CASA0001 – Urban Systems Theory

module notes (update: 01/10/21)

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Contents

1. Urban Systems and Social Theory

In this chapter, we review the fundamental epistemological paradigms in the social sciences – positivism and idealism and structuralism. We identify their salient characteristics and examine how they influence our notions of cities and how we can apply them to an analytical problem in the context of urban analytics.

1.1. Epistemological paradigms in the social sciences

The three fundamental epistemological paradigms in the social sciences are positivism, idealism and structuralism. Sheppard's (2015) 'epistemological triangle' (Figure 1.1) places the three paradigms at three extremes opposing each other. Each paradigm implies a critique of the other two.

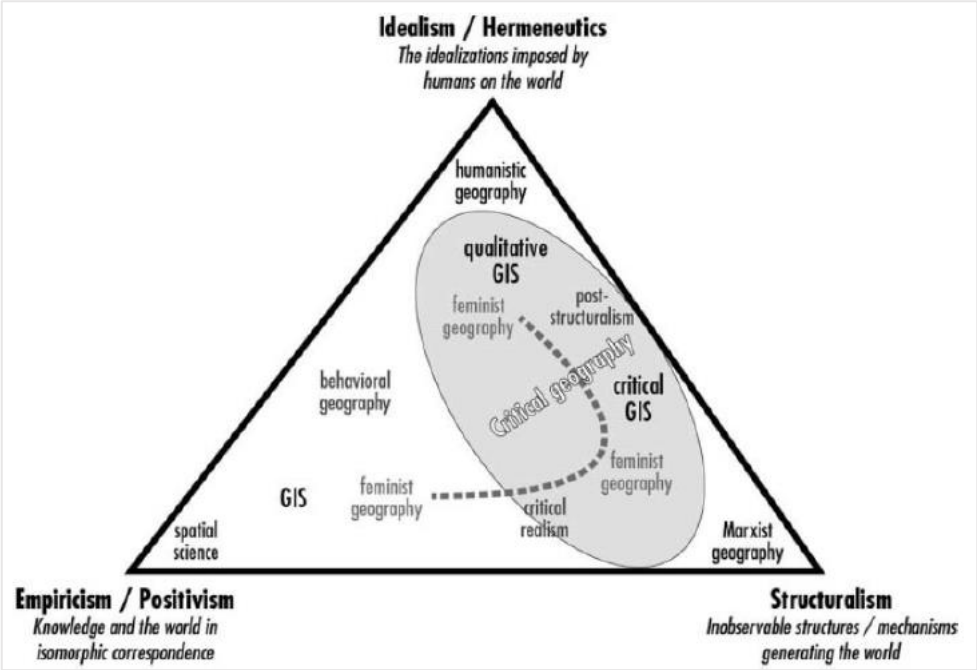

Figure 1.1. The 'epistemological triangle' of the social sciences (Sheppard 2015).

In practice, scholars rarely adopt any of the paradigms in its pure form and (often without stating this) blend elements of the other paradigms into their epistemology. Some of the 'hybrid' viewpoints are well established, for example behaviourism, post-structuralism or realism.

Sheppard (*ibid*) underlines the importance of theoretical and conceptual openness and constructive engagement with different epistemological viewpoints. Openness is particularly important in transdisciplinary field such as urban analytics, which stretches across the social, data and engineering sciences.

Positivism

Principles

Positivism is a rigorous variant of empiricism. Both empiricism and positivism hold that:

- The world exists independent from our consciousness.
- All our perceptions have constituents in the material world.

- Our perceptions are the medium through which we may develop knowledge about the world.

Building up on these tenets, positivism goes further in maintaining that (Giddens 1974, 3):

- The procedures of natural science may be directly applied to the study of social phenomena.
  › *Unity of method between natural and social sciences.*
- The outcomes of those procedures can be stated as universal laws.
- Laws are technical in character and they can be used to modify the world.

Positivism seeks to *explain*, *predict* and *change* the world. The purpose of changing the world is to organise it more rationally in accordance with its 'natural' laws. Popular metaphors in positivist social science are *machine* or *organism*, which are notions often applied to cities.

Positivism in urban research

Location theory and land use theory seek to explain the spatial organisation of urban systems. For example, Christaller's Central Place Theory (King 1984) views cities as market places, where both producers and consumers seek to reduce transport cost to maximise the utility of their transactions. Alonso (1964) builds on these ideas and develops a general economic model of the relation of land values to land uses within the city, which is known as the bid-rent model. Related theories of cities' internal structures will be reviewed in more detail in chapter 2.

Human ecology. The Chicago School of Sociology formulated universal, ecological processes (competition, domination, succession) whereby they explained the socio-spatial structure of cities (Burgess 1925; McKenzie 1924; Park 1936). The structure of cities is in direct, unobscured correspondence with these processes and can be *deduced* from them. The Chicago School produced a large body of studies, and their work cannot be wholly attributed to positivism. But their focus on explaining and predicting urban structure using laws of nature has inspired many positivist studies on urban systems.

Factorial ecological modelling was in parts inspired by the Chicago School of Human Ecology (see e.g. Berry & Rees 1969) and remains an active research area to this date. Current studies of this type, such as the one by Fotheringham et al (2015) on hedonic house price modelling, focus on explanation and prediction based on *induction*: they articulate hypotheses, collect a sample of data, select and develop statistical methods and formulate generalizable findings, which can be used to modify outcomes.

Idealism

Principles

Idealism or humanism holds that knowledge is constructed by individuals and hence can take diverse forms. Key tenets are:

- The world does not exist independently from observation.
- Individuals construct knowledge based on perceptions and the meanings they give to them.
- These constructions are causal to actions.

The focus is therefore upon the individual subject, who takes decisions based on unconscious and conscious constructions which appear true, plausible or consistent. Perception, construction and action constitute being; and these are in constant flux. There is not just one reality or true knowledge, there are plural constructions of reality among individuals. Consequently, all social phenomena are unique, space and time-specific and need to be appreciated as such.

Idealism in urban research

Sense of place refers to the meaning individuals give to places based on their experience, observation and intentions. The classic works by human geographers Relph (1976) and Tuan (1977) emphasise the experiential and affective dimension involved in apprehending, recognising, shaping and acting upon places. They propose a *hermeneutic* approach to understanding the role of place in individuals' actions. Sense of place has also been researched using ethnographic methods, participating observations, narrating, mental maps, which was in parts inspired by Lynch's (1960) classic work *The Image of the City*, and recent techniques of emotional cartography. Some of these studies exhibit a certain positivist orientation in emphasising measurement and explanation of behaviour (*behaviourism*).

Structuralism

Principles

In the structuralist paradigm, the world is constituted by hidden processes that shape relations between living beings or other physical entities. Key tenets include:

- Causal processes cannot be directly observed.
- Causal processes become manifest in changing relations between beings or entities.
- Knowledge is conditioned by the experience of material conditions inherent in relations between beings or entities.

The causes of any material or immaterial phenomenon can be apprehended not through empirical verification but through *retroductive* reasoning about a larger system of relationships. Retroduction is a method of developing plausible theories about the workings of the *infrastructure* underpinning the *superstructure* of appearance in the world. The latter, however, may feed back to the former, so that material conditions and relations mutually shape each other. In structuralism, the notion of *dialectics* is fundamental to understanding change.

Examples in urban research

The industrial city is the spatial manifestation of the capitalist relations of production, which, according to Marx's analysis of the political economy (Marx 1887), ultimately govern social life. Although England was one of the wealthiest countries in the world, Engels (1844) observed the abject living conditions of the working class suffering from poor housing, pollution, overcrowding and lack of sanitation in English cities. It appeared the that the contradictions of capitalism were laid bare in cities, which emerged as the locus for class conflict and eventually social progress.

Post-industrial and entrepreneurial urbanism, viewed through a structuralist lens, emerged from new needs of capital under post-Fordist capitalism characterised by monopolisation, market saturation and a new international division of labour. The production of urbanisation, supported by particular, entrepreneurial forms of urban governance, has come to be a key driver of advanced economies (Harvey 1987, 1989, 2013). The urban outcomes of these processes include the spatial separation of functions, suburbanisation along transport routes, privatisation and financialisation of urban services, speculative land sales and public-sector supported real estate investment.

1.2. Critiques of the paradigms

Each paradigm implies in parts a critique of the other two, and in recent years, we have seen some convergence between research, although major differences persist.

Main critiques of positivism:

- Reductionism (dissection of wholes into parts, preoccupation with quantification and linearity, disregard for specificity or historical context)
- Ecological fallacy (average effects, neglect of difference and diversity)
- Naturalistic fallacy (appearances are taken as natural)
- False neutrality (normativity of rationality)

Main critiques of idealism (humanism):

- Voluntarism (disregard or ill specification of social forces)
- Extreme relativism
- Generalisation paradox
- Limited ability to translate into actions or to policy outcomes

Main critiques of structuralism:

- Social determinism (preoccupation with relations of production, disregard of agency, specificity)
- Method of retroduction (impossibility of verification)

Conclusions and outlook

The different epistemological paradigms have inspired distinct ways of studying and interpreting urban systems. With its emphasis on processing of quantitative data, urban analytics has a certain tendency to identify the 'measurable' with the 'real' in positivist fashion, but one may argue that urban analytics of the 21st century should be so applied as to enable us to look at cities in many different ways (spatial, social, experiential, subjective). Throughout out this module, we will review how the different paradigms have been applied in the study of urban systems and where they reach their limits. We will also explore latest ideas on how urban analytics may make novel conceptual and methodological contribution.

References

Essential [*] and recommended

McKenzie, R.D., 1924. The Ecological Approach to the Study of the Human Community. *American Journal of Sociology*, 30(3), 287–301. https://doi-org.libproxy.ucl.ac.uk/10.1086/213698

Park, R.E. (1936). Human Ecology. *American Journal of Sociology*, 42(1), 1–15. https://doi-org.libproxy.ucl.ac.uk/10.1086/217327

Sheppard, E. (2015).**[*]** Thinking geographically: globalizing capitalism and beyond. *Annals of the Association of American Geographers*, *105*(6), 1113–1134. https://doi-org.libproxy.ucl.ac.uk/10.1080/00045608.2015.1064513

Concepts and debates

Alonso, W. (1964). *Location and land use: Toward a general theory of land rent.* Cambridge, Mass.: Harvard University Press. UCL Library

Burgess, E.W. (1925[1967]). The growth of the city: An introduction to a research project. In: Park, R.E., Burgess, E.W. and McKenzie, R.D. (ed.). *The city.* London: Chicago University Press. UCL Library

Engels, F. (1844[1977]). *The condition of the working-class in England: From personal observation and authentic sources.* London: Lawrence & Wishart. UCL Library

Giddens, A. (1974). *Positivism and sociology*. London: Heinemann Educational. UCL Library

Harvey, D. (1978). The urban process under capitalism: a framework for analysis. *International Journal of Urban and Regional Research*, *2*(1–3), 101–131. https://doi-org.libproxy.ucl.ac.uk/10.1111/j.1468-2427.1978.tb00738.x

Harvey, D. (1989). From managerialism to the entrepreneurialism: the transformation in urban governance in late capitalism. *Geografiska Annaler. Series B, Human Geography*, *71*(1), 3–17. https://doi-org.libproxy.ucl.ac.uk/10.1080/04353684.1989.11879583

Harvey, D. (2013). *Rebel cities: from the right to the city to the urban revolution.* London: Verso. UCL Library

King, L. (1984). *Central place theory*. Beverly Hills; London: Sage Publications. UCL Library

