Proceedings of the Ninth International Space Syntax Symposium
Edited by Y O Kim, H T Park and K W Seo, Seoul: Sejong University, 2013

# CENTRAL PLACES AND MODALITY ENVIRONMENTS:
## An historical architecture of urban places

051

**Stephen Read**
Delft University of Technology
e-mail: s.a.read@tudelft.nl

**Jorge Gil**
Delft University of Technology
e-mail: j.a.lopesgil@tudelft.nl

## Abstract

*Cities, city regions and their structures are products of the historical construction of 'hegemonic' (Taylor 1999) networks. These networks define and make available the spaces of geopolitical entities like regions, nations, cities and neighbourhoods. Historically specific technical infrastructures – airways, waterways, motorways, railways, metros, tramways, urban streets – are the reality of these networks, articulating places and mediating action at global, regional, national, urban and neighbourhood levels. And regions, cities and intracity places are where these 'levels' of networks intersect and multiple logics and processes are coordinated and synchronised between. We relate this structure to Jane Jacobs' idea of 'organised complexity'. We explore and start to define the architecture of these spaces and places with their limits and their inter-articulations to eventually turn these into a model in the computer. This paper introduces the concepts of 'movement culture' and 'modality environment' which are designed to describe the socio-technical complexes of movement networks, travel technologies and ways of life that characterise 'levels' in this model and discuss what 'level' and 'scale' mean here.*

**Keywords:** *networks, places, urban structure, urban form, space syntax*

**Theme:** *Modelling and Methodological Developments*

## Introduction: dealing with technologies

When one of us did their PhD 15 years ago it was very much an empirical exercise, collecting data and fitting it to the space syntax models of cities. Pedestrian data of 5 cities in the Netherlands was collected on the one hand and space syntax measures and the images produced by the software used to create models of these cities on the other. It became apparent in interpreting models and data that one became highly involved and familiar with both and over time sensitive to the minute variabilities of the relations between them. After being satisfied with the nature and detail of the 'fit' between models and data, the need was felt to reflect on the exercise and find broader reasons and explanations for the 'fit', for the patterns space syntax produced and why space syntax worked. It became clear the process of research had not at all been the hypothetico-deductive exercise it was expected to be. Rather than taking a model comprising measurable variables, and accepting or rejecting this for reason of its ability to predict and control causal outcomes the researcher found himself involved in an interpretive exercise to discover and articulate meaning in the little (life)world of researcher, the data and the model. Don Ihde would call this a 'material hermeneutical' exercise (Ihde 1997). In this little world the city of experience (and of the data-collecting process) and the model became interchangeable, like a figure flickering back and forth between the one and the other, influencing each other and influencing the way one articulated one's understanding of both. One structure appeared and reappeared as a factor of and as a vehicle of interpretation in both, and this was the structure we call in space syntax the supergrid. In time an understanding of both the city itself and the space syntax model could be collapsed on this structure, and it became a more parsimonious model and general schematic or 'diagram' – and centre of the interpretive and articulation processes. We could see it as the model in its own right: an apparatus for interpretation and simultaneously a fact of the city, which could serve as an explanation for and even replace the original space syntax model.

Since then the search has been for theory that can help explain some of this and there has been some difficulty finding it. It seemed certain we were dealing with something that stepped out of our common ideas of model or theory, and that in a way the thing itself was its own theory in a philosophy of science that 'inverts' the textual dimension of explanation or theory (Ihde 1997) to let the objects 'speak' more directly for themselves. The years that have intervened have eventually taught us that things that are 'their own theory' are technology. Patrick Heelan taught us years ago that if we want to know the 'theory' behind the production of results in experimental science, we need look no further than the apparatus (Heelan 1977). But only in the last years has this idea really started to catch on, with now major parts of the philosophies of science and technology – as well as minor parts of sociology, anthropology and archaeology – led by a so-called 'technoscience' perspective (Heelan; Hacking; Galison; Latour; Ihde). For us, the understanding of the city – or certain critical structures in it – as being itself the 'apparatus' or 'technology' producing the effects of the city, including its socialities and econometrics, seems remarkably close to the founding instincts of space syntax – perhaps closer than axial maps and integration measures.

