

Chapter 28

Scales and Networks

Part II

*John Paul Jones III, Sallie A. Marston,
and Keith Woodward*

Introduction

In this chapter we discuss geographic scales and networks. Depending on one's point of view, these are either: (a) actual things that exist in the real world or (b), concepts (analytic lenses) used to study geographic phenomena. The distinction between "thingified" and "conceptual" approaches to scales and networks pivots on whether one understands them to have an ontological status: Do they exist in the world, on a par with other seemingly bedrock aspects of spatiality such as place or landscape? And if so, what do we know about them and how can we best theorize how they work? Or are they better thought of as methodological tools, reflecting an epistemology that assists us in sorting through the chaos and complexity of an unruly world? And if the latter, then what are the benefits and limitations of using these concepts in understanding our geographies?

Such questions are important in light of the fact that scales and networks are now deployed in every branch of human geography, especially in economic geography, political geography, and political ecology. They also have reach beyond the discipline; indeed, it is hard for any scholar to describe the phenomena associated with "globalization" without relying on one or the other of them. Yet if scales and networks are concepts rather than concrete spatialities, then at least some of the *explanatory* weight they have been asked to carry, as both products and determinants, should be offloaded onto more secure geographic forms, such as region or connectivity. Finally, the ontological and epistemological status of scales and networks has proven to be central to ongoing efforts at theorizing social space more generally. Hence they have wide significance in our evaluation of the objects of human geographic analysis.

Scale

Scale has such varied meaning in geography that it sometimes seems as if most of the distinctions drawn about it are merely definitional. McMaster and Sheppard (2004) offer a helpful categorization based on scale's use in cartography, biophysical geography and human geography. From cartography we have a well known use of scale based on the "representative fraction" (where RF 1:24 000 indicates that one distance unit on the map equates with 24 000 such units on the earth's surface). Within this cartographic designation, McMaster and Sheppard find another distinction between the size of a geographical area studied – its spatial extent or "scale" – and the resolution or "granularity" of the data to be collected. On this point it is important to keep in mind that there is no necessary relationship between spatial extensiveness and spatial resolution. The typical national census, for example, is conducted extensively, but at a high resolution (i.e. at a "small scale"); likewise a regression analysis using averaged data for states, provinces or other large areal units can have a large spatial extent but the data can hardly be said to reflect a high level of resolution. Still another confusion is introduced by the fact that small extents of space, when mapped (e.g. at RF 1:1 000), are referred to as "large scale" (because the actual ratio is relatively larger than, for instance, maps based on RF 1:100 000, which are referred to as "small scale"). And not lastly, when mapping is done in a digital environment of pan and zoom technology (as in GIS or Google Earth), there is no meaningful scale in terms of representative fraction (Goodchild 2004).

The problem of scale in the biophysical sciences has received a great deal of attention, but these discussions have been conducted separately from the debates in human geography. This is unfortunate, since in some respects the problems faced by physical geographers are similar and, especially in human-environment study (Manson 2008), relevant. Physical geographers have shown a keen interest in "operational" scale: the areal reach or extensiveness of environmental processes (see Bauer, Veblen and Winkler 1999; Manson 2008; Phillips 1997, 1999; Summerfield 2005). The primary problem with the operational approach arises from the fact that physical geographers deal in scales from the molecular to the planetary (Phillips 2004), at the same time that the appropriate scales of data collection and analysis shift with different objects of analysis, research questions, and methodologies. Sorting these complexities out has been a chore unto itself, but an even larger challenge is how to make linkages from one scale to another. In some process-response relationships, for example, variables that are independent at one scale become dependent at another (Phillips 2004: 90). In addition, crucial assumptions about processes and mathematical models necessary at one scale can be irrelevant at another. And finally, some concepts – such as equilibrium, complexity, and contingency – appear to be relevant only at specific scales. In a helpful review, Jonathan Phillips (2004: 97) points to "an inability to transfer representations at any given scale across the entire hierarchy of interest to physical geography," noting that methods and principles may be scale-restricted; at the same time, while seamless representation across a whole range of scales is impossible, interpreting results at one scale may in fact require embedding them within the contexts of broader or more detailed scales.