Marx, K. (1887[1996]). Capital, vol. 1. In: *Karl Marx, Frederick Engels: Collected Works, vol. 35*. London: Lawrence & Wishard; New York: International Publishers. UCL Library

Relph, E. (1976). *Place and placelessness.* London: Pion. UCL Library

Tuan, Y. (1977). *Space and place: The perspective of experience / Yi-Fu Tuan.* Minneapolis: University of Minnesota Press. UCL Library

Case studies and applications

Berry, J.L. & Rees, P.H. (1969). The Factorial Ecology of Calcutta. *American Journal of Sociology*, 74(5), pp.445–491. https://doi-org.libproxy.ucl.ac.uk/10.1111/j.1435-5597.1964.tb01283.x

Fotheringham, A., Crespo, S., & Yao, R. (2015). Exploring, modelling and predicting spatiotemporal variations in house prices. *The Annals of Regional Science, 54*(2), 417-436. https://doi-org.libproxy.ucl.ac.uk/10.1007/s00168-015-0660-6

Further reading

Berry, J.L. & Rees, P.H. (1969). The Factorial Ecology of Calcutta. *American Journal of Sociology*, 74(5), pp.445–491. https://doi-org.libproxy.ucl.ac.uk/10.1111/j.1435-5597.1964.tb01283.x

De Landa, M. (2006). *A new philosophy of society: assemblage theory and social complexity.* London: Continuum. UCL Library

Harvey, D. (1969). *Explanation in geography*. London: Edward Arnold. UCL Library

Johnson, R.J. (1986). *Philosophy and human geography.* London: Edward Arnold. UCL Library

Ley, D., & Samuels, M. (1978). *Humanistic geography. Prospects & Problems.* London: Croom Helm. UCL Library

2. Spatial Theories of Urban Systems

Urban researchers have long been interested in the study of the spatial structure of urban systems. The endeavour was to discover laws that govern cities' growth and morphological development. The fundamental conceptual building blocks were developed in the context of 19th and early 20th century economics. Today, this field, which Michael Batty has characterised as the 'New Science of Cities' (Batty 2013), focuses on the understanding and modelling of complex dynamics involved in the spatial structuring of urban systems.

2.1. Cities, space and complexity

Spatial theories of urban systems presuppose that there are universal patterns observed across all urban systems in all countries. These spatial 'laws' mainly arise out of economic activities, specifically location decisions by rational actors, such as households or firms. Such decisions combine to bottom-up processes that give rise to the spatial structure of urban systems. The term *urban systems* has a dual meaning here: it can refer to an *interurban* system of cities or to a single city with an *intraurban* connotation. In other words, cities can be viewed as systems that are themselves embedded in systems of cities (Berry 1964).

Interurban location theory: Central Place Theory

In economic thought, the bottom-up location decisions of rational actors become manifest in the *agglomeration* of activities, which arise as actors pursue savings in the cost of activities (e.g. production of goods) to increase returns, a phenomenon that is also known as *economies of scale*. Christaller developed his *Central Place Theory* (King 1984) to explain where activities are located in relation to other activities and why. He argued that the population size of cities is related to the market size of commodities produced in each city. As a result of competition for access to markets with the lowest transportation cost possible, there can only be a few large urban centres surrounded by many more smaller centres such as towns or villages. From this distribution, Christaller deduces a hierarchical urban settlement structure within which city sizes are distributed according to the *power law* (more on this in chapter 2.2.).

Intraurban location theory: urban land use

Similar universal spatial laws have been identified for the internal structure of cities. In the early 19th century, Von Thünen examined spatial patterns of land rent. Drawing on Ricardo's concept of economic rent, he proposed that land rent is inversely related to transportation cost needed to move an agricultural good from that location to its market. This fundamental principle in fact informed Christaller's *Central Place Theory* and formed the bases for later influential contributions, such as Weber's *Theory of the Location of Industries* or Alonso's *Bid-rent Model.*

Alonso's bid-rent model is part of an influential theory by which he sought to explain the location of land uses within in a city (Alonso 1964). Actors – households, firms, other organisations – compete for the best location within a city given certain trade-offs of ability to pay for rent and the profit or benefit that can be realised at a location. The ratio of cost and benefit differs for different types of actors (consistent with their *bid-rent curves*), and actors deriving greater advantage from a location outbid other actors. The emerging structure of land uses is considered generic across cities, and this structure has also been known as the *Standard Urban Model* (Fig. 2.1.), which forms the foundation

of urban economics (Fujita 1989) and the economic analysis of urban location decisions of various actors (e.g. Egan & Nield 2000).

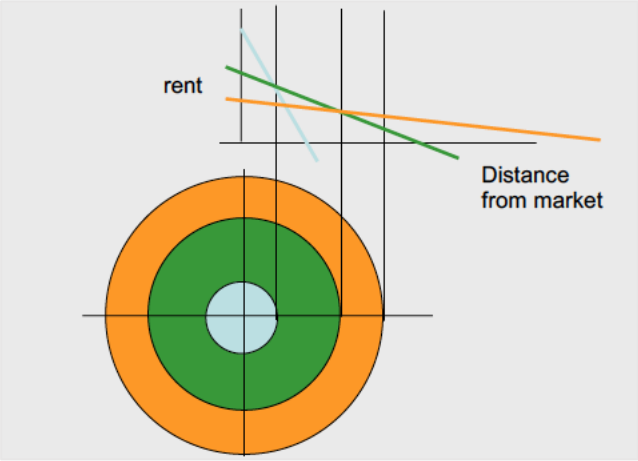

Figure 2.1. The Standard Urban Model: Land rent and land use change depending the distance to the urban centre, the core of the 'market' (courtesy: Michael Batty).

Theories of urban morphology

Morphology can be defined as the study of forms, specifically by what processes particular forms arise. In the context of cities, morphology relates to urban physical form or built form. The architect Louis Sullivan defined the famous law 'Form follows function.' This law embodies the notion that cities grow from the bottom up, i.e. their structures emerge out of uncoordinated activities in space leading to organic growth of cities (Batty 2008). In this process, researchers have discovered certain degrees of *self-similarity*, repeated forms at different levels of scale (Batty & Longley 1994; Batty n.d.). The mathematical notion pertaining to self-similarity is *fractals*.

Fractal geometries are an inherent property of the Central Place Theory. Self-similar urban hierarchies can be identified at all levels of scale, e.g. the relation between a primate city and surrounding towns compared with the relation between a town and surrounding villages. But cities also show modular forms of growth at different scales, and such regularities underpin simulations of cities and their expansion (Batty 2009). These principles reveal another key feature of urban systems inherent in all spatial theories: the unequal, 'Mandelbrotian' distribution of the concentration of activities, which can be represented and measured by fractals.

Cities as complex systems

Building on these spatial theories, notably the notion of a bottom up processes generating emerging spatial structures, urban systems have been increasingly conceptualised in terms of *complexity* (Newman 2011; Weaver 1948). Urban systems are regarded as complex in a sense that their structure arises from diverse, interacting elements (Batty 2009, ch.1). The emergent spatial structure in turn influences those interactions that gave rise to it. While this process leads to a degree of self-similarity between elements and their structure, the outcomes those interactions produce are inherently unpredictable (*ibid*). Urban systems are thus path dependent, constantly evolving and far from any equilibrium predicted by economic theories.

Another notion of complexity relates to the interurban dimension of urban systems. Cities have now become embedded in activities that extend beyond the traditional hinterland and span the entire globe. As global connections of activities intensify, the interconnectedness of urban processes leads to

increasing complexity and unpredictability, rendering the status and future of fundamental spatial laws and theories highly uncertain.

For example, the increasingly globalised process of urbanisation complicates the question of how we actually identify and define cities. Territorial definitions of urban systems are crucial to our theories on and studies of cities, such as the identification and verification of urban economies of scale. But, if in an extreme scenario of urbanisation, the entire world may become a single city (Batty 2018), such properties, which have hitherto been held essential to cities, would not be detectable any more. It must be noted, however, that this *singularity* – the world being a single city – would be highly differentiated and patterned. Nevertheless, the globalisation of urban systems and urbanisation pose new conceptual and methodological challenges for a theory and science of urban systems.

2.2. Urban Scaling Laws

Despite the complex and uncertain nature of urban systems, the principles embedded in spatial theories of urban systems reveal the existence of structures and regularities that can be informative about a wide range of urban outcomes. In particular, urban scaling laws have recently been applied to characterise forms and degrees of economies of scale at different levels of the urban settlement hierarchy.

Defining cities

Detecting economies of scales or measuring any other urban outcomes relies on a robust definition of the unit of analysis – cities. Cities have always been characterised by functional relationships between activities located more or less proximate to their cores. As a result, there are no clear-cut city boundaries; urban extents are fuzzy and unsharp. CASA has been developing methods to address this problem (Arcaute et al 2015) through a consistent, parameter-based approach to spatial city definitions and a systematic assessment of the impact of different parameter choices on outcomes.

Power laws

Power laws formally describe the very unequal distribution of events, such as city sizes in the urban settlement hierarchy as identified in the Central Place Theory (see chapter 2.1.). Power laws can be defined through the power law exponent (β), which indicates the degree of inequality in the distribution. Power laws have been empirically verified, rigorously tested and reviewed for urban systems across the globe (Cottineau et al 2017; Cottineau 2017). But some uncertainty is evident, too. Examining the variation of the specific power law that is thought to best apply to cities – *Zipf's law* formulated in 1949 – the CASA researchers (*ibid*) found that a large part of the variation can be attributed to the choice of cities' territorial definitions and technical choices of statistical parameters.

Applying recently designed methods dealing with this uncertainty (Clauset et al 2009; Shalizi 2011), power law distributions can still be clearly confirmed in urban systems across the globe. Yet, technical issues other than city definitions can compound the analysis, such as outliers and uncertainties in estimating the goodness of fit between the empirical and Zipf's optimal distribution (Pisarenko and Sornette 2012; Sornette 2009).

Scaling Laws

If the principles of power laws are applied to a relationship between *two* variables, such as city size and wealth, we speak of *scaling laws* (Arcaute & Hatna 2019). Although the idea of scaling laws have

their origin in biology (West 1997), they have been used to identify different types of economies of scale in urban systems (Bettencourt 2013; Bettencourt et al 2007). In the study of urban systems, scaling laws permit different scaling regimes – superlinear, linear and sublinear. These regimes describe the degree to which an urban outcome, e.g. the number of patents in a city, is related to a measure of scale, e.g. population size (Fig. 2.2).

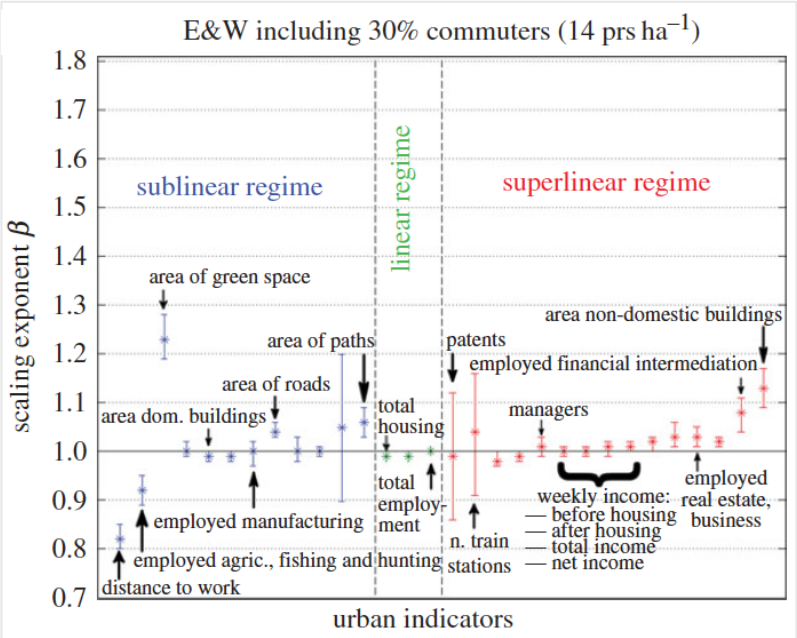

Figure 2.2. Urban indicators and their scaling regimes in the English and Welsh urban system (Arcaute et al 2015).

