs, top service firms, value of capital markets), human capital formation, information exchange, cultural experience and political influence (e.g. presence of embassies, think-tanks, international organizations). The 2012 ranking, in descending order, lists New York, London, Paris, Tokyo, Hong Kong, Los Angeles, Seoul, Brussels, Washington, Singapore, Sydney, Vienna and Beijing: familiar names fast being chased by many new ones from China and India, according to A. T. Kearney. Linked into common corporate, supply or transactional chains, and sharing elite interests (Khanna, 2011; Taylor, 2004), these cities exercise a network power that circumvents and displaces that exercised by traditional jurisdictions of state and polity, prompting Saskia Sassen (2012a: 5) to aver that 'our geopolitical future…will be determined in good part through twenty or so strategic worldwide urban networks'. The state-centred discourses and tools of political science will need to change in order to grasp this nodal/network power (Taylor, 2013).

Third, these economic and political powers are neither mirrored equitably across the urban landscape, nor do they provide assurance of wellbeing within cities. In fact, they are

part of a fabric of extreme inter-urban and intra-urban disparity. By 2050, 70 per cent of the world's expected nine billion people will be living in urban areas, a relentless rise from today's 50 per cent (UN-Habitat, 2008). Today there are over 450 cities with more than one million inhabitants, and they include twenty-one cities with between ten and 35 million people. The pace of growth is particularly marked in the developing world, whose cities – stretched in every respect – are projected to house 80 per cent of the world's urban population in 2030. Already by 2020, a billion of these residents are expected to be living in slums (ibid.). These ill-serviced and very often officially ignored or condemned settlements are set to become part of the normal urban landscape. They are zones of extreme poverty, marginality and deprivation, and day-to-day survival in an informal economy amounting to half the world's workforce of 1.8 billion people (expected to rise to two-thirds by 2020), according to the OECD (Jütting and de Laiglesia, 2009). In other words, in the contemporary city profoundly divided social worlds are co-located on a very large scale, with power and resources biased towards the elites and middle classes at the expense of poor majorities. This spatiality of extremes co-located and disparities amplified is still inadequately understood by all the social sciences interested in the dynamics of social differentiation and inequality.

Fourth, global environmental change is powered by, and is largely about, urban metabolism. As Burdett and Rode (2011, p. 10) observe, 'occupying less than 2 per cent of the earth's surface, urban areas concentrate…between 60 and 80 per cent of global energy consumption, and approximately 75 per cent of CO_2 emissions'. Their energy demands are vast and ever-growing, as are their emissions, although the environmental footprints of individual cities vary considerably: 'whereas cities in Europe, the US and Brazil, for example, have a lower environmental impact than their respective countries, cities in India and China have a much larger impact owing to their significantly higher income levels compared with national averages (op. cit., p. 11)'. The hazards of climate change, in contrast, are confronting all cities with punitive energy and food prices,

economically most dynamic cities (Glaeser, 2011; Storper, 2013); on the sustenance and resilience provided by well-maintained and evenly distributed urban infrastructures (Graham and Marvin, 2001; Heynen, Kaïka and Swyngedouw, 2006; Amin, 2014a); and on the social webs of improvisation that enable survival in cities organized solely for the well-off (Simone, 2010; Venkatesh, 2014).

This ontology has been the focus of a 'relational' turn in urban studies in recent years imagining cities as a combinatorial force field (Amin and Thrift, 2002; Amin, 2007; McFarlane, 2011a; Farías, 2011; Simone, 2011; Taylor, 2013). Here the city is thought of as a 'complex adaptive assemblage' (Dovey, 2010; 2012) governed by the balance of force between many authority structures – corporate and institutional, technical and infrastructural, computational and cartographic, social and symbolic, codified and informal. The city is not seen as reducible to imperatives of base or superstructure, or to the self-organizing dynamic of an open system (Batty, 2005; Sanders, 2008). Instead, the relational approach delves into the push and pull of competing hybrids of association, explicitly seeking to understand how their 'traffic, exchanges, and interactions' (Ong, 2009, p. 88) maintain particular orders and hierarchies of power (McFarlane, 2011b; Graham, 2010; Weizman, 2012). The labour involved is explicitly recognized, as are the many formal and informal entities of the force field (from commanding ideas, people, policies and institutions to mundane directionalities of urban design, engineering and calculation). Urban force is conceptualized as distributed, coalitional and heterogeneous, and as fixed through various returns of power but also as constantly evolving in new directions because of the emergent properties of interactive systems.