Though the connections are seldom recognized in the geography literature, there are parallels in some of the discussions about operational scale in both physical and human geography. For example, a relevant question in both subfields is: at what scale do certain processes become (ir)relevant, and what are the implications for explanation that accompany these shifts? Peter Taylor (1982) famously broached this question in human geography, wherein he concluded that political economic processes exist at three distinct “vertical” scales: (a) the global, at which resides the world-economy; (b) the nation, where the ideology of the state apparatus unfolds; and (c) the urban, the scale of daily experience. A couple of years later Neil Smith offered a landmark theoretical analysis of the production of scales under capitalism in his book, *Uneven Development* (Smith 1984). Greatly extending Taylor, Smith’s assessment of capitalism’s contradictory and disjointed character unhinged any simplistic reading of processes from scalar levels. In subsequent work (Smith 1992, 1993, 1996, 2000, 2004), Smith widened his discussions of scale to levels not previously considered, such as the body and the home (Marston and Smith 2001), as well as to other socio-cultural markers of difference (gender, race, sexuality). Another prominent scale theorist is Erik Swyngedouw (1997, 2000, and 2004). His work is noteworthy for including ecological processes alongside social ones, and for relying on ever more complex notions of interweaving, nesting, and shifting scales: “Scale configurations change as power shifts, both in terms of their nesting and interrelations and in terms of their spatial extent. In the process, new significant social and ecological scales become constructed, [while] others disappear or become transformed” (Swyngedouw 2004: 132). Finally, the research of Neil Brenner constitutes still another step forward in the move away from Taylor’s initial model. Brenner coined the term “scalar structuration” to indicate “relations of hierarchization and rehierarchization among vertically differentiated spatial units” (1998: 603; also Brenner 2001), while his later writing dovetails into network theorizing by arguing that: “Each geographical scale is constituted through its historically evolving positionality within a larger relations grid of vertically “stretched” and horizontally “dispersed” sociospatial processes, relations and interdependencies” (2001: 605–606; also Brenner 2005; Leitner 2004).

While they may differ on specifics, these and many other theorists of the social production and construction of scale (e.g. Agnew 1993; Cox 1998; Cox and Wood 1997; Delaney and Leitner 1997; Harvey 1998; Herod 1991; Herod and Wright 2002; Howitt 1998, 2002; Jonas 1994; Mamadough, Kramsch and Van der Velde 2004; Marston 2000; Silvern 1999; Staeheli 1994) are united in their affirmation of the “thingness” of scale: that is, regardless of the complexity of spatial processes, there is an assertion, often implicit rather than explicit, that scale “exists” and, in the tradition of socio-spatial dialectics (Lefebvre 1991), is both produced by social activity and a powerful “platform” (Smith 2000) for it. This view does not, however, exhaust the range of scale theories, for a number of writers have asserted the conceptual view – that is, while scale may be an analytic device for thought, or even a perspective on the world, it is nothing more than that. As Katherine Jones put it in an early critique focusing on the discursive deployment of scale, “we may be best served by approaching scale not as an ontological structure which “exists,” but as an epistemological one – a way of knowing or apprehending” (Jones 1998: 28). In an article titled “Human geography without scale,” we pursued and built upon

Jones's line of argument (Marston, Jones and Woodward 2005). That paper, along with extensive commentary (Collinge 2006; Escobar 2007; Hoefle 2006; Jonas 2006; Leitner and Miller 2007) and our rejoinder (Jones, Woodward and Marston 2007), became known as the "scale debates" – a conversation that, in the words of Trevor Barnes (2008: 655), "never seems to end."