Like power laws, scaling laws are sensitive to the spatial definition of cities (Pumain 2004). Arcaute et al (2015) test the impact of boundaries on the detection of scaling regimes and discover that a significant number of urban outcomes vary across regimes depending on different parameter choices in the definition of cities, notably the thresholds of commuter flow and population density. Their work suggests that different thresholds and variables used in city definitions might be appropriate for different urban outcomes. To address this issue, Leitão et al (2016) have proposed an iterative approach that tests different parameter choices and city definitions against goodness-of-fit criteria and produces likely distributions and confidence intervals of scaling coefficients for each urban outcome.

Conclusions and outlook

Spatial theories of urban systems have had a long, successful history in identifying common patterns in the growth and morphology of urban systems. As increasing computational capacity permits the processing of large urban datasets, numerous conceptual and methodological spatial science contributions have been and will be made. Yet, the field is faced with challenges of increasing interconnectedness of urban systems and trends that seem to undermine some of the spatial laws that have hitherto been held to be universal. For example, the work on urban scaling laws demonstrates that urban economies of scale are difficult to detect – and perhaps increasingly so. The field's recent move towards complexity may help us understand the new urban processes, and further methodological innovations are needed to advance a spatial science of cities.

References

Essential [*] and recommended

Arcaute, E. & Hatna, E. (2019). Scaling laws: insights and limitations. In: Pumain, D. (ed.) *Scaling laws: universal solutions for urban planning or contingent products of circumstances?* Springer Series Lecture Notes in Morphogenesis. *Please note: You can find a digital copy of this chapter on Moodle > Lecture Material > Additional Material.*

Arcaute, E., Hatna, E., Ferguson, P., Youn, H., Johansson, A. & Batty, M. (2015). Constructing cities, deconstructing scaling laws. *Journal of the Royal Society Interface* 12(102), p.20140745. https://doi-org.libproxy.ucl.ac.uk/10.1098/rsif.2014.0745

Batty, M. (2018).**[*]** Inventing Future Cities. Cambridge MA: MIT Press, ch. 1-2. UCL Library *Note: You can find a digital copy of these two chapters on Moodle > Lecture material > Additional material.*

Batty, M. (2008). The Size, Scale, and Shape of Cities. *Science*, 319(5864), pp. 769–771. https://doi-org.libproxy.ucl.ac.uk/10.1126/science.1151419

Cottineau, C. Hatna, E., Arcaute, E. and Batty, M. (2017). Diverse cities or the systematic paradox of Urban Scaling Laws. *Computers, Environment and Urban Systems*, 63, 80–94. https://doi-org.libproxy.ucl.ac.uk/10.1016/j.compenvurbsys.2016.04.006

Pumain, D. (2004). Scaling Laws and Urban Systems. *Santa Fe Institute Working Paper* https://www.santafe.edu/research/results/working-papers/scaling-laws-and-urban-systems

Concepts and debates

Alonso, W. (1964). *Location and land use: Toward a general theory of land rent*. Cambridge, Mass.: Harvard University Press. UCL Library

Batty, M. (2013). *The New Science of Cities*. Cambridge, US; London: The MIT Press. https://www-jstor-org.libproxy.ucl.ac.uk/stable/j.ctt9qf7m6

Batty, M. (2009) 'Cities as Complex Systems: Scaling, Interaction, Networks, Dynamics and Urban Morphologies', in Meyers, R. A. (ed.) *Encyclopedia of Complexity and Systems Science*. New York, NY: Springer New York, pp. 1041–1071. https://doi-org.libproxy.ucl.ac.uk/10.1007/978-0-387-30440-3_69

Batty, M. (no date) Mike Batty's Lectures on Models, Complexity, and Smart Cities at various places. Available at: http://www.spatialcomplexity.info/.

Batty, M., & Longley, P. (1994). *Fractal Cities: a geometry of form and function*. London; San Diego: Academic Press; freely available at http://www.fractalcities.org/.

Berry, B. J. L. (1964) Cities as system within systems of cities. *Papers of the Regional Science Association*, 13(1), pp. 147–163. https://doi-org.libproxy.ucl.ac.uk/10.1111/j.1435-5597.1964.tb01283.x

Bettencourt, L.M.A., Lobo, J., Helbing, C., Kühnert, West, G.B. (2007). Growth, innovation, scaling, and the pace of life in cities. *PNAS: Proceedings of the National Academy of Sciences of the United States of America.* 104(17), 7301–7306. https://doi-org.libproxy.ucl.ac.uk/10.1073/pnas.0610172104

Bettencourt, L.M.A. (2013). The Origins of Scaling in Cities. *Science.*, 340(6139), pp.1438–1441. https://doi-org.libproxy.ucl.ac.uk/10.1126/science.1235823

Clauset, A., Shalizi, C.R. & Newman, M.E.J. (2009). Power-law distributions in empirical data. *SIAM Review* 51(4), 661-703. https://doi-org.libproxy.ucl.ac.uk/10.1137/070710111

Cottineau, C. (2017). MetaZipf. A dynamic meta-analysis of city size distributions. *PLOS ONE* 12 (8), e0183919. https://doi-org.libproxy.ucl.ac.uk/10.1371/journal.pone.0183919

Fujita, M. (1989). *Urban Economic Theory*. *Land Use and City Size*. Cambridge MA: Cambridge University Press. https://doi-org.libproxy.ucl.ac.uk/10.1017/CBO9780511625862

King, L. (1984). Central place theory. Beverly Hills; London: Sage Publications. UCL Library

Leitão, J.C., Miotto, J.M., Gerlach, M., Altmann, E.G. (2016). Is this scaling nonlinear? *Royal Society Open Science*, 3(7), 150649. https://doi-org.libproxy.ucl.ac.uk/10.1098/rsos.150649

Mandelbrot, B. (1967) 'How Long Is the Coast of Britain? Statistical Self-Similarity and Fractional Dimension', Science, 156(3775), pp. 636–638. https://doi-org.libproxy.ucl.ac.uk/10.1126/science.156.3775.636

Newman, M. E. J. (2011). Resource Letter CS–1: Complex Systems. *American Journal of Physics*, 79(8), pp. 800–810. https://doi-org.libproxy.ucl.ac.uk/10.1119/1.3590372

Pisarenko, V.F., Sornette, D. (2012). Robust statistical tests of Dragon-Kings beyond power law distributions. *The European Physical Journal.*, 205(1), 95–115. https://doi-org.libproxy.ucl.ac.uk/10.1140/epjst/e2012-01564-8

Shalizi, C.R. (2011). Scaling and Hierarchy in Urban Economies. arXiv (Cornell University Library) 1102.4101. https://arxiv.org/abs/1102.4101

Sornette, D. (2009). Dragon-Kings, Black Swans and the Prediction of Crises. *International Journal of Terraspace Science and Engineering* 2(1), 1–18. https://arxiv.org/abs/0907.4290

Weaver, W. (1948) 'Science and Complexity', American Scientist, 36(4), pp. 536–544. Available at: https://shibbolethsp.jstor.org/start?entityID=https%3A%2F%2Fshib-idp.ucl.ac.uk%2Fshibboleth&dest=https://www.jstor.org/stable/27826254&site=jstor.

West, G.B. (1997). A General Model for the Origin of Allometric Scaling Laws in Biology. *Science.*, 276(5309), 122–126. https://doi-org.libproxy.ucl.ac.uk/10.1126/science.276.5309.122

Case studies and applications

Egan, D.J. & Nield, K. (2000). Towards a Theory of Intraurban Hotel Location. *Urban Studies* 37(3), 611-621. https://doi-org.libproxy.ucl.ac.uk/10.1080/0042098002140

Longley, P., & Batty, M. (2003). Advanced spatial analysis: the CASA book of GIS. Redlands, Calif: ESRI Press. UCL Library *Please note: a digital copy of this item is provided in Lecture Material > Additional Material.*

Santa Fe Institute (no date). Complexity Explorer. Available at: http://www.complexityexplorer.org/.

Thunen.exe in 'Lecture Material' > 'Additional Material'.

Further reading on agglomeration

Puga, D. (2020). The magnitude and causes of agglomeration economies. *Journal of Regional Science* 50(1), 203-219. https://doi-org.libproxy.ucl.ac.uk/10.1111/j.1467-9787.2009.00657.x

Rosenthal, S.S. & Strange, W.C. (2004). Chapter 49 – Evidence on the Nature and Sources of Agglomeration Economies. In: Henderson, J.V. & Thisse, J.F. (Ed.) *Handbook of Regional and Urban Economics* vol. 4. Amsterdam: Elsevier, 2119-2171. https://doi-org.libproxy.ucl.ac.uk/10.1016/S1574-0080(04)80006-3

3. Society and Space

Having looked at spatial theories on urban systems, we now examine more closely the concept of space. Spatial theories view space as a sphere in which we can identify certain laws that universally shape the growth and morphology of cities. But how does space relate to other social processes, such as those identified by structuralists (chapter 1). Are spatial laws unaffected by social processes? Are spatial structures expressions of social processes? In order to answer these questions, we need to conceptualise the relationship between society and space.

3.1. 'Space is society'

'Space is society'. This is the answer by Manual Castells (1996, 441) to the question of how the social and spatial spheres relate to each other. In fact, notions of society-space relations differ between epistemological orientations in the social sciences (see chapter 1). Fundamental concepts describing the social sphere come from sociology (Weber 1922) and include:

- *society*: the system of all social relations arising from interacting human beings;
- *culture*: shared ways of thinking, understanding, communicating and evaluating that shape common ways of life;
- *social structure*: relatively persistent relations between individuals and groups;
- *community*: a group constituted by individuals with an emotional attachment to this group, shared goals, values and practices;
- *norms*: expectations with respect to behaviour of individuals in particular social situations;
- *social practice*: unconscious and conscious action influencing others and being influenced by others; and
- *power*: the capacity of an actor to influence other actors.

Fundamental concepts in the spatial realm include *distance, location, scale, area, position, movement and networks* (Longley et al 2015; Jessop et al 2008). Much of the study of urban systems is concerned with how the elements of the social and spatial dimensions combine and produce specific urban phenomena and outcomes. Some terms spanning both the social and spatial spheres include *place*, *territory* and, of course, *cities.*

3.2. Three notions of society-space relations

We can distinguish three fundamental notions – autonomy, directed causality and co-constitution.

Autonomy of space

Theories ascribing a high degree of autonomy to space, if not a causal role to shaping society, include human ecology, wherein the socio-spatial structure of cities arises out of ecological competition for access to resources. Park (1936, 4) defines a community as a "territorially, organised population [that is] more or less completely rooted in the soil it occupies." Urban systems emerge out of this fundamentally spatial relationship of interdependence. Industrial location theory and land use theory argue that the structure of urban systems arises from location decisions of rational actors, who consider trade-offs to minimise cost and maximise utility and locate accordingly. Rational location in space is one condition for greater social welfare.

