Check for updates

Progress in Human Geography
1–7
© The Author(s) 2020
Article reuse guidelines:
sagepub.com/journals-permissions
DOI: 10.1177/0309132520940833
journals.sagepub.com/home/phg
SAGE

Book review symposium

Michael Batty (2018) *Inventing Future Cities*. Cambridge, MA: MIT Press.

Commentary 1

Batty's *Inventing Future Cities* is not a futuristic book about cities, as in a collection of urban visions and blueprints. It is instead a well-articulated essay about our inherent inability to predict cities, both in the long run and in the short run. Batty's starting point is the recognition of cities as complex systems. T[hey evolve from the bottom up, they are in disequilibrium and, therefore, their dynamics are a more important feature than structure.

Interestingly, technology is recognised throughout this book as a key driving force for how cities have evolved and how they might change in the future. This recognition does not reflect a deterministic standpoint, but instead illustrates the idea that new technologies and their adoption may affect individual behaviours which actually drive urban evolution. Batty demonstrates how cities are becoming more complex over time with the invention of new technologies and the adoption of new behaviours. For instance, digital technologies directly intervene with one of the main attributes of cities – the importance of proximity. After all, 'in the last 25 years every action is mediated by instant communications', as Batty says. But even after recognising the role of new inventions in shaping urban futures, it is still difficult to predict how cities will look in the near or distant future simply because we cannot predict what we will invent. After all, since the early 1980s onwards, our attempts to predict how cities will look in the future have been anything but successful, because of the widespread adoption of digital technologies. As a quote from Peter Thiel indicates, 'we wanted flying cars, we got 140 characters'.

Similarly to his previous book (*The New Science of Cities*), Batty uses the introduction to discuss a number of principles which will form the basis of the book. Those who are familiar with his extensive volume of work on urban systems will not be surprised to see the well-known Zipf law as the first principle listed here. He then discusses what he calls the 'Glaeser paradox', according to which, although digital technologies lead to a decrease in the cost of distance, the importance of physical proximity increases. Batty then links population distribution to transportation systems. He also connects with classical geographical arguments by discussing Tobler's first law of geography. The last principle that Batty highlights is how cities more resemble evolving organisms than top-down designed machines, and he avoids defining cities as distinct physical artefacts. Instead, he refers to thinkers such as Plato, Dickens, Orwell and Jacobs, who approached the city from a historical and cultural perspective instead of a geographical or an economic one. He goes a step further and expands such classic arguments. For example, he identifies the concept of the smart city as the 6th Kondratieff – a paradigm of the computable city. And although he is a proponent of the smart city narrative, he highlights that humans instead of devices need to be smart, despite the developments in the field of artificial intelligence. In the same vein, he does not neglect to critically assess the value of some of these new sources of 'big data' that he extensively talks about.

For those familiar with the work of Batty and his group, some of the ideas discussed in this book are not entirely new. What is new and worth reading, though, is the overarching understanding of the nexus of cities, urban science and technological changes – from horse-based communications and smoke signals to the first industrial revolution and then to the internet and smart phones. Batty cannot hide his long experience in studying cities, which enables him to build an overarching framework of urban research of the past and the present, and also include an attempt to foresee the future of such research. Although he claims that this is not a book about predictions, he risks making a few of them: we might never succeed in building a comprehensive aggregate theory of how cities form and function; we will all live in cities in the near future; artificial intelligence will probably not replace human decision-making; and the world's population will not explode.

Who is this book for? Urban researchers will enjoy the big picture that Batty draws. They will not find a comprehensive urban science literature review, but this is not what this book is about. Instead, they will find a well-curated list of classic and more contemporary key urban readings and some exemplary empirical research. Although this is not a planning book, urban planners will benefit from the emphasis on urban dynamics and the discussion behind the drivers of urban evolution. They will also appreciate the strong assertion that cities and urban systems are not systems in equilibrium, as well as the emphasis on the short run in studying urban dynamics. And they will enjoy the discussion about urban sprawl and the 'urban scientific' discussion about height, skyscrapers and built-up surface. Postgraduate students with an interest in cities will also enjoy this book. Interestingly, students with both an urban and a more technical background (e.g. data science) will equally benefit by reading the book. And although this is not a popular science type of book, readers outside the urban research world will also find this book valuable as long as they have an interest in cities. But, as Batty predicts, in the not so distant future everybody will live in some sort of city, so interest in urban research will only increase.