What are the coordinates of this debate? In brief, our argument (Marston, Jones and Woodward 2005: 422) was that scales – as levels or hierarchies of space – do not exist as such; they are the product of a particular epistemology, a "God's Eye view leveraged on the Archimedean point of the global from which the world is surveyed" (see also Haraway 1988). With Jones (1998), we did not reject the epistemological (or discursive) power of scalar thought. Instead, we approached the question ontologically, arguing that whenever processes are conceptualized according to vertical/scalar imaginaries, they become unhinged from their domain of actual practice (also Gibson-Graham 2002; Ley 2004; Massey 2004). We believe that scale thinking invariably slots processes into structured spatialities (e.g. global, national, regional, local) that are out of reach of everyday spatial life, and moreover it short circuits our ability to mobilize political forces capable of confronting inequality, exploitation, and oppression. This is not to say that some processes do not have more "reach" than others (although in emphasizing everyday doings and sayings over jumbo social formations such as "capitalist globalization" or "neoliberalism" we are less inclined to imagine them as floating over the actors that enact them). It is to say, however, that when conceptualized as a "nested hierarchical ordering of space" (Howitt 2002: 305) or as a "hierarchical scaffolding of nested territorial units stretching from the global, the supranational, and the national downwards to the regional, the metropolitan, the urban, the local, and the body" (Brenner 2005: 9), we are likely to "lose touch" with the concrete practices that form the bedrock of everyday life.

Numerous criticisms have been levied against our argument. Along with Leitner and Miller (2007), there are many (e.g. Hoefle 2006; Jones 2009; Jessop *et al.* 2008; Leitner *et al.* 2008; Neumann 2009; Rangan and Kull 2009) who continue to support the idea that scale is an actual thing existing in the world, not atypically through an affirmation of the "differences in powers and capacities, opportunities and constraints, among nested spaces" (Leitner and Miller 2007: 119; see Jones, Woodward and Marston 2007 for a reply to critics). At the same time, there are others who, like us, reject claims regarding scale's ontological status, but who see value in further assessments of its epistemological points of orientation and the discursive-practical work these enable (e.g. Kaiser and Nikiforova 2008; Legg 2009; Moore 2008). Still others support developing alternative ontologies that do not rely on scalar approaches (Ansell 2009; Escobar 2007; Hiller 2008; Isin 2007; McFarlane 2009; Pain 2009). One such approach revolves around networks.

Networks

Unlike discussions of scale – which have largely taken place within a truncated field populated by geographers – theoretical treatments of networks (and flows) have long been dominated by sociologists, especially under the banner of social network analysis (Wasserman and Faust 1994). With the emergence of globalization

discourses in the 1990s, however, network approaches to spatiality also became prominent. At the forefront among political economists was the work of Manuel Castells. His "Information Age" trilogy (Castells 1996, 1997, 1998) was premised on the concept of "spaces of flows," a combination of technology, places, and people that "dissolves time by disordering the sequence of events and making them simultaneous, thus installing society in an eternal ephemerality" (1996: 467). This understanding of a "networked society" does not quite reach the status of spatial ontology, but it is certainly aimed at identifying material shifts in late capitalism that resonate broadly with David Harvey's (1989) notion of "space-time compression" and Doreen Massey's (1993) "power geometries."

As the network concept began to significantly shape geographers' spatial imaginations over the past decade, it also began to inform studies focused on the dynamism and complexity of society-space relations (Coe and Bunnell 2003; Smith 2003a, 2003b). Today, the network frequently figures along side "relational ontologies" and "non-representational," approaches (Amin 2002) as a tool for negotiating the challenges to describing worlds "made up of billions of ... encounters ... consisting of multitudinous paths which intersect" (Thrift 1999: 302). Whatmore, for example, observes that the network "betokens a shift in analytical emphasis from reiterating fixed surfaces to tracing points of connection and lines of flow" (Whatmore 1999: 31). Still, characterizations of capital flows as total, singular and pervasive sometimes risks reducing critique and mobilization to hapless amazement in the face of a supposedly inevitable "global capitalism." Confronted with such omni-potent and omni-fluidic visions, it is worth recalling Massey's early reminder: "... different social groups and different individuals are placed in very distinct ways in relation to these flows and interconnections. ... some are more in charge of it than others; some initiate flows and movement, others don't; some are more on the receiving end of it than others; some are effectively imprisoned by it" (Massey 1993: 62).