Directed causality

In structuralist thought, spatial structures result from social relations. Marx-inspired geographers argue that urbanism in capitalist cities reflects unequal power relations whereby space is appropriated and structured in a way that suits the needs of the powerful, capitalist class and its allies. For example, Harvey (1978) argues that urbanisation is driven by the need to accumulate capital and prevent its devaluation. Structuralists describe positivists' autonomous view of space as 'spatial fetishism'.

Simmel (1903) extends and modifies this thinking in his classic work *The metropolis and mental life.* While he accepts that the city is an outcome of wider social forces, he also admits some influence of space on social relations. Faced with the dissolution of traditional social bonds, the impersonal relationships imposed by the 'money-economy' and the need for specialisation, all of which become manifest in the city, urban dwellers adopt a 'blasé' attitude and simultaneously emphasize their individuality to cope with day-to-day life in cities and preserve a sense of security.

Co-constitution: the socio-spatial dialectic

A third set of theories holds that social and spatial realms are inseparably linked: they *dialectically* constitute each other and are *homologous*, i.e. they arise from the same generative process. Although this idea is implicit in earlier work, Soja (1980) develops the explicit notion of a *socio-spatial dialectic*. Spatial structures result from social relations, which in turn are constructed over space. Space consists of locally specific, historically evolved structures (*created* space), which are experienced by humans. Humans act upon or react to this experience and engage in practices that may alter social, material conditions and relations. Agency thus produces plural (locally specific) outcomes, which may reinforce social relations or subvert them. Examples for the latter, studied from a socio-spatial perspective, include miners' strikes (Massey 1984), immigrant rights movements in the US (Leitner et al 2008) and urban riots in Paris and London (Enright 2017).

Figure 3.1. The suburbs of Phoenix: expression of and conditions for modern social relations. (Source: writeopinions.com/urban-sprawl)

Soja argues that the socio-spatial dialectic integrates the spatial and the social domains and admits agency while rejecting universality, ahistoricity and spatial fetishism implicit in positivist thought.

The emphasis is on space as relational construct (e.g. concentration versus fragmentation) as opposed to an absolute, geometric 'container' lending *context* to society. In this sense, the socio-spatial dialectic, which later work also refers to as *spatiality*, *spatial dialectics* or *socio-spatial theory* (Leitner et al 2008), is a post-structural concept in the study of cities.

Conclusions and outlook

Based on varying theories on the relationship between society and space, we can distinguish three broad notions of urban systems.

(1) urban systems arise – at least in parts – out of autonomous spatial laws;
(2) urban systems are a product of social relations, specifically economic relations of production; and
(3) the dialectic of social relations and spatial structures generates urban systems with unique socio-spatial configurations, denying the possibility of universal, uniform spatial laws or social determinism.

These notions are often aligned with different epistemological positions in the social sciences. Recognising these orientations can help us identify our own, often tacit assumptions about the workings and the character of urban systems.

References

Essential [*] and recommended

Soja, E. (1980). **[*]** The Socio-Spatial Dialectic. *Annals of the Association of American Geographers*, *70*(2), 207–225. https://doi-org.libproxy.ucl.ac.uk/10.1111/j.1467-8306.1980.tb01308.x

Simmel G. (1903[1971]). *The metropolis and mental life*. London: Teaching Collection, UCL History of Art (HART2227). UCL Library

Sheppard, E. (2019). Sociospatial dialectic. *The Wiley Blackwell Encyclopedia of Urban and Regional Studies*, 1-5. https://doi-org.libproxy.ucl.ac.uk/10.1002/9781118568446.eurs0301

Concepts and debates

Jessop, B., Brenner, N. & Jones, Martin. (2008). Theorizing sociospatial relations. *Environment and Planning. D, Society & Space*, *26*(3), 389-401. https://doi-org.libproxy.ucl.ac.uk/10.1068/d9107

Lefebvre, H., (1991). *The production of space*. Oxford: Blackwell. UCL Library

Leitner, H., Sheppard, E., & Sziartot, K. M. (2018). The Spatialities of Contentious Politics. *Transactions of the Institute of British Geographers*, 33(2), 157–172. https://www-jstor-org.libproxy.ucl.ac.uk/stable/30133354

Longley, P., Goodchild, M., Maguire, D.J. & Rhind, D.W. (2015). *Geographic information science & systems.* Hoboken, NJ : John Wiley & Sons. http://app.knovel.com/web/toc.v/cid:kpGISSE001/viewerType:toc//root_slug:geographic-information-science

Massey, D. (1984). *Spatial divisions of labour: social structures and the geography of production*. London: Macmillan. UCL Library

Park, R.E. (1936). Human Ecology. *American Journal of Sociology*, 42(1), 1–15. https://doi-org.libproxy.ucl.ac.uk/10.1086/217327

Weber, M. (1922[1962]). *Basic concepts in sociology*. Secaucus, N.J.: Citadel. UCL Library

Case studies and applications

Enright, T. (2017) The political topology of urban uprisings. *Urban Geography*, 38:4, 557-577. https://doi-org.libproxy.ucl.ac.uk/10.1080/02723638.2016.1168568

Further reading

Gregory, D. & Urry, J. (1985). *Social relations and spatial structures.* London: Macmillan. UCL Library

McDowell, L. (1993). Space, place and gender relations: Part I. Feminist empiricism and the geography of social relations. *Progress in Human Geography*, 17(2), 157–179. https://doi-org.libproxy.ucl.ac.uk/10.1177/030913259301700202

Murdoch, J. (2006). *Post-structuralist geography a guide to relational space*. London: SAGE. UCL Library

4. Cities and Urbanisation

Urbanisation is clearly a central theme in the study of urban systems. But why is the world is urbanising? And what theoretical resources can help us make sense of diverse urbanisation trends across the globe? We review different theories of urbanisation and identify their salient characteristics in terms of epistemology and methodology. We will also apply our understanding of society-space relations in order to interpret urbanisation trends.

4.1. Demographic perspectives

The assertion that we are entering an 'urban age' owes its popularity to demographic perspectives of urbanisation. While many European cities are not growing much, or are even shrinking, cities in Asia, Africa, and the Americas are expanding rapidly. The United Nations (United Nations 2018) estimate that 55% of the world's population currently reside in urban areas and predict that more than two thirds (68%) will do so by 2050. Urbanisation is viewed as a result of population growth and rural-urban or international migrations.

Cities act as attractors of people and industries due to the agglomeration benefits (economies of scale and of scope) they offer. This view is held by location theorists and economic geographers, who – based on neoclassical and related assumptions – proposed dynamic models for the emergence of urban systems.

- The **stages of urban development** (Berg et al 1982; see Pacione 2009, chapter 4) describe the evolution of *functional urban regions* as cyclical. The resulting phases comprise urbanisation, suburbanisation, disurbanisation and reurbanisation.
- The model of **differential urbanisation** (Geyer & Kontuly 1993; Kontuly & Geyer 2003) explains the evolution of hierarchical urban systems based on selective migratory flows between settlements of different sizes.

These models still inform explanations of the emergence of urban settlement structures in Europe and the US over the last 100-200 years, including phenomena such as 'edge cities' (Garreau 1992) or widespread suburbanisation (Bourne 1996). The models are also empirically tested in other contexts (e.g. South Africa, see Geyer 2018) and resonate with reasoning on urbanisation as a result of the intrinsic qualities of cities (e.g. Angel 2011; Glaeser 2011).

4.2. Critical perspectives

Critical perspectives emphasise the role of the **political economy** and view urbanisation essentially as a spatial outcome of the need for capital accumulation. Technological innovations in logistics and communication has enabled cities to grow beyond the limits of what their adjacent hinterlands could sustain (Harvey 1996). As a result, cities could expand to suit the increasing pressure to accumulate capital. In addition, since technological innovation, global shifts in production and over-accumulation are a constantly evolving by-product of the capitalist mode of production, the built environment always lags behind in terms of providing optimal conditions for accumulation. A continuous process of transformation of the built environment ensues.

This transformation occurs globally and becomes manifest in **planetary urbanisation** (Brenner & Schmid 2012), which comprises processes of *concentrated* and *extended urbanisation*. While the former refers to agglomeration, the latter involves places that ostensibly remain untouched by urbanisation, transformation within the existing built structure (*creative destruction*) and global

networks of communication (Brenner 2013). Urban research should focus on the socio-spatial processes through which variegated urban landscapes are produced (*ibid*, 99) with the aim to develop a critique of pervasive urbanisation.

Figure 4.1. Global maritime trading routes: a phenomenon of *planetary urbanisation*? (Source: UCL shipmap.org)

By contrast, **postcolonial** perspectives propose the *provincialisation* of urban theory. Global meta narratives of urbanisation are thought to be ill-specified and a product of a predominantly Western research tradition (Leitner & Sheppard 2016; Robinson 2011). Urbanism in the Global South does not fit into any of the schemata of modern urban theory, including concepts such as *peri-urban development, exo-urbanisation* or *in-situ urbanisation* (see Pacione 2009, chapter 21), which remain grounded in the point of view of the North. Hence, theoretical work in areas outside the core of knowledge production need to be advanced and employed to conceptualise the plural forms of urbanisation, for example by means of in-depth comparative urban research (Robinson 2016).

Conclusions and outlook

Urbanisation can take diverse forms, and there currently is a vivid debate in urban studies on how diverse urban phenomena can be understood. The academic views can be broadly categorised into totalising narratives informed by demographic, economic or structuralist orientations and peripheralising narratives stressing pluralism. Across these views, critical urban researchers emphasise the need for a significant shift in focus away from 'settlement' notions of cities towards a contextual, topological view of urban systems.

References

Essential [*] and recommended

Angel, S., Parent, J., Civco, D.L., Blei, A., & Potere, D. (2011). The dimensions of global urban expansion: Estimates and projections for all countries, 2000–2050. *Progress in Planning*, 75(2), pp.53–107. https://doi-org.libproxy.ucl.ac.uk/10.1016/j.progress.2011.04.001

Brenner, N. (2013). [*] Theses on Urbanization. *Public Culture*, 25(1 69), 85-114. https://doi-org.libproxy.ucl.ac.uk/10.1215/08992363-1890477

Geyer, H., & Kontuly, T. (1993). A Theoretical Foundation for the Concept of Differential Urbanization. *International Regional Science Review*, 15(2), 157-177. https://doi-org.libproxy.ucl.ac.uk/10.1177/016001769301500202

Kontuly, T., & Geyer, H. (2003). Lessons Learned from Testing the Differential Urbanisation Model. *Tijdschrift Voor Economische En Sociale Geografie*, 94(1), 124-128. https://doi-org.libproxy.ucl.ac.uk/https://doi.org/10.1111/1467-9663.00242

Concepts and debates

Bourne, L. (1996). *Reinventing the suburbs: Old myths and new realities*. Progress In Planning, 46, 163-&. https://doi-org.libproxy.ucl.ac.uk/10.1016/0305-9006(96)88868-4

Brenner, N., & Schmid, C. (2014). The Urban Age in Question. *International Journal of Urban and Regional Research*, *38*(3), 731–755. https://doi-org.libproxy.ucl.ac.uk/10.1111/1468-2427.12115

Garreau, J. (1992). *Edge city: Life on the new frontier*. New York; London: Anchor Books. UCL Library

Glaeser, E. (2011). *Triumph of the city. How Our Greatest Invention Makes Us Richer, Smarter, Greener, Healthier, and Happier.* London: Pan Books. UCL Library

Harvey, D. (1996). Cities or urbanization? *City*, *1*(1–2), 38–61. https://doi-org.libproxy.ucl.ac.uk/10.1080/13604819608900022

Leitner, H. & Sheppard, E. (2016). Provincializing Critical Urban Theory: Extending the Ecosystem of Possibilities. *International Journal of Urban and Regional Research*, 40(1), pp.228–235. https://doi-org.libproxy.ucl.ac.uk/10.1111/1468-2427.12277

Robinson, J. (2016). Comparative Urbanism: New Geographies and Cultures of Theorizing the Urban. *International Journal of Urban and Regional Research*, 40(1), 187-199. https://doi-org.libproxy.ucl.ac.uk/10.1111/1468-2427.12273

Robinson, J. (2011). Cities in a world of cities: The comparative gesture. *International Journal of Urban and Regional Research*, 35(1), 1-23. https://doi-org.libproxy.ucl.ac.uk/10.1111/j.1468-2427.2010.00982.x

United Nations (2018). World Urbanization Prospects: The 2018 Revision. (United Nations, Department of Economic and Social Affairs). Retrieved from https://population.un.org/wup/.