Emmanouil Tranos
University of Bristol, UK

Commentary 2

Anyone who has ever written an academic book knows that choosing a title can be a pretty daunting task. The title *Inventing Future Cities* is not less than a stroke of genius by Michael Batty, because it shows how just three words can raise curiosity, loads of questions and some constructive suspicion at the same time. While 'inventing' evokes the classical (and outdated) image of a lone scientist who experiences a eureka moment while tinkering in a lonely attic, Batty makes short work of the idea that we might be able to predict the future in general, or the future of our cities more particularly:

> . . . we cannot predict how we might invent it, especially as the future, particularly with respect to cities, is composed of a multiplicity – indeed, almost an infinity – of decisions predominantly generated from the bottom up by all of us. (p. 12)

Especially the last part of this phrase is interesting, since the idea of predicting the city has been long intertwined with ideas of general system theory and top-down urban planning and design, of which many examples are provided in the book. However:

> It is now widely accepted that social systems and cities are more like organisms than they are like machines. In this sense, they are the product of countless individual and group decisions that do not conform to any grand plan. These actions lead to structures that are self-organising and exhibit emergent behaviour. (p. 5)

In other words, cities are unpredictable complex systems. The development of such systems

emerges over time and includes various forms of path dependency and feedback loops, which clearly implies that not only context but also history matters (p. 8). Maybe it is for this reason that Batty defines a number of principles embodying what we really need to understand about cities in general in order to invent their future. Several of these principles relate to classic geographical ideas. They include Zipf's law (predicting that there are many more small cities than big), the standard model from Von Thünen (the logic that cities are structured around their central business districts), Glaeser's 'paradox of the modern metropolis' (suggesting that proximity is becoming more important when the costs of connecting across distance are decreasing), Well's proposition (population distribution is dependent on the kind of transport that ties the population together), and Tobler's first law of geography, which suggests that 'near locations exert a stronger pull than locations farther away' (p. 16). A more 'contemporary' principle relates to the pulse of a city, i.e. flows, networks, cycles, speed and frequency of people, vehicles and information in cities, partly invoked by human life-cycles and rhythms. This principle chimes with the perception of cities as complex organisms, but also with the concept of the smart city in which rapid technologic developments and information networks (re)shape the function of cities as places of exchange and innovation. Throughout the book, Batty's analysis relates back to two further classic ideas, i.e. 'form follows function' (Louis Sullivan, see Chapter 4), and the 'death of distance' (Cairncross).

On the basis of his thorough analysis of the aforementioned principles, Batty invites the reader to think about future cities and how to invent them, seeing 'the city as a process rather than product'. Such a perspective requires us to think about the role and agency of actors who are doing the inventing, in line with the notion of cities as organisms and the importance of 'decisions predominantly generated from the bottom up by all of us' (p. 12).

The point I would like to raise here is the potentially massive gap between the scope and impact of bottom-up decisions and solutions to the fundamental problems of our time. Towards the end of the book, when the reader might be inclined to blame Batty for an overly focused spatial argument around form and function, he proceeds to make a link to 'The Bigger Questions' of 'climate change, low carbon futures, ageing, migration and health care as well as income inequality, pollution, crime' (p. 216).

The question here is to what extent bottom-up processes of inventing our future cities will be sufficiently powerful to provide a proper answer to such fundamental challenges in our world of cities. Based on his book *If Mayors Ruled the World*, Benjamin Barber would probably be inclined to ascribe this potential power to cities. (At least) two issues are at stake. First, the assumption (underlying a positive answer to the above question) is that 'inventive processes' which have potential to mitigate the fundamental issues are effectively absorbed and incorporated by an increasingly urbanised world. The debate around climate change reveals a sobering example regarding the joint absorption capacity of cities and countries as complex systems. The Paris Agreement (2015) aims to strengthen global responses to the threat of climate change by keeping global temperature rise in the current century well below 2 degrees Celsius above pre-industrial levels. The required systemic changes, not only in future cities but also beyond, are endangered by large countries withdrawing from the agreement and its implications. Thus, if future cities are invented from the bottom up, an equally big challenge is to 'scale up' inventions to the level of our societies and the globe. One or a few swallows do not make a summer yet.