Many of the orientations toward networks have been propelled by the cross-disciplinary popularity of actor-network theory (ANT), which has been widely adopted by human geographers interested in specifying the complexity of global economic and political relations. The theorists of ANT such as Bruno Latour (1993, 2005), Michel Callon (1991, 1998), and John Law (1999; 2004), examine single networks, or networks within networks, of material and semiotic relations between people, things and concepts. As a challenge to the rigidity of critical theory's earlier distinctions between structure-agency, this work re-envisioning human/non-human relations as complicated, local inter-actions that give rise to complex global networks (Law 1999). From this perspective, agency appears less the exclusive regime of human choice and action, and more the broad workings of many aggregates of different things (Robbins and Marks 2010). Despite its enthusiastic employment of local-global frameworks, the extent of ANT's contribution to new forms of spatial theorizing is less obvious. In one sense, space is sometimes reduced to a self-evident trace in the continuum of networked relations, as in, for example, telecommunication and transport systems, where global reach is viewed as the outcome of relations that are "local at all points" (Latour 1993: 117). In a slightly different, though not unrelated sense, space is also invoked as the location across which many relations unfold: for example, the laboratory or the field site as the place where scientific objects and explanations get constructed (Latour 1999). Following a period of

engagement with geographers in the early 2000s – and in the midst of a broader spatial turn within the humanities and social sciences – networked space was granted a more nuanced explanatory role (see Hetherington and Law, 2000 and related essays in the same issue of *Environment and Planning D*, Volume 18). At the same time, this was accompanied by something of a retrenchment of scalar logics. Latour's recent discussions of the sociality of networks, for example, while more attentive to space, nevertheless repeatedly equates them with abstract and "sizist" scalar imaginaries (Latour 2005: 203–204).

Today we find that networks are as pervasive as scale in offering descriptions of the spatialities of global institutions and actors. In economic geography, network approaches are used to explore how social actors, operating in dense and geographically extensive webs of social relations, produce and reproduce networks (wherein intrafirm, interfirm and extrafirm connections sometimes substitute for, or even drive, relations that are local, regional and transnational) (Berndt and Boeckler 2009; Yeung 1998, 2005; Henderson *et al.* 2002; Dicken *et al.* 2001; Dicken and Malmberg 2001). In further developing a global production network approach, some authors have sought to append scales to networks in order to sort some of the territorial and jurisdictional contexts of actor and institutional embeddedness (Kim 2006; Feagan 2007; Hall 2007). The conjoining of scale to networks is intended to introduce an element of causality to the latter by indicating how power struggles among differently situated actors/actants organized in a scalar hierarchy are able to shape behaviors within the network in significant ways. An emerging response to the "scalar networks" formulation (akin to Brenner's (2005) horizontal and vertical relations), however, has been to rally around an anti-scalar imaginary that recognizes networks as extensive bonds (specified as either flows or linkages) among geographically grounded associations that connect mobile actors (e.g. scientists, business managers), firms/institutions (e.g. transnational corporations, the state), and objects (e.g. technology, money) across regional and global space in a decisively grounded, horizontal emergence that challenges notions of materialized verticality (Amin 2002). Finally, it is not only economic geographers and political ecologists who have come to increasingly embrace network conceptualizations; political geographers too are employing network approaches, most often orienting their work around resistance projects (Bosco 2001; Ettlinger and Bosco 2004; Routledge 2008). It is also important to point out, however, that a substantive critique of the political limits of using networks to apprehend the contemporary global economy – including their constitutive inequalities, asymmetries and democratic deficits – has also been launched (Hadjimichalis and Hudson 2006).

Conclusion

What unites many of the perspectives we have discussed is a driving concern with the pervasive unevenness and exploitation that continues to unfold across the world today. Our recent work on site ontology has been presented as an alternative to many of these scalar and networked spatial theories because we share these same concerns while arguing for the recognition of new ontological spaces (Jones, Woodward and Marston 2007; Marston, Woodward and Jones 2007; Woodward, Jones and Marston 2010; also Shaw 2010). One thing that underwrites this work

is the possibility that, while it is undeniable that globalized neoliberalism is in many senses performative (in the sense of discursively practiced: Butler 1990), many critical encounters with scales and networks unwittingly institute the very performativity they seek to discipline. Thus while critical spatial theory is typically launched against structural processes, it can nonetheless also enable capitalistic strategies that naturalize scalar hierarchies and reify global power relations. Accordingly, it is no longer sufficient, when faced with the question of radical politics, to mutter the old mantra that “space matters.” We grant that it is difficult to over-estimate the importance of this observation for social theory in the 1980s and 1990s. Today, however, everyone knows that space matters: from structure-adjusting capitalists to landless anti-capitalists, all are mobilizing around a recognition that space is at the center of new forms of accumulation and exploitation as well as resistance. The questions for today are, rather: (a) how might we come to better understand the spatial complexities that daily enfold us and *enable the systematization of exploitation*; (b) how might geography be complicit in – and how might it again extract itself from – the production of knowledges that rationalize, teach, and disseminate the production of exploitative spatialities; and (c) how might we learn to enable – and learn from – new forms of situated political practice that refuse systemic oppression and produce egalitarian alternatives?