Case studies and applications

Geyer, N. (2018). Counterurbanization in South Africa: Measuring migration significance. *Regional Science Policy & Practice*, *10*(1), 3-14. https://doi-org.libproxy.ucl.ac.uk/10.1111/rsp3.12105

Further reading

Pacione, M. (2009). *Urban Geography: A Global Perspective*. London, New York: Routledge, chapter 4. UCL Library

5. Mobilities

Mobility is an essential part of urban, social life. Social theories of mobility emphasise the practical, social and transformative nature of mobility and thus differ from notions in engineering and economic, wherein mobility is a regarded as *derived demand* resulting from *utility*-maximising choices (Domencich & McFadden 1975; Oppenheim, 1995; Wegener & Fuerst 2004). We examine three important social theories on mobility and discuss their implications for the contemporary study of urban systems.

5.1. Theories of mobility

Time geography

The *time geographic* perspective proposed by the Lund School (Hägerstrand 1970, 1978; Lenntorp 1978) proposes a range of principles and concepts in relation to individuals' biographies and daily routines, which are constituted by physical movements over different temporal and spatial scales. There is a fundamental distinction between

- Individual's life-paths in space and time (Fig. 5.1.), which result from individual's decisions under certain constraints limiting individuals' spatial ranges. Constraints on mobility appear as the maximum range of possible locations that can be visited in a given time interval (*space-time prism*).
- Spatio-temporal constraints imposed by *authority*, *capacity* and *coupling constraints*, which limit individual's access within their space-time prisms.

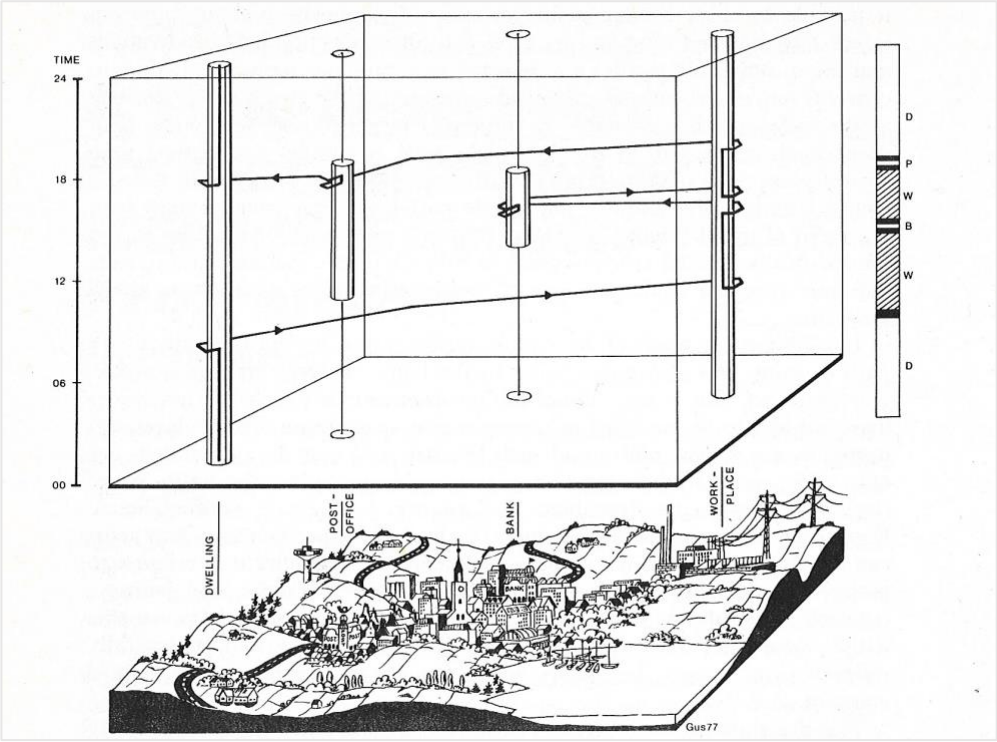

Figure 5.1. An individual's daily space-time path in the city (Lenntorp 1978).

Taking all individuals' life paths together reveals the spatio-temporal organisation of society. Different types of mobility (residential, daily) reflect different compositions of individual and spatio-temporal constraints.

Structuration theory

Structuration theory (Giddens 1984) focuses on day-to-day routines that make up social life. Routines are repeated individual practices, whose relative fixity in space-time leads to institutionalisation, which are relatively stable structural features of social systems. Institutions are a result and a condition of day-to-day practices, which reproduce these institutions. Central to this reproduction are co-presences of social agents as part of routine encounters. These encounters are sustained through reflexive acts grounded in the practical consciousness of agents, which is formed by the cumulative experience of social relations in space and time.

Giddens does not directly discuss mobility, but physical movement is implied in spatially and temporally structured encounters. In other words, mobility makes encounters possible and thus is routinely part of day-to-day life; in particular as social relations stretch out over increasingly long distances (*space-time distanciation*). In its practical character, mobility is a socially organised or institutionalised practice that constitutes modern social life.

Mobilities paradigm

A third perspective has recently evolved and is known as the new 'mobilities paradigm' (Sheller and Urry 2006; Urry 2007). The fundamental premises are:

- Movement, not stasis, is to be taken as the 'natural' state of social phenomena; movement is the necessary starting point of efforts to understand the social world;
- Movement, potential movement and blocked movement are the media through which economic, social and political relations are constituted;
- More precisely, social relations are formed, shaped and sustained through an individually organised rhythm of face-to-face co-presences made possible by multiple intersecting *mobility systems*.

The mobilities paradigm emphasises *networked individualism* (Urry 2014) and the social expectations, forces and constraints in forming those networks over varying distance. Material, immobile systems (e.g. large-scale mobility-enabling physical infrastructure) as well as objects (e.g. mobile phones) are part of mobility, and essential elements in constituting and transforming contemporary social relations. Castells (1996) put forward similar arguments, which are associated with his concepts of *network society* and *space of flows*.

5.2. Types and examples of mobility research

Two frequently discussed kinds of urban mobility are residential and daily mobility. Latest approaches to studying those types of mobility, such as Pacione (2009), Coulter et al (2016), van Ham et al (2014), Lansley & Li (2018), Kandt & Leak (2019), Kwan (2004) and Longley & Adnan (2014), share the following features:

- An emphasis on mobility as an active practice shaping the life course and vice versa – rather than only the life course shaping mobility;
- Mobility as a strategy involving the use of various mobility systems (from human-object couplings to vast infrastructures) to sustain social networks and existence;
- An intimate link between spatial and social mobility as well as engagement in networks and status;

- A mutual relationship between mobility and subjective social positioning (e.g. mobility and ageing)
- An emphasis upon *longitudinal* data sources (as opposed to *cross-sectional* sources) and mixed methods combining spatial trajectories with subjective accounts.

Conclusions and outlook

Mobility has come to be a defining mode of shaping and sustaining social relations formed of increasing spatial distances. Since mobility is implicated in all social practices, it is fundamental to the reproduction of contemporary social life and – by extension – urban systems. Research should attend to the dynamic character of urban phenomena, and urban analytics may be well placed to make innovative contributions using a range of methods and data sources, including novel longitudinal, 'big' datasets.

References

Essential [*] and recommended

Sheller, M. & Urry, J. (2006).[*] The New Mobilities Paradigm. *Environment and Planning A*, 38(2), 207–226.https://doi-org.libproxy.ucl.ac.uk/10.1068/a37268

Hägerstrand, T. (1970). What about people in regional science? *Papers in Regional Science*, *24*(1), 7–24. https://doi-org.libproxy.ucl.ac.uk/10.1007/BF01936872

Concepts and debates

Castells, M. (1996). *The Rise of the Network Society*. Chichester: Wiley-Blackwell. https://doi-org.libproxy.ucl.ac.uk/10.1002/9781444319514

Giddens, A. (1986). *The constitution of society: outline of the theory of structuration*. Cambridge: Polity Press. https://ebookcentral.proquest.com/lib/ucl/detail.action?docID=1221197

Coulter, R, van Ham, M & Findlay, AM, 2016. Re-thinking residential mobility. *Progress in Human Geography*, 40 (3), 352-374. https://doi-org.libproxy.ucl.ac.uk/10.1177/0309132515575417

Domencich, T. & McFadden, D. (1975). *Urban travel demand: a behavioral analysis*. Amsterdam; Oxford: North-Holland Publishing Co. UCL Library

Hägerstrand, T. (1978). Survival and arena. In: Carlstein, T., Parkes, D. & Thrift, N. (1978). *Timing space and spacing time vol.2: human activity and time geography*. London: Edward Arnold, 122-145. UCL Library *Please note: a digital copy of this chapter can be found on Moodle (Lecture material > additional material).*

Urry, J. (2014). Social networks, mobile lives and social inequalities. *Journal of Transport Geography*, 21, 24–30. https://doi-org.libproxy.ucl.ac.uk/10.1016/j.jtrangeo.2011.10.003

Urry, J. (2007). *Mobilities*. Cambridge: Polity. UCL Library

Case studies and applications

Kandt, J. & Leak, A. (2019). Examining inclusive mobility through smartcard data: What shall we make of senior citizens' declining bus patronage in the West Midlands? *Journal of Transport Geography*, 79, p.1-10. https://doi-org.libproxy.ucl.ac.uk/10.1016/j.jtrangeo.2019.102474

Kwan, M.P. (2004). Gis methods in time-geographic research: geocomputation and geovisualization of human activity patterns. *Geografiska Annaler: Series B, Human Geography*, 86(4), 267–280.https://doi-org.libproxy.ucl.ac.uk/10.1111/j.0435-3684.2004.00167.x

Lansley, G. & Li, W. (2018). Consumer Registers as Spatial Data Infrastructure and their Use in Migration and Residential Mobility Research. In: Longley, P., Cheshire, J. & Singleton, A. (eds.) *Consumer Data Research*. London: UCL Press, 14-27.https://www.jstor.org/stable/j.ctvqhsn6.4

Lenntorp, B. (1978). A time-geographic simulation model of individual activity programmes. In: Carlstein, T., Parkes, D. & Thrift, N. (1978). *Timing space and spacing time vol.2: human activity and time geography*. London: Edward Arnold, 163-180. UCL Library *Please note: a digital copy of this chapter can be found on Moodle (Lecture material > additional material).*

Longley, P.A. & Adnan, M. (2015). Geo-temporal Twitter demographics. *International Journal of Geographical Information Science*, 30(2), 1–21. https://doi-org.libproxy.ucl.ac.uk/10.1080/13658816.2015.1089441

Oppenheim, N. (1995). *Urban travel demand modeling: from individual choices to general equilibrium*. New York; Chichester: Wiley. UCL Library

Van Ham, M. et al. (2014). Intergenerational transmission of neighbourhood poverty: an analysis of neighbourhood histories of individuals. *Transactions of the Institute of British Geographers*, 39(3), 402–417.https://doi-org.libproxy.ucl.ac.uk/10.1111/tran.12040

Wegener, M. & Fürst, F. (2004) *Land-Use Transport Interaction: State of the Art*. Dortmund, DE: Institut für Raumplanung, Berichte aus dem Institut für Raumplanung 46. https://doi-org.libproxy.ucl.ac.uk/10.2139/ssrn.1434678

Further reading

Carlstein, T., Parkes, D. & Thrift, N. (1978). *Timing space and spacing time vol.2: human activity and time geography*. London: Edward Arnold. UCL Library

6. Socio-spatial differentiation

Another prominent theme that has remained as current as ever is the questions of how urban systems come to be socially and spatially differentiated. We have already discussed earlier spatial theories and alluded to social theories on this subject, and here we will focus in more detail on the different processes involved in urban socio-spatial divisions. We will also review how these processes can and have been studied, understood and explained through advances in urban research.