A second and related issue concerns solidarity and (in)equality. Inventing our future cities undoubtedly involves a series of outcomes,

which are by definition not static. These outcomes will affect individual people in different ways, in terms of benefits and costs. Again, climate change policy is a case in point. Even if we know how to invent climate-proof future cities, the question is whether citizens and politicians have the will and ability to endure huge personal and financial sacrifices to realise this ideal (or should we say dire necessity). The fact that less affluent and poor residents will be disproportionately affected by this reminds us of the necessity of distributing the costs and benefits in an equal and fair way in and across cities and societies. At the same time, the way in which Batty invites the reader to think about future cities, seeing them as 'a process rather than product', is likely the most effective way to properly address the issue of solidarity and (in)equality. And through the word 'inventing', Batty encourages us never to lose hope.

Reinout Kleinhans
Delft University of Technology, The Netherlands

Reference

Barber BR (2013) *If Mayors Ruled the World: Dysfunctional Nations, Rising Cities*. New Haven: Yale University Press.

Commentary 3

> The future tramples all prediction. (Kinnell, 2006: 87)

Cities are contradictions: at any single point in time they may appear coherent and cohesive, but when we take a longer view they become simultaneously planned and unplanned, coherent and incoherent, rational and irrational. It is into this contradiction that *Inventing Future Cities* enters, noting at the outset that, although we have long wished to be able to predict the path of city development, cities have routinely confounded our expectations, predictions and ideas. Rooted firmly in the grand tradition of urban studies, the book locates its contribution through the principles of cities – how they form (and are formed), what they need to contain, how they may be (hierarchically) structured. Within this grounded introduction we are then moved to consider the processes that operate within these themes and around the city. The overarching thesis of this work is that we are currently situated at a pivotal point in the development of the city, progressing from something that was treated as if it were akin to a physics-based structure (with gravity models, etc.) towards something that has more in common with biological metaphors and allows us to view the city as a living organism. Underpinning many of these developments has been the increased availability of data (especially under the rubric of so-called big data). We are currently experiencing a surge in the volume and veracity (Kitchin, 2014) of data so that, to borrow a surfing metaphor, we need to learn how to ride through the barrel of the wave to ensure we are not drowned by the crest as it crashes down on the beach.

This is the side of the city that relates to the development, the structure and the facilities that are present. The processes that they enable (here we are primarily talking about the technological connectedness of the modern urban environment), such as Uber and Airbnb, are fundamentally rewriting the social contract of the city, even if they are not, as Batty rightly asserts, reordering the spatial environment (or at least not yet!). Here, though, is where the book lacks engagement. There are multiple hints at a move into the social throughout the book, but it isn't until we hit the concluding chapter that the issues of gentrification, segregation, and ghettoization ([sic] – on this see Wacquant, 2013), in addition to issues such as climate change, arise. With the latter it is noted that, should energy requirements and reduction in transport mean that lives need to become more compact, then the city would change. But this ignores the contradiction set out at the outset. Whilst cities may

at once be dynamic environments (glittering lights, 24-hour contact, abounding opportunities), they are also slothful and static. The very reason why Uber or Airbnb have yet to have a spatial impact (although the latter could be questioned – see Grisdale, 2019) is because the infrastructure (roads, rail, etc.) required for movement, in addition to development (buildings for commerce, industry, and supply of, above all, residence), represent substantial and immovable problems (in the short to medium-term time scale).