It is this kind of urban force – combinatorial and disjunctive – that is likely to be involved in generating the outcomes listed in the preceding section, not one of particular presences; for example, the number of entrepreneurs, leaders and mediators, the synergies between bureaucracies, corporations and research organizations, or the smartness and speed of sociotechnical systems. Urban agency may be a function both of how, in a force field of relational

interactions, hybrid inputs are aligned and made to work through various coupling and amplification devices (e.g. infrastructures, bureaucracies, calculative logics), and of the character of the general ecology of interactions (e.g. tolerance capacity, population dynamics, flow turbulence). The field and its rules of operability, rather than its individual entities, may matter most in explaining collective urban agency, operating as a practical capability and intelligence spread across intersecting infrastructures. This intersection can be thought of as the machine, habitat and atmosphere of the city, one that holds things in place, enables process, and endows the entities and their associations with purposeful capacity.

Let us take one world-making capacity as an example: the special character of urban intelligence, which is normally reduced in the literature to the presence of particular types of people, skills and dispositions. Yet, this intelligence, be it the creativity necessary to enable search and innovation or the social detachment that helps urbanites to negotiate the city's many demands and sensations, cannot be reduced to particular types of human or social attribute, because in the city objects, technologies and infrastructures are the prosthetics that enable subjects to think, act and feel (Amin, 2012; Gandy, 2005; Jacobs, 2012). These prosthetics are on the inside of human being, and when on the outside, for example, as ‘smart’ buildings and infrastructures, they are anything but inert. The assemblages of machinery, technological intelligence and matter play as much more than just a valet service to deciding human beings. They enable collective urban life through their provisions and circulations, and they are the envelopes in which humans enact their personal and social lives in the city (Mackenzie, 2010; Thrift, 2012; Shepard, 2011).

This is not to reduce the city to machine intelligence, in the way of a new literature on ‘smart cities’ fed by a fantasy of computational systems successfully working on data from sensors lodged in every pore of the city so as to produce a delirium of choice. Rather, it is to acknowledge the interactive intelligence of the provisioning infrastructures, built forms and associational networks, and their reciprocities with thinking and acting humans. In cities

awash with sensors and processors nested in street technologies, public infrastructures, buildings, homes and offices, and all kinds of mobile device, it is undeniable that calculations in 'code/space' (Kitchin and Dodge, 2011) continuously adjust the urban habitat without active human intervention (Khan, 2011). In this environment 'imbued with the capacity to remember, correlate and anticipate', as Mark Shepard (2011) observes, we are on 'the cusp of a near-future city capable of reflexively monitoring its environment and our behaviour within it, becoming an active agent in the organization of everyday life' (p. 10). But it is an active agency that both reconfigures and enrols human being itself, as we argue more fully in Chapter 3.

Immersed in an intelligent habitat, urban dwellers, including experts and decision makers, are constantly stretched beyond their bodies by adjunct nonhumans, enacting their subjectivity through the interdependencies so formed (Ash, 2013). Typically, circulating with smartphones that offer a personalized map, and images, sounds and conversations that mingle with those of the city, they navigate the city as a series of dots and pins, their subjectivity formed in the intersections of personal biography, urban experience and wireless dwelling (Mackenzie, 2010; Born, 2013). They find themselves immersed in multiple fields of intelligence with 'their own kinds of vitality, capacities of repetition, variation and adaption, that in turn feed back into the becomings of sentience' (Fuller, 2011, p. 181). As one of us has argued elsewhere, in the smart city, 'a new kind of inhabitant who can don the city like a cloak' is formed, joining other 'avatars, at least in the sense that the persona they don can be expressed in more dimensions' (Thrift, 2012, p. 159).

This immersive subjectivity and distributed intelligence is not just a feature of the technologically mediated urban environment. It is often assumed that in cities with rudimentary technologies, poor infrastructures and failing bureaucracies, where humans are left to do the heavy lifting, inhabitants proceed without prosthetics, challenged rather than formed by their habitat. Rarely in writing on the world's urban majority living in challenging circumstances does the habitat feature on the inside of subjectivity. Slums,

suburbs, congested public spaces, tower blocks and busy city centres tend to get narrated as uncongenial spaces that urban dwellers learn to negotiate or survive, distorting subjectivity from the outside, for example, by encouraging opportunistic, feral or furtive behaviour. In contrast, a new genre of urban ethnography is emerging, showing that humans are equally of their habitat in these environments, with agency very much a hybrid of mind, body, machine and matter. Thus, technologies are revealed to be woven into daily sociality in even the most makeshift of places, in the form of the rub of machine, building material and body in cramped space, pirated technologies providing essential services, mundane objects that enable connectivity, and hope sustained by consumer or educational technologies (see Sundaram, 2010 for Delhi; Simone, 2014a for Jakarta; Pieterse and Simone, 2014 for various African cities). Social behaviour here is as materially mediated as it is in the software-dominated city, if only for the simple reason that in every urban setting, 'built environments engage their users' (Degen and Rose, 2012, p. 3273) as 'perceptual memories that mediate the present moment of experience… by multiplying, judging and dulling the sensory encounter' (p. 3271).