6.1. Theories of social and residential differentiation

Socio-spatial divisions as unintended outcomes

The Chicago School (see chapter 1) viewed socio-spatial divisions of cities as unplanned, natural outcomes of human ecological processes. Later, Schelling, an economist, developed an early agent-based model to study the micro events that produce the macro phenomenon of segregation. In his *dynamic models of segregation* (Schelling 1971), agents relocate according to their racial preferences concerning their neighbours.

Schelling's simulations illustrate how individual acts produce unintended higher-level structures that feedback to individuals as conditions for their actions. The reasons *why* people seek to sort themselves lay outside the scope of his study. Nevertheless, urban scholars would argue that congregation and segregation of people ultimately results from the social meaning attached to certain perceptible attributes such as race, culture or class (Espino 2015, ch. 3). People reflexively employ these meanings and interpretations as they form their identities and socially differentiate themselves.

Social differentiation

Sociologist Bourdieu argues that the way agents classify and judge other agents and their practices depends on their own positioning in *social space*; that is the space of social relations cast by *economic* and *cultural capital* (Bourdieu 1987). Social differentiation occurs in practice by means of acts and objects that assume symbolic character in day-to-day life (Bourdieu 1998, ch.1). Residential sorting represents such an act and thus obeys the same laws as social differentiation. Consequently, social space and the structure of 'created' geographic space (see lecture 2) are homologous, co-evolve and differentiate along axes of economic and cultural distance.

Residential differentiation along the economic axis

Some theories emphasise the economic dimension of residential differentiation and focus on the unequal material opportunities and constraints experienced by social classes (see Castells 1989; Harvey 1989, ch. 4). For example, Sassen (1991) argues that in the globalised economy, cities attract and generate a high-skilled, high-paid class of professionals alongside an expanding class of low-paid, unskilled workers, while the social 'middle' rooted in manufacturing sectors disappears. Pronounced socio-spatial divisions ensue, expressing an increasingly unequal social order ranked by economic capital.

Residential differentiation along the cultural axis

Alternative views stress the role of dispositions and taste that prevail in different social milieus and recognises the role of space in forming class identities (Savage et al 2005; Parker et al 2007). In modern society, residential sorting does not just reflect material conditions; sorting is crucially

influenced by *lifestyle* and reinforces social identity. The resulting 'spatialisation of class' (Burrows & Gane 2006, 808) is further accelerated by new information and communication technology and selective unbundling of urban infrastructure (*ibid*). Graham and Marvin (2001) refer to this phenomenon as *splintering urbanism*, a process by which privatised and differentially accessible infrastructure supplants integrated, publicly provided infrastructure.

6.2. The empirical study of socio-spatial divisions

Empirical studies show overwhelming evidence of socio-spatial divisions in cities around the world, which appear in historically and regionally specific guises. Such studies are often quantitative and *ecological*, that is they take neighbourhoods or other types of spatial zones as the unit of analysis. Recent developments in urban analytics, however, have made possible investigations at the individual or household level. Two established branches of urban geography studying socio-spatial divisions are geodemographics and segregation studies.

Geodemographics

The aim of *geodemographics* is to classify and characterise neighbourhoods based on complete, available data. Geodemographic studies generate taxonomies of neighbourhoods based on the aggregate characteristics of their residents, visitors or built environment characteristics. Geodemographics involves a conscious act of interpretative and reflexive characterisation, which can resemble the method of retroduction (see chapter 1).

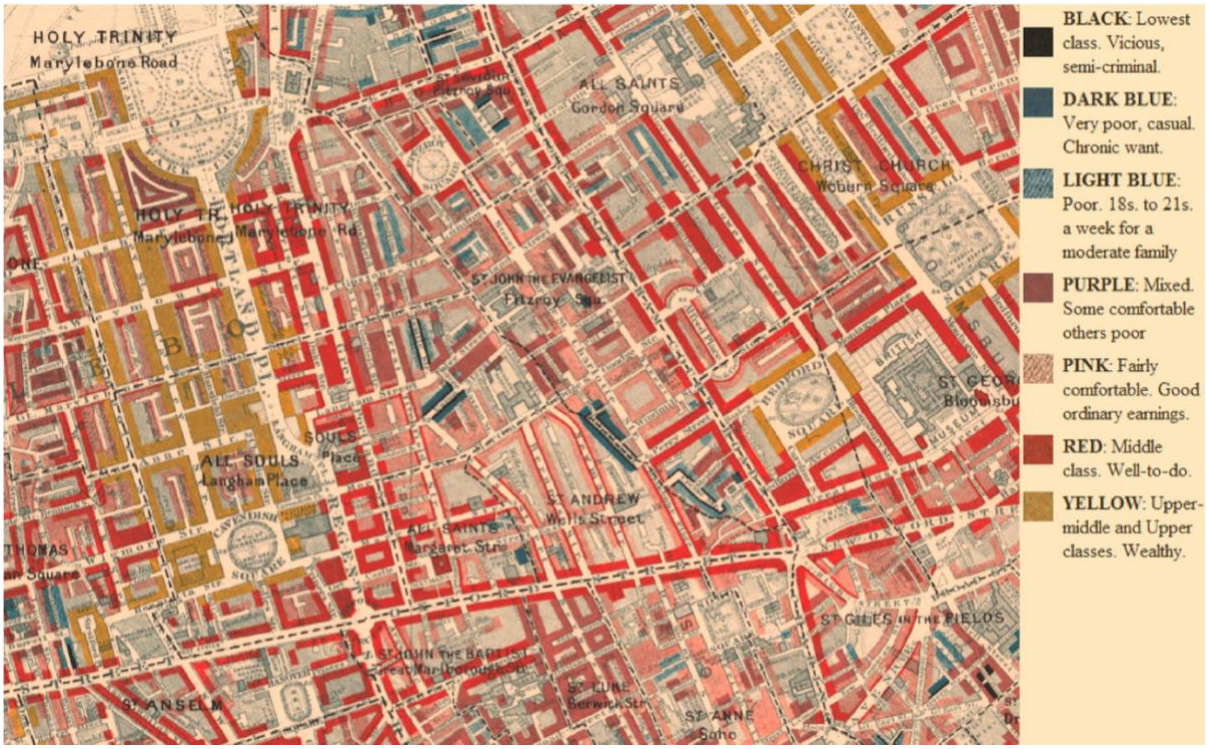

Figure 6.1. Mapping socio-spatial differentiation: Booth's famous maps of London (Source: phone.booth.lse.ac.uk)

The earliest example is the study by Booth (1897), who typified dwellings in London based extensive field work and administrative records (Fig. 6.1.). Today, researchers use multivariate analytical and exploratory techniques, most often some form of cluster analysis (Harris et al 2005; Longley & Singleton 2016). More advanced approaches combine data at different ecological levels, for example

by developing lifestyle taxonomies from social surveys (Kandt 2018) and combining them with zonal Census data to estimate lifestyle geographies using *spatial microsimulation* (Harland et al 2012). The fusion of different data sources within a geodemographic framework is a promising approach to studying socio-spatial divisions based on new and emerging forms of data.

Segregation studies

Segregation studies assess the degree to which different groups of urban dwellers live spatially proximate to each other. The degree of mixing is taken as indicator for social integration. The measurement of segregation trends and patterns remains an ongoing concern in urban research (Harris & Johnston 2018). Classic quantitative studies on socio-spatial divisions first select pre-defined variables (e.g. ethnic group, deprivation type) and measure their distribution and concentration in space.

For example, segregation indices measure ratios of discrete categories to establish the degree of *evenness* and *isolation* of groups. Lan et al (2020) apply these indicators to measure segregation in Great Britain over the last 20 years. They find that the level of segregation has reduced but the level of evenness and isolation varies significantly between ethnic groups. Poulsen et al (2011) develop measures of spatial statistics to detect geographical concentrations of ethnic groups and identify various undercurrents of segregation and mixing. More recently, advanced segregation studies use novel data, such as consumer data, to classify individuals (Kandt & Longley 2018) and measure segregation with the highest possible social, spatial and temporal resolution (Lan et al 2019).

Conclusions and outlook

Socio-spatial divisions of cities are unintended outcomes resulting from practices by socially positioned agents acting under time and space-specific institutional configurations. Social and geographical space are homologous and mutually shape each other; and this homology presents another guise of the socio-spatial dialectic. Established quantitative, empirical approaches to studying socio-spatial divisions include geodemographic classifications and segregation studies. These studies typically take spatial zones as units of analysis. Recently emerging forms of data and increased processing power, however, promise advances that socio-spatial divisions can be analysed at flexible and highly granular social, spatial and temporal resolutions.

References

Essential [*] and recommended

Burrows, R. & Gane, N. (2006). Geodemographics, Software and Class. *Sociology* 40(5), 793-812. https://doi-org.libproxy.ucl.ac.uk/10.1177/0038038506067507

Espino, N.A. (2015). [*] *Building the inclusive city: theory and practice for confronting urban segregation*. London: Routledge, **chapters 6 to 8**. https://doi-org.libproxy.ucl.ac.uk/10.4324/9781315747491

Concepts and debates

Booth, C. (1897). *Life and Labour of the People in London*. London: Macmillan & Co. UCL Library

Bourdieu, P. (1987). What makes a social class? On the theoretical and practical existence. *Berkeley Journal of Sociology*, 32, 1, 1–17.

https://shibbolethsp.jstor.org/start?entityID=https%3A%2F%2Fshib-idp.ucl.ac.uk%2Fshibboleth&dest=https://www.jstor.org/stable/41035356&site=jstor

Bourdieu, P. (1998). *Practical Reason: On the Theory of Action*. Cambridge: Polity Press. UCL Library

Castells, M. (1989). *The informational city: information technology, economic restructuring, and the urban-regional process*. Oxford: Blackwell. UCL Library

Graham, S. & Marvin, S. (2001). *Splintering urbanism: networked infrastructures, technological mobilities and the urban condition*. London: Routledge. UCL Library

Harris, R., Sleight, P. & Webber, R. (2005). *Geodemographics, GIS, and neighbourhood targeting*. Chichester: Wiley. UCL Library

Harris, R., & Johnston, R. (2018). Measuring and modelling segregation – New concepts, new methods and new data. *Environment and Planning B: Urban Analytics and City Science*, *45*(6), 999–1002. https://doi-org.libproxy.ucl.ac.uk/10.1177/2399808318808889

Harvey, D. (1989). *The urban experience.* Baltimore; London: Johns Hopkins University Press.