What this highlights is that cities are a two-sided coin: on the one side there is the structure (that which Batty is primarily concerned with), and on the other there are the people and the social. As with much that is currently written under the rubric of the future city (or the smart city), the promotion of the technology without the people is akin to the earlier work where the physical structure (Christaller, Hoyt, etc.) neglected the decisions, 'random walks' and irrationalities of the individuals. To return to the idea of relating the city to a biological metaphor: yes, cities are like organisms; they represent the skeleton (or shell), the pipe work (or blood vessels) evolving and changing. But as humans without blood are inert, so cities without people are not cities. Thus, the two must be considered together and the interaction of both is where the development will come. So whilst I fully concur that the uptake of new technology is rapidly increasing with lag times only a fraction of what they were a couple of decades ago, it will be unlikely to ever reach the point of a singularity.

Understanding how people – individuals – and groups interact within the urban environment is notoriously difficult. We can map how they use urban space and predict from that how they will use the same space in the future. But we must also understand how they interact in business, economics, culturally, socially, and how politics and debate will continue to shape the urban space. Predicting how these will develop on a single plane is hard – understanding the interactions, nearly impossible. Thus, to borrow a quote that Batty uses, a butterfly may well flap its wings in Brazil and cause a tornado in Texas, but even when we can observe the daily travel flows of commuters or the credit card spending of the entire Spanish population. it remains possible that a single decision, which externally is seemingly irrational, could result in a perturbation that then sends the entire system onto a different trajectory. This apparent randomness is well-known in the epigenetic literature (see for instance Smith, 2011) and thus fits within the biological metaphor. However, all is not gloomy, because what is different is the rate of detection through which we can find this difference: the apparent anomalies as an alternative pathway is taken will become apparent much earlier, and the change in patterns will occur much sooner than before to the smart city.

Perhaps, then, as Michael Batty gave (almost) the final word to Alan Turing, so will I: 'We can only see a short distance ahead, but we can see plenty there that needs to be done'. Batty follows on and concludes: 'We can say much the same for the invention of the future city', a sentiment that is well argued in this book and which scholars would be well placed to heed in terms of sensing the implications of the data revolution on which we are currently surfing and ensure that is does not become the tsunami that drowns the people.

David Manley
University of Bristol, UK

References

Grisdale S (2019) Displacement by disruption: Short-term rentals and the political economy of 'belonging anywhere' in Toronto. *Urban Geography*. DOI: 10.1080/02723638.2019.1642714.

Kinnell G (2006) Pure balance. *The Yale Review* 94(4): 87.

Kitchin R (2014) *The Data Revolution: Big Data, Open Data, Data Infrastructures and Their Consequences*. London: SAGE.

Smith GD (2011) Epidemiology, epigenetics and the 'gloomy prospect': Embracing randomness in population health research and practice. *International Journal of Epidemiology* 40(3): 537–562.

Wacquant L (2013) A Janus-faced institution of ethnoracial closure. *Mainz Historical Cultural Sciences* 17: 15.

A response to the commentaries

Thank you for the perceptive and constructive comments on my book *Inventing Future Cities*. My central argument is that all human systems – and indeed many systems within the natural and physical sciences too – are built and evolve from the bottom up. In cities, countless decisions are made by all of us who live within them at every instant in time, and these decisions which lead to order, pattern, structure and organisation emerge without any obvious central control, generating functions that we use to define the way we theorise about how the city is formed. But although we can identify and impose an order on how we see the city spatially and how cities change, we continue to wrestle with the conundrum that cities grow from the bottom up but much of our intervention – through planning, for example – is from the top down. How we reconcile top down with bottom up is one of the central problems of our times, which is reflected not only in cities, but in society at large – in the economy, in all the grand challenges from climate change to aging, and from social inequality to economic polarisation in the global economy. The dilemmas involved which are raised in the book are highlighted as well as qualified by all three commentators.

If systems evolve from the bottom up, and the agents who motivate this evolution do this without any central control, other than the 'hidden hand' that seems to constrain our behavioural responses, there is no possibility that we can predict the future for we cannot even guess what each of us might do next. However, our imperative is still to engage with the future, and this we do by inventing it. My argument, which I believe has been true for all of history, is that even though we invent our own future – and this future might not be preferable to the present or the past – we can never predict what we invent. In this sense, we are faced with a double bind: invention without prediction, a future that in principle we should be able to control but in practice we find we rarely can control. I generally assume that this is the bedrock on which any intervention we might make to improve the quality of life and the sustainability of our cities rests. But the particular dilemma facing us at present and probably throughout this century is that the rate of change in digital technologies is now so great that any semblance we had in the past of being able to manipulate the physical form of cities to meet certain goals has long since gone. 'Form no longer follows function' is the dictum for this dilemma – whether it ever did follow function is contestable.