Acknowledgements

The authors thank Morgan Apicella for research assistance in the preparation of this chapter.

References

- Agnew, J. (1993) Representing space: space, scale and culture in social science. In J. Duncan and D. Ley (eds), *Place/culture/representation*. Routledge, London, pp. 251–271.
- Amin, A. (2002) Spatialities of globalization. *Environment and Planning A* 34 (3), 385–399.
- Ansell, N. (2009) Childhood and the politics of scale: descaling children’s geographies? *Progress in Human Geography* 33 (2), 190–209.
- Barnes, T.J. (2008) History and philosophy of geography: life and death 2005–2007. *Progress in Human Geography* 32 (5), 650–658.
- Bauer, B.O., Veblen, T.T., and Winkler, J.A. (1999) Old methodological sneakers: fashion and function in a cross-training era. *Annals of the Association of American Geographers* 89 (4), 679–687.
- Berndt, C. and Boeckler, M. (2009) Geographies of circulation and exchange: constructions of market. *Progress in Human Geography* 33 (4), 535–551.
- Bosco, F. (2001) Place, space, networks, and the sustainability of collective action: the Madres de Plaza de Mayo. *Global Networks* 1 (4), 307–329.
- Brenner, N. (1998) Between fixity and motion: accumulation, territorial organization and the historical geography of spatial scales. *Environment and Planning D: Society and Space* 16 (4), 459–481.
- Brenner, N. (2001) The limits to scale? Methodological reflections on scalar structuration. *Progress in Human Geography* 15 (4), 525–548.

- Brenner, N. (2005) *New state spaces: urban governance and the rescaling of statehood*. Oxford University Press, New York.
- Butler, J. (1990) *Gender trouble: feminism and the subversion of identity*. Routledge, London.
- Callon, M. (1991) Techno-economic networks and irreversibility. In J. Law (ed), *A Sociology of Monsters: Essays on Power, Technology and Domination*. Routledge, London, pp. 132–165.
- Callon, M. (1998) Actor-network theory: the market test. *Sociological Review* 46 (5), 181–195.
- Castells, M. (1996) *The rise of the network society*. Blackwell, Oxford.
- Castells, M. (1997) *The Power of Identity*. Blackwell, Oxford.
- Castells, M. (1998) *End of Millennium*. Blackwell, Oxford.
- Coe, N.M. and Bunnell, T.G. (2003) “Spatializing” knowledge communities: towards a conceptualization of transnational innovation networks. *Global Networks* 3 (4), 437–556.
- Collinge, C. (2006) Flat ontology and the deconstruction of scale: a response to Marston, Jones and Woodward. *Transactions of the Institute of British Geographers* 31 (2), 244–251.
- Cox, K. (1998) Spaces of dependence, spaces of engagement and the politics of scale, or: looking for local politics. *Political Geography* 17 (1), 1–23.
- Cox, K. and Wood, A. (1997) Competition and cooperation in mediating the global: the case of local economic development. *Competition and Change* 2 (1), 65–94.
- Delaney, D. and Leitner, H. (1997) The political construction of scale. *Political Geography* 16 (2), 93–97.
- Dicken, P., Kelly, P.F., Olds, K., and Yeung, H.W.-C. (2001) Chains and networks, territories and scales: towards a relational framework for analyzing the global economy. *Global Networks* 1 (2), 89–112.
- Dicken, P. and Malmberg, A. (2001) Firms in territories: a relational perspective. *Economic Geography* 77 (4), 345–363.
- Escobar, A. (2007) The ontological turn in social theory: commentary on “Human Geography without Scale” by Sallie Marston, John Paul Jones III, and Keith Woodward. *Transactions of the Institute of British Geographers* 32 (1), 106–111.
- Ettlinger, N. and Boscoe, F. (2004) Thinking through networks and their spatiality: a critique of the US (public) war on terrorism and its geographic discourse. *Antipode* 36 (2), 249–271.
- Feagan, R. (2007) The place of food: mapping out the “local” in local food systems. *Progress in Human Geography* 31 (1), 23–42.
- Gibson-Graham, J.K. (2002) Beyond global vs. local: economic politics outside the binary frame. In A. Herod and M. Wright (eds), *Geographies of power: placing scale*. Blackwell, Oxford, pp. 25–60.
- Goodchild, M. (2004) Scales of cybergeography. In E. Sheppard and R.B. McMaster (eds), *Scale and geographic inquiry*. Blackwell, Oxford, pp. 154–169.
- Hadjimachalis, C. and Hudson, R. (2006) Networks, regional development, and democratic control. *International Journal of Urban and Regional Research* 30 (4), 858–872.
- Hall, S. (2007) Knowledge makes the money go round: conflicts of interest and corporate finance in London’s financial district. *Geoforum* 38 (4), 710–719.
- Haraway, D. (1988) Situated knowledges: the science question in feminism and the privilege of partial perspective. *Feminist Studies* 14 (3), 575–599.
- Harvey, D. (1998) The body as an accumulation strategy. *Environment and Planning D: Society and Space* 16 (4), 401–421.
- Harvey, D. (1989) *The condition of postmodernity*. Blackwell, Oxford.