Parker, S., Uprichard, E. & Burrows, R. (2007). Class Places and Place Classes: Geodemographics and the spatialization of class. *Information, Communication & Society* 10(6), 902-921. https://doi-org.libproxy.ucl.ac.uk/10.1080/13691180701751122

Sassen, S. (1991). *The global city: New York, London, Tokyo.* Princeton, NJ: Princeton University Press. UCL Library

Savage, M., Bagnall, G. & Longhurst, B. (2005). *Globalization and belonging*. London: SAGE. UCL Library

Schelling, T.C. (1971). Dynamic models of segregation. *The Journal of Mathematical Sociology* 1(2), 143–186. https://doi-org.libproxy.ucl.ac.uk/10.1080/0022250X.1971.9989794

Case studies and applications

Harland, K., Heppenstall, A., Smith, D. & Birkin, M. (2012). Creating realistic synthetic populations at varying spatial scales: A comparative critique of population synthesis techniques. *Journal of Artificial Societies and Social Simulation* 15 (1), 1460–7425. https://doi-org.libproxy.ucl.ac.uk/10.18564/jasss.1909

Kandt, J. (2018). Social practice, plural lifestyles and health inequalities in the United Kingdom. *Sociology of Health & Illness* 40(8), 1294–1311. https://doi-org.libproxy.ucl.ac.uk/10.1111/1467-9566.12780

Kandt, J. & Longley, P. (2018). Ethnicity estimation using family naming practices. *PLOS One* 13(8), e0201774. https://doi-org.libproxy.ucl.ac.uk/10.1371/journal.pone.0201774

Lan, T., Kandt, J. & Longley, P. (2019). *Geographic scales of residential segregation in English cities, Urban Geography* Aug 2019, 1-21. https://doi-org.libproxy.ucl.ac.uk/10.1080/02723638.2019.1645554

Lan, T., Kandt, J. & Longley, P.A. (2020). Measuring the Changing Pattern of Ethnic Segregation in England and Wales with Consumer Registers. *Environment & Planning B: City Science and Urban Analytics*. https://doi-org.libproxy.ucl.ac.uk/10.1177/2399808320919774

Longley, P.A. & Singleton, A. (2015). *London Output Area Classification (LOAC)*. Retrieved from http://www.opengeodemographics.com/#LOAC-section, Nov 2018.

Poulsen, M., Johnston, R., & Forrest, J. (2011). Using Local Statistics and Neighbourhood Classifications to Portray Ethnic Residential Segregation: A London Example. *Environment and Planning B: Planning and Design*, 38(4), 636-658. https://doi-org.libproxy.ucl.ac.uk/10.1068/b36094

Reardon, S. & O'Sullivan, D. (2004). Measures of Spatial Segregation. *Sociological Methodology* 34, 121–162. https://doi-org.libproxy.ucl.ac.uk/10.1111/j.0081-1750.2004.00150.x

Further reading

Byrne, D. (1998). *Complexity theory and the social sciences: an introduction*. London: Routledge. UCL Library

Knox, P.L. & Pinch, S. (2010). *Urban social geography: an introduction*. Harlow: Prentice Hall. UCL Library

Pacione, M. (2009). *Urban geography: a global perspective*. London: Routledge, chapter 10. https://doi-org.libproxy.ucl.ac.uk/10.4324/9780203881927

7. Urban Disparities

We now focus on the ways in which space may affect social outcomes. We examine how urban disparities, as a particular form of socio-spatial divisions in cities, affect our individual lives and the character of urban systems.

7.1. Social consequences of urban disparities

Urban disparities refer to the spatial differences in social outcomes within cities. Unlike segregation, which may be understood as socio-spatial division between discretely defined groups, disparities refer to degrees of difference. For example, the Index of Multiple Deprivation (DCLG 2015) represents deprivation as the sum of scores pertaining to seven dimensions – income, employment, health, education, housing, environment and crime – all of which are measured at neighbourhood level.

Neighbourhood effects

The notion of *neighbourhood effects* presupposes a distinction between neighbourhood and residents' personal attributes. For example, neighbourhood poverty is thought to influence an individual's life chances over and above the personal level of poverty (van Ham et al 2012; 2013; see also Small & Feldman 2012). In other words, a poor person living in a poor neighbourhood is more disadvantaged than an equally poor person living in an affluent neighbourhood. Independent neighbourhood effects may influence a range of social outcomes such as employment, educational performance, social mobility, health or well-being. A key task in neighbourhood effects research is to identify underlying causal pathways and their *confounding*, *mediating* and *moderating* factors.

Disparities in life chances: health

Let us focus on the example of health and examine potential causal pathways linking neighbourhoods to health. The Social Determinants of Health (SDH) model (Brunner & Marmot 2009) describes how social position affects physiological processes of the body. The model identifies material, psycho-social and behavioural types of *exposure*, which include the residential environment alongside other 'risk factors' originating in various domains of society. Bodily 'interfaces' linking the environment and pathophysiological response include the nervous system, the endocrine system and epigenetics.

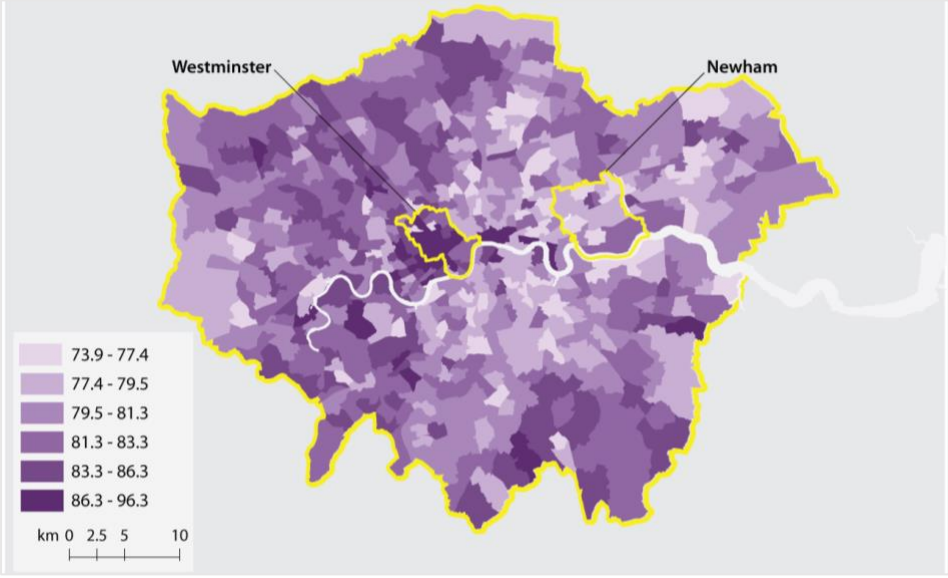

Figure 7.1. Average life expectancy at ward level in London in 2012 (courtesy: Jens Kandt).

7.2. Empirical studies on urban health disparities

Urban health disparities have been recorded around the world (GRNUHE 2010; WHO & UN-Habitat 2010). Empirical studies seek to identify the causes and impacts of urban health disparities. They often employ *cross-sectional* research designs, by which they investigate the contribution of causal factors to a particular outcome. Many studies are set up to untangle factors at different ecological levels, i.e. individual, household or neighbourhood level.

Cross-sectional, neighbourhood effects studies

Neighbourhood effects studies focus on plausible pathways linking spatial characteristics to individual outcomes. The strengths are:

- A clearly defined research programme and set of measurement techniques;
- Incorporation of multiple scales (individual, neighbourhood, city etc.);
- Adaptability to crossdisciplinary investigations; and
- Large sample sizes if not complete population coverage.

But neighbourhood effects studies are also limited by a number of factors:

- Frequent, unacknowledged grounding in the positivist paradigm and limited ability to account for complexity;
- A strong spatial framing of the problem and neglect of broader social context (liability to spatial fetishism); and
- Liability to ecological fallacy.

Furthermore, cross-sectional studies only provide a snapshot in time and rely on contemporaneous correlations between outcomes and covariates as potential evidence for causation. Hence, cross-sectional studies often require further, in-depth investigations as *mixed methods* designs or they may be extended to longitudinal designs, both of which can incorporate processes of social and residential differentiation.

Mixed methods design: Pre-mature mortality in Hong Kong

In the research project on urban disparities in Hong Kong (Kandt et al 2016), we process 80,770 mortality records to identify neighbourhood characteristics associated with premature mortality – mortality before the age of 75. We find that the risk of premature mortality is lower in more affluent neighbourhoods and in neighbourhoods with lower access to services and higher provision of public housing.

But our interpretation of these results is limited by lack of information on residential selection. Did more vulnerable residents drift into poorer neighbourhoods or the private rental sector and thus cause the associations we observe? Based on the cross-sectional spatial analysis, we sampled three neighbourhoods with particular combination of social and physical characteristics and ran focus groups with longer settled residents in these neighbourhoods. We used this qualitative method to explore wider social factors alongside neighbourhood characteristics influencing residents' well-being. Qualitative methods grounded in quantitative, spatial analysis can thus combine the respective strengths of substantive depth and population coverage.

Agent-based models

Some researchers have proposed agent-based models to explore interactions between individual and neighbourhood-level factors involved in urban health disparities (Auchincloss & Diez-Roux 2008; Auchincloss & Garcia 2015; see also Grow & Van Bavel 2017). Similar to the Schelling models, these simulations reveal system dynamics that can be investigated in different scenarios.

Conclusions and outlook

Urban disparities evidently influence our lives in a number of ways. The pathways underpinning neighbourhood effects constitute in parts the 'space→society' component of the socio-spatial dialectic. Understanding this component requires us to understand the human body as a locus of space-society relations. New research collaborations pursuing this research programme have emerged between urban geography and science, neuroscience, psychology, epidemiology, genetics and sociology. Urban Analytics and Spatial Data Science will have key contributions to make in these endeavours.

References

Essential [*] and recommended

Brunner, E. & Marmot, M. (2009). Social organization, stress, and health. In: Marmot, M. & Wilkinson, R.G. (Eds.) *Social determinants of health*. Oxford: Oxford University Press, 6-30. https://doi-org.libproxy.ucl.ac.uk/10.1093/acprof:oso/9780198565895.003.02

Small M.L. & Feldman J. (2012). [*] Ethnographic Evidence, Heterogeneity, and Neighbourhood Effects After Moving to Opportunity. In: van Ham M., Manley D., Bailey N., Simpson L., Maclennan D. (eds) *Neighbourhood Effects Research: New Perspectives*. Springer, Dordrecht https://doi-org.libproxy.ucl.ac.uk/10.1007/978-94-007-2309-2_3

Concepts and debates

Krieger, N., 2005. Embodiment: a conceptual glossary for epidemiology. *Journal of Epidemiology and Community Health* 59(5), 350–355. http://dx.doi.org/10.1136/jech.2004.024562

GRNUHE (2010). *Improving urban health equity through action on the social and environmental determinants of health*. London: Global Research Network for Urban Health Equity.

Please note: a digital copy of this report can be found on Moodle (Lecture material > additional material).

Brunner, E. & Marmot, M. (2009). Social organization, stress, and health. In: Marmot, M. & Wilkinson, R.G. (Eds.) *Social determinants of health*. Oxford: Oxford University Press, 6-30. https://doi-org.libproxy.ucl.ac.uk/10.1093/acprof:oso/9780198565895.003.02

Van Ham, M., Manley, D., Bailey, N., Simpson, L. & Maclennan, D. (2013). *Understanding Neighbourhood Dynamics: New Insights for Neighbourhood Effects Research*. Dordrecht: Springer Netherlands. UCL Library

Van Ham, M., Manley, D., Bailey, N., Simpson, L. & Maclennan, D. (2012). *Neighbourhood Effects Research: New Perspectives*. Dordrecht: Springer Netherlands. UCL Library

WHO & UN-Habitat (2010). *Hidden Cities, Unmasking and Overcoming Health Inequities in Urban Settings*. Geneva: World Health Organization & UN-Habitat. https://apps.who.int/iris/handle/10665/44439

Please note: a digital copy of this report can be found on Moodle (Lecture material > additional material).