These ethnographies suggest that the reciprocities of habitat and subjectivity are ubiquitous, and not just confined to fringe spaces such as abandoned parks or parking lots, where unusual plant and animal species may cohabit with visiting humans, themselves dwelling in these spaces in unusual ways (Gandy, 2012). Nor are they confined to orphan spaces such as cemeteries, where urban outcasts often live close to, and with the ground, enabling them to improvise, make ends meet, hone a degree of environmental awareness, and build cloaked occult identities as skills of survival (cf. de Boeck and Plissart, 2004, on Kinshasa's street-children and Sawhney, 2009, on the noir in Delhi's poor neighbourhoods). Thus, for example, Charles Hirschkind (2006) shows how taped sermons in the streets of Cairo form a sensorium for ethical reflection amid the frenzy of the city. Silwa and Riach (2012) reveal how smells of disinfectant, boiled cabbage or perfume in the public spaces of Krakow serve as mnemonics of association –

positive or negative – with Poland's communist past or its future in the European Union. Elijah Anderson (1999) shows how the 'codes of the street' that equip people in Philadelphia's high-risk neighbourhoods with a 'careful way of moving, of acting, of getting up and down the streets' (p. 23) are an iteration between honed instinct and street syntax (e.g. signals sent out by gathered groups of people, cars slowing down, dark and unkempt corners – see also Swanton, 2010; Blokland, 2008; Goffman, 2014; Venkatesh, 2014). Sara Fregonese (2012) uncovers how street atmospheres incorporating gunfire, eerie silences, barriers, hasty movement, partisan banners and flags, play their part in the geopolitics of fear and anxiety in the conflict-ridden city of Beirut. These examples confirm Simmel's (2002, p. 17) prescient observation a century ago, that a 'person does not end with the limits of his physical body or with the area to which his physical activity is immediately confined, but embraces, rather, the totality of meaningful effects which emanates from him temporally and spatially'. The urban landscape, as sensorium, habitat and directional intelligence, can be thought of as a space of 'outstincts' and 'escalated atmospheres' (Thrift, 2014) stretching bodily instincts and intelligences.

In this discussion on the infrastructures of urban agency, we have focused on just one example – the hybrids of urban intelligence and social subjectivity. But as we show in the chapters that follow, similar sociotechnical combinations lie behind other forms of urban push, inviting analysis of the dynamics of prosperity and poverty that note how the composition and political economy of a city's sociotechnical systems convert, amplify, and distribute resources, and produce the power to acknowledge the enrolments of the built form (e.g. the symbolic power of iconic buildings, the silent allocations of infrastructures), to change the calculus of global hazard and risk.

calculated.

The exponents of complexity science believe such calculation is finally possible because of advances in data capture and analysis offering live data feeds on all manner of urban phenomena from digital sensors everywhere in the city, sophisticated software to map the typologies and topologies of interaction and aggregation, and modelling techniques capable of processing large data and multiple variables without eliminating ambiguity, uncertainty and emergence. They believe that advancements in data capture, computational modelling and nonlinear science now allow the living city to be constructed and tracked in its plural and hidden detail, simulated in ways that allow the underlying dynamics to be understood and potentially worked upon (Batty, 2013). If, until recently, quantitative science in urban studies might have suffered from the criticism of being distant from reality and process, its systems science cousin claims the ability to stay close to specificity and nuance in the way of qualitative science, but also to capture and interpret the aggregates.

These are seductive claims for city leaders confronted by an increasingly opaque, hazardous and uncertain urban environment, yet still expected to make informed, judicious and effective decisions. What better than a science able to work with the urban as a field of interactions and feedback loops, offering planning choices cognisant of field dynamics? And indeed, where funds, technologies and expertise permit, municipal authorities have rushed to establish or fund intelligence units collecting and analysing large datasets, visualizing the city of flows, interactions and feedback loops, identifying the forces of recursion, amplification and dissonance, developing realistic scenarios with the help of probabilistic models and sophisticated simulation technologies, and drawing on real-time data analysis to fine-tune policy making. Such moves are helping urban decision makers to think that the city made legible by complexity science is the basis of knowing and governing the city as an open, plural system.

It is an open question whether complexity science can actually get close to the city of multitudinous interactions