- Henderson, J., Dicken, P., Hess, M., Coe, N., and Yeung, H.W.-C. (2002) Global production networks and the analysis of economic development. *Review of International Political Economy* 9 (3), 436–464.
- Herod, A. (1991) The production of scale in United States labor relations. *Area* 23 (1), 82–88.
- Herod, A. and Wright, M. (2002) Placing scale: an introduction. In A. Herod and M. Wright (eds), *Geographies of power: placing scale*. Blackwell, Oxford, pp. 1–14.
- Hetherington, K. and Law, J. (2000) After networks. *Environment and Planning D: Society and Space* 18 (2), 127–132.
- Hiller, J. 2008: Plan(e) speaking: a multiplanar theory of spatial planning. *Planning Theory* 7 (1), 25–50.
- Hoefle, S.W. (2006) Eliminating scale and killing the goose that laid the golden egg? *Transactions of the Institute of British Geographers* 31 (2), 238–243.
- Howitt, R. (1998) Scale as relation: musical metaphors of geographical scale. *Area* 30 (1), 49–58.
- Howitt, R. (2002) Scale and the other: Levinas and geography. *Geoforum* 33 (3), 299–313.
- Isin, E.F. (2007) City.state: critique of scalar thought. *Citizenship Studies* 11 (2), 211–228.
- Jessop, B., Brenner, N., and Jones, M. (2008) Theorizing sociospatial relations. *Environment and Planning D: Society and Space* 26 (3), 398–401.
- Jonas, A.E.G. (1994) The scale politics of spatiality. *Environment and Planning D: Society and Space* 12 (3), 257–264.
- Jonas, A.E.G. (2006) Pro scale: further reflections on the “scale debate” in human geography. *Transactions of the Institute of British Geographers* 31 (3), 399–406.
- Jones III, J.P., Woodward, K., and Marston, S.A. (2007) Situating flatness. *Transactions of the Institute of British Geographers* 34 (2), 264–276.
- Jones, K.T. (1998) Scale as epistemology. *Political Geography* 17 (1), 25–28.
- Jones, M. (2009) Phase space: geography, relational thinking, and beyond. *Progress in Human Geography* 33 (4), 487–506.
- Kaiser, R. and Nikiforova, E. (2008) The performativity of scale: the social construction of scale effects in Narva, Estonia. *Environment and Planning D: Society and Space* 26 (3), 537–562.
- Kim, S.-J. (2006) Networks, scale, and transnational corporations: the case of the South Korean seed industry. *Economic Geography* 82 (3), 317–338.
- Latour, B. (1993) *We have never been modern*. (Translation by C. Porter) Harvard University Press, Cambridge.
- Latour, B. 1999: *Pandora's hope: essays on the reality of science studies*. Harvard University Press, Cambridge.
- Latour, B. 2005 *Reassembling the social*. Oxford University Press, New York.
- Law, J. (1999) After ANT: complexity, naming and topology. In J. Law and J. Hassard (eds), *Actor network theory and after*. Blackwell, Oxford, pp. 1–14.
- Law, J. (2004) And if the global were small and noncoherent? Method, complexity, and the baroque. *Environment and Planning D: Society and Space* 22 (1), 13–26.
- Legg, S. (2009) Of scales, networks and assemblages: the League of Nations and the scalar sovereignty of the government of India. *Transactions of the Institute of British Geographers* 34 (2), 234–253.
- Leitner, H. (2004) The politics of scale and networks of spatial connectivity: transnational interurban networks and the rescaling of political governance in Europe. In E. Sheppard and R.B. McMaster (eds), *Scale and geographic inquiry*. Blackwell, Oxford, pp. 236–255.
- Leitner, H. and Miller, B. (2007) Scale and the limitations of ontological debate: a commentary on Marston, Jones and Woodward. *Transactions of the Institute of British Geographers* 32 (1), 116–125.