David Manley in his commentary makes this point quite forcefully, suggesting that this future is likely to be dominated by organisations, now called platforms, that are 'fundamentally rewriting the social contract of the city, even if they are not, as Batty rightly asserts, reordering the spatial environment (or at least not yet!)'. His gentle admonishment that I have not taken this argument far enough and not engaged with the social is well-taken and I must admit that those looking for a view of cities where the social and spatial are closely integrated will not find it here. I well remember David Harvey on the publication of his book *Social Justice and the City* in 1972 giving the Norma Wilkinson Memorial Lecture at the University of Reading, making the same point: the dualism of social process with spatial form must obviously be the way we look at cities, but how we progress it is a mystery; and it still remains so (Harvey, 1970). I am quite happy to acknowledge that my argument runs out of road once we begin to explore the kinds of processes of segregation that characterise the contemporary city which are being aided and abetted by many new digital technologies and our access, or lack of access, to them. These

need to be explored at length and the whole question of how new technologies manifest themselves spatially is an enormous conundrum that we face in looking at the future city. It is already clear that new technologies that have given rise to new forms of 'residence' and 'mobility', as in Airbnb and Uber, for example, are continually and rapidly morphing into new spatial and organisational forms that make figuring out their eventual impact almost impossible. In fact the point is well made by Emmanouil Tranos, who says in his commentary that 'their dynamics are a more important feature than structure'. The world of the city we have entered has no equilibrium and may never have one – indeed it probably never has.

This incompleteness in my argument is also reflected in my casual assumption that cities grow from the bottom up while being also affected by processes and decisions that come from the top down, notwithstanding the fact that it is individuals acting in groups at every level who turn the model into a continuum of decision-making. Reinout Kleinhans in his commentary picks this up when he says: 'here is the potentially massive gap between the scope and impact of bottom-up decisions and solutions to the fundamental problems of our time'. He is of course addressing some of the grand challenges, such as climate change, which I introduce briefly towards the end of my book, as much to throw these onto the agenda, pointing the way from the arguments made in the book about our need to think through the impact of new technologies on spatial form. This incompleteness almost suggests a 'follow up' book, but I could never do justice to the entire spectrum of features defining a city, although others might be able to attempt this. My central thesis is to alert readers to the difficulties of prediction and invention for future cities from one clear but limited perspective, with the implication that some of these ideas might be translatable into other quite different but equally relevant perspectives.

What I try to do in the book, in the face of the dramatic technological change that I sketch, is to distil a series of principles that I believe will be enduring when it comes to theorising about cities and their futures. I do not suggest that these principles are the only principles, but Reinout Kleinhans extracts five from what I say: Zipf's law (predicting that there are many more small cities than big), the standard model from Von Thünen (the logic that cities are structured around their central business districts), Glaeser's 'paradox of the modern metropolis' (suggesting that proximity is becoming more important when the costs of connecting across distance are decreasing), Well's proposition (population distribution is dependent on the kind of transport that ties the population together), and Tobler's first law of geography, which suggests that 'near locations exert a stronger pull than locations farther away'. To this, he adds my focus on cities as flows in real time, the idea that 'form follows function', which we can call Sullivan's Law, and the 'death of distance', which is Cairncross's Law. Hardly laws, as I am always at pains to point out, but nevertheless themes that run deep in our understanding of the past and the present and, as I imply, will run as deeply in future cities.

Although we are unable to predict the future but can only invent it, these laws and themes do at least provide some pointers to what this future might be like. So my focus on the rather dismal position we find ourselves in with respect to prediction must not be confused with our enduring spirit when we look at cities, where we will always be able to invent a better future.

Michael Batty
University College London, UK

Reference

Harvey D (1970) Social processes and spatial form: An analysis of the conceptual problems of urban planning. *Papers of the Regional Science Association* 25: 46–69.