Case studies and applications

Auchincloss, A. & Diez-Roux, A. (2008). A New Tool for Epidemiology: The Usefulness of Dynamic-Agent Models in Understanding Place Effects on Health. *American Journal of Epidemiology*, 168(1), 1–8. https://doi-org.libproxy.ucl.ac.uk/10.1093/aje/kwn118

Auchincloss, A.H. & Garcia, L.M.T. (2015). Brief introductory guide to agent-based modeling and an illustration from urban health research. *Cadernos de Saúde Pública*, 31(suppl 1), 65–78. http://dx.doi.org/10.1590/0102-311X00051615

DCLG (2015). The English Indices of Deprivation 2015 – Technical Report. (Department for Communities and Local Government). Retrieved from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/464485/English_Indices_of_Deprivation_2015_-_Technical-Report.pdf, Nov 2018.

Kandt, J., Chang, S.S., Yip, P. & Burdett, R. (2017). The spatial pattern of premature mortality in Hong Kong: How does it relate to public housing? *Urban Studies* 54(5), 1211–1234. https://doi-org.libproxy.ucl.ac.uk/10.1177/0042098015620341

Further Reading

Grow, A. & Van Bavel, J. (2017). *Agent-Based Modelling in Population Studies: Concepts, Methods, and Applications*. Switzerland: Springer, Cham. (currently not available through UCL library but available at the British Library)

Kandt, J. (2015). *The social and spatial context of urban health inequalities: Towards an interpretive geodemographic framework*. UCL Doctoral Dissertation. https://discovery.ucl.ac.uk/id/eprint/1472789/

8. Urban Governance and Planning

In this final chapter, we draw on the theoretical resources we have covered to explore how urban governance and planning link society and space. We review current urban governance approaches and influential planning paradigms. We assess the degree to which these approaches condition and are conditioned by the urban processes and outcomes we have discussed in this module.

8.1. Prevalent planning and governance paradigms

From the managerial to the entrepreneurial mode of urban governance

Harvey (1989) documents a shift in urban governance from *managerialism* to *entrepreneurialism* in the governance of cities. The defining characteristic of managerialism is a technical bureaucracy assuming the public function of planning and managing cities. By contrast, entrepreneurial urbanism views cities as competing enterprises that should seek to attract capital and people (Ward 2012, 728). Urban success is viewed as an endogenous outcome of cities' competitiveness (EU 2007). Although entrepreneurial strategies vary, they typically involve some form of public-private partnerships, speculative development and place marketing.

The entrepreneurial mode of governance has become the dominant approach to governing cities around the world. Strategies can be broadly classified into two types:

- Production-oriented: Cities mobilise, exploit and advertise their local advantages to optimise conditions for production. This may include tax breaks, business parks, special enterprise zones, particular governance arrangements.
- Consumption-oriented: Cities generate new opportunities for consumption across consumer industries including housing, commerce and leisure. Examples: urban regeneration, place marketing, tourist attractions, urban spectacles.

Strategies of both types are often taken simultaneously. Florida (2003) has called for particular measures in the consumption sphere to attract a highly successful, *creative class* and develop a competitive knowledge-based urban economy.

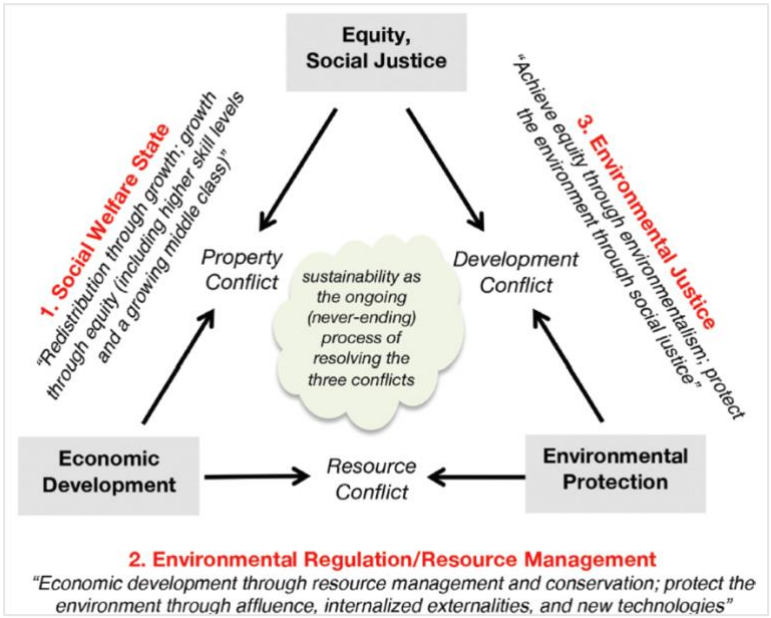

Figure 8.1. The Planner's Triangle (Campbell 2016).

Urban planning and sustainable development

The most influential planning paradigm of the last decades has been the *sustainable city*, defining economic prosperity, social justice and environmental protection as central normative goals. The importance of sustainable urban development was initially articulated in the United Nations' Agenda 21 (UN 1992) and reinforced most recently by the UN Sustainable Development Goals (UN 2015) and the New Urban Agenda (UN Habitat 2017). Simultaneous discussions have begun to focus on the concept of urban resilience (www.100resilientcities.org).

The notion of sustainable cities underpins a spatial vision of *compact cities*, which rejects functional division and urban sprawl (Jenks et al 1996). Common strategies to achieve compact urban growth are densification, mixed land-use, walkability and transit-orient development (Jabareen 2006; Kenworthy 2006) as well as climate-resilient urban designs. Yet, such measures are often undermined if not in conflict with other societal goals and economic imperatives (Campbell 1996; 2016).

8.2. Discussion: Entrepreneurial and sustainable cities

The discourse on urban entrepreneurialism and sustainable development heavily influence visions and modes of urban governance and planning. Drawing on our discussions from earlier lectures, we can formulate a number of hypotheses about the prospects of urbanisation that is simultaneously entrepreneurial and sustainable.

- The trend of reurbanisation (chapter 4 & lecture) broadly supports entrepreneurial urbanism and compact cities structures. Yet, further socio-spatial divisions are likely to ensue (chapter 6 & lecture).
- Entrepreneurial urbanism can be regarded as an institutional enabler of planetary urbanization (chapter 4 & lecture). This brings urbanisation in conflict with the goal of environmental protection.
- Entrepreneurial narratives view economic prosperity as an endogenous outcome of cities strongly emphasising agency. Yet, the unintended, 'exogenous' consequences producing uneven development are central to our understanding of social inequalities (chapter 1 & lecture).
- Production-side investments into infrastructure tend to increase mobility of capital and people (chapter 5 & lecture). Increased mobility is likely to accelerate creative destruction (chapter 4 & lecture) and uncertainty in economic, social and environmental outcomes (chapter 2 & lectures).
- An entrepreneurial view of cities demands that performance should be measured against indicators. Yet, the territorial integrity of urban governance is decreasing as urbanization becomes planetary and globally connected. Cities are embedded, open systems (sections 2 and 5 & lectures).
- Entrepreneurialism enables certain forms of bottom-up urbanism (chapter 5 & lecture), which give rise to unintended social-spatial divisions (chapter 6 & lecture) and individual life outcomes (chapter 7 & lecture).

Indeed, scholars of diverse backgrounds (e.g. Florida 2017; Harvey 1989; Pratt 2011) have identified increasing regional and urban disparities, social disadvantage, displacement and segregation as unintended outcomes of the entrepreneurial mode of urban governance .

Conclusions and outlook

Urban governance and planning comprise institutional practices at the nexus of society and space. The character and impact of these practices embody global and local normative agendas, which are currently dominated by notions of entrepreneurial urbanism and sustainable development. Some of the tensions that arise out of these agendas are symptomatic of globalising capitalism. To resolve them, some urbanists advocate a particular urban vision: the *smart city*.

References

Essential [*] and recommended

Campbell, S. (2016).**[*]** The Planner's Triangle Revisited: Sustainability and the Evolution of a Planning Ideal That Can't Stand Still. *Journal of the American Planning Association* 82(4), 388-397. https://doi-org.libproxy.ucl.ac.uk/10.1080/01944363.2016.1214080

Harvey, D. (1989). From managerialism to the entrepreneurialism: The transformation in urban governance in late capitalism. *Geografiska Annaler Series B Human Geography* 71(1), 3–17. https://doi-org.libproxy.ucl.ac.uk/10.1080/04353684.1989.11879583

Concepts and debates

Florida, R. (2003). Cities and the Creative Class. *City & Community* 2(1), 3-19. https://doi-org.libproxy.ucl.ac.uk/10.1111/1540-6040.00034

Florida, R. (2017). The new urban crisis: How our cities are increasing inequality, deepening segregation, and failing the middle class – and what we can do about it. *New York: Basic Books*. UCL Library

Jabareen, Y.R. (2006). Sustainable Urban Forms: Their Typologies, Models, and Concepts. *Journal of Planning Education and Research*, 26(1), 38–52. https://doi-org.libproxy.ucl.ac.uk/10.1177/0739456X05285119

Jenks, M., Burton, E., & Williams, K. (1996). *The compact city: A sustainable urban form? / edited by Mike Jenks, Elizabeth Burton and Katie Williams.* London: E & FN Spon. UCL Library

Kenworthy, J. (2006). The eco-city: ten key transport and planning dimensions for sustainable city development. *Environment and Urbanization*, 18(1), 67–86. https://doi-org.libproxy.ucl.ac.uk/10.1177/0956247806063947

Pratt, A.C. (2011). The cultural contradictions of the creative city. *City, Culture and Society* 2, 123–130. https://doi-org.libproxy.ucl.ac.uk/10.1016/j.ccs.2011.08.002

UN (1992). *Agenda 21*. Rio de Janeiro: United Nations Sustainable Development. https://sustainabledevelopment.un.org/outcomedocuments/agenda21

UN (2015). *Transforming our world: The 2030 agenda for sustainable development*. United Nations, sustainabledevelopment.un.org.

UN Habitat (2017). *The new urban agenda: Habitat III*. (UN Habitat). Retrieved from: http://habitat3.org/the-new-urban-agenda, Dec 2018.

Ward, K. (2012). Entrepreneurial Urbanism, Policy Tourism, and the Making Mobile of Policies. In: Bridge, G. (Ed.). *Wiley-Blackwell Companions to Geography, The New Blackwell Companion*

to the City, City Politics and Planning. Oxford, UK: Wiley-Blackwell, 726-737. https://doi-org.libproxy.ucl.ac.uk/10.1002/9781444395105.ch63

Case studies and applications

EU (2007). *State of European Cities Report: Adding value to the European Urban Audit.* (European Union Regional Policy). Retrieved from: https://ec.europa.eu/regional_policy/sources/docgener/studies/pdf/urban/stateofcities_2007.pdf, Dec 2018.

Further reading

Hall, P., & Pfeiffer, U. (2000). *Urban future 21: A global agenda for twenty-first century cities*. London: Spon Press. UCL Library

Hall, P. & Tewdwr-Jones, Mark (2010). *Urban and regional planning* (5th ed.). Abingdon, Oxon, England; New York: Routledge. UCL Library