- Leitner, H., Sheppard, E., and Sziarto, K.M. (2008) The spatialities of contentious politics. *Transactions of the Institute of British Geographers* 33 (2), 157–172.
- Ley, D. (2004) Transnational spaces and everyday lives. *Transactions of the Institute of British Geographers* 29 (2), 151–164.
- Lefebvre, H. (1991) *The production of space* (Trans. D. Nicholson-Smith). Blackwell, Oxford.
- Mamadough, V., Kramsch, O., and Van der Velde, M. (2004) Articulating local and global scales. *Tijdschrift voor Economische en Sociale Geografie* 95 (5), 455–466.
- Manson, S.M. (2008) Does scale exist? An epistemological scale continuum for complex human-environment systems. *Geoforum* 39 (2), 776–788.
- Marston, S.A. (2000) The social construction of scale. *Progress in Human Geography* 24 (2), 219–242.
- Marston, S.A., Jones III, J.P., and Woodward, K. (2005) Human geography without scale. *Transactions of the Institute of British Geographers* 30 (4), 416–432.
- Marston, S.A. and Smith, N. (2001) States, scales and households: limits to scale thinking? A response to Brenner. *Progress in Human Geography* 25 (4), 615–619.
- Marston, S.A., Woodward, K., and Jones III, J.P. (2007) Flattening ontologies of globalization: the Nollywood case. *Globalizations* 4 (1), 45–63.
- Massey, D. (1993) Power geometries and a progressive sense of place. In J. Bird, B. Curtis, T. Putnam, G. Robertson, and L. Tickner (eds), *Mapping the futures: local cultures, global change*. Routledge, London, pp. 60–70.
- Massey, D. (2004) Geographies of responsibility. *Geografiska Annaler B*, 86 (1), 5–18.
- McFarlane, C. (2009) Translocal assemblages: space, power and social movements. *Geoforum* 40 (4), 561–567.
- McMaster, R.B. and Sheppard, E. (2004) Introduction: scale and geographic inquiry. In E. Sheppard and R.B. McMaster (eds), *Scale and Geographic Inquiry*. Oxford, Blackwell, pp. 1–22.
- Moore, A. (2008) Rethinking scale as a geographical category: from analysis to practice. *Progress in Human Geography* 32 (2), 203–225.
- Neumann, R. (2009) Political ecology: theorizing scale. *Progress in Human Geography* 33 (3), 398–406.
- Pain, R. (2009) Globalized fear: towards an emotional geopolitics. *Progress in Human Geography* 33 (4), 466–486.
- Phillips, J.D. (1997) Humans as geological agents and the question of scale. *American Journal of Science* 297 (1), 98–115.
- Phillips, J.D. (1999) *Earth surface systems: complexity, order and scale*. Blackwell, Oxford.
- Phillips, J.D. (2004) Independence, contingency, and scale linkage in physical geography. In E. Sheppard and R.B. McMaster (eds), *Scale and geographic inquiry*. Blackwell, Oxford, pp. 86–100.
- Rangan, H. and Kull, C.A. (2009) What makes ecology political? Rethinking scale in political ecology. *Progress in Human Geography* 33 (1), 28–45.
- Robbins, P. and Marks, B. (2010) Assemblage geographies. In S.J. Smith, R. Pain, S.A. Marston, and J.P. Jones III (eds), *The Sage Handbook of Social Geographies*. Sage, London, pp. 176–194.
- Routledge, P. (2008) Acting in the network: ANT and the politics of generating associations. *Environment and Planning D* 26 (2), 197–217.
- Shaw, I.G.R. (2010) Sites, truths, and the logics of worlds: Alain Badiou and human geography. *Transactions of the Institute of British Geographers* 35 (3), 431–422.
- Silvern, S.E. (1999) Scales of justice: law, American Indian treaty rights and the political construction of scale. *Political Geography* 18 (6), 639–668.
- Smith, N. (1984) *Uneven development: nature, capital and the production of space*. Blackwell, Oxford.

- Smith, N. (1992) Contours of a spatialized politics: homeless vehicles and the production of geographical space. *Social Text* 33, 54–81.
- Smith, N. (1993) Homeless/global: scaling places. In J. Bird, B. Curtis, T. Putnam, G. Robertson, and L. Tickner (eds), *Mapping the futures: local cultures, global change*. Routledge, London, pp. 87–119.
- Smith, N. (1996) Spaces of vulnerability: the space of flows and the politics of scale. *Critique of Anthropology* 16 (1), 63–77.
- Smith, N. (2000) Scale. In R.J. Johnston, D. Gregory, G. Pratt, and M. Watts (eds), *The dictionary of human geography*, 4th edn. Blackwell, Oxford, pp. 724–727.
- Smith, N. (2004) Scale bending and the fate of the national. In E. Sheppard and R.B. McMaster (eds), *Scale and geographic inquiry*. Blackwell, Oxford, pp. 192–212.
- Smith, R.G. (2003a) World city actor-networks. *Progress in Human Geography* 27 (1), 25–44.
- Smith, R.G. (2003b) World city topologies. *Progress in Human Geography* 27 (5), 561–582.
- Staeheli, L. (1994) Empowering political struggle: spaces and scales of resistance. *Political Geography* 13 (5), 387–391.
- Summerfield, M. (2005) A tale of two scales, or the two geomorphologies. *Transactions of the Institute of British Geographers* 30 (4), 402–415.
- Swyngedouw, E. (1997) Neither global nor local: “glocalization” and the politics of scale. In K. Cox (ed.), *Spaces of globalization: reasserting the power of the local*. Guilford, New York, 137–166.
- Swyngedouw, E. (2000) Authoritarian governance, power and the politics of rescaling. *Environment and Planning D: Society and Space* 18 (1), 63–76.
- Swyngedouw, E. (2004) Scaled geographies: nature, place and the politics of scale. In E. Sheppard, and R.B. McMaster (eds), *Scale and geographic inquiry*. Blackwell, Oxford, pp. 129–153.
- Taylor, P. (1982) A materialist framework for political geography. *Transactions of the Institute of British Geographers* NS 7 (1), 15–34.
- Thrift N. (1999) Steps to an ecology of place. In D. Massey, J. Allen, and P. Sarre (eds), *Human geography today*. Polity Press, Cambridge, pp. 295–322.
- Wasserman, S. and Faust, K. (1994) *Social network analysis: methods and applications*. Cambridge University Press, Cambridge.
- Whatmore, S. (1999) Hybrid geographies: rethinking the “human” in human geography. In D. Massey, J. Allen, and P. Sarre (eds), *Human geography today* Cambridge, Polity Press, pp. 22–40.
- Woodward, K., Jones III, J.P., and Marston, S.A. (2010) Of eagles and flies: orientations toward the site. *Area* 42 (3), 271–280.
- Yeung, H.W. (1998) *Transnational corporations and business networks: Hong Kong firms in the ASEAN region*. Routledge, London.
- Yeung, H.W. (2005) Rethinking relational economic geography. *Transactions of the Institute of British Geographers* 30 (1), 37–51.