Technoscience basically reverses the order of priorities in relation to technology and science: instead of 'pure' science leading 'applied' technology, technology comes first and it is telescopes, microscopes and steam engines that trigger the development of the theoretical sciences (Ihde 1991). Certain issues became important in relation to the supergrid, and this reflects concerns in technoscience. For a start, history is critical in relation to the emergence of technologies and to the emergence of their meanings. It is also critical in relation to the transformations technologies and their meanings undergo. 'Ideal' structure or theory – by this we mean what we normally think of as the 'laws' of science – emerge not out of thin air but out of the concerns

and involvements of people with the stuff of the world. Generic structures follow from particular ones by a process of 'technology transfer' (see Hård & Misa 2010). And even the most abstract ideas are somewhere in the world; the idea of a 'concrete abstraction' is an old one we know from Hegel, Marx and Lefebvre, but one we need to take seriously again.

Also, technologies never exist on their own, rather they are always tied up with multiple other – especially human and social – factors, and it is the spaces and organisations of these socio-technical 'hybrids' that matter. However we shouldn't let the term 'hybrid' convince us that society and technology exist as equal categories before they come together: rather they emerge together in their organised relations with each other. Where, after all, would contemporary suburban society be without its commuter trains, motorcars and washing machines.

The issue is about where we locate meaning – in the mind, in language or in the world? Hermeneutical phenomenological thinking today locates it in the world and specifically in the way the world is equipped or prepared for knowing and doing. Peter Taylor says: "Spaces are created by social practices. Thus they are not universal, they are always historically specific. Spaces become socially important when they are constituted by myriad social practices. In this form they define a material spatiality of life. All spatialities are products of social agents ..." (Taylor 1999). To which we would add that agency starts in the subject-environment – which means the subject-technology – relation. We can track these spaces through the technologies themselves.

One could make the case that our models of cities are products of quite specific situations. Space syntax reflects something of its origins in London and may have looked different if Hillier, Hanson and their colleagues and students had started it up in Amsterdam. We can, in any event, be rather sure now that space syntax as a model is rather specific to European industrial city fabric. Attempts to transport it to other fabrics will likely succeed or fail by virtue of the similarity of the fabric concerned to European industrial city, rather than by any universal 'laws' it is supposed to embed or represent. Our point is that space syntax as well is a technology and one that originates somewhere specific before finding its 'generic' relevance elsewhere. We will start by briefly outlining the role of our technology, the supergrid, going on to outline what the relevance of supergrids and other structures are for processes and patterns of urbanisation and the distribution of central places, and ending by outlining the shapes of societies in these structures in terms of 'movement cultures' and 'modality environments'. Of course this is much too much to do in one paper but the different parts of this story are written or being written in other papers and this is a first attempt to introduce these last two concepts and put them in relation to the rest of the story.

## The structures we find in space syntax

In a previous paper it was argued that the structure space syntax reveals is already embedded in the form of the urban fabric and is an historical product of a 'rescaling' of the city in the industrial phase of urban expansion. This phase involved the reconstruction of the Western European city in the 19th and early 20th centuries. (Read 2013 forthcoming). It was argued that what this consisted of was a 'structuration' of neighbourhoods and centres around a 'grid' of new transportation networks consisting of trams, metros and so on. In space syntax we have remarked this grid before and called it the 'supergrid'. The fact public transportation uses the supergrid alerts us to a relatively higher 'level' of scale and 'publicness' of this network. This difference is reflected not just in the relatively higher rates and ranges of movement but also in the more public role of the grid. The functions associated with this supergrid and the image

reflected on it, reflect its city-wide role. This contrasts with the functions and image we find on the fine-grained street and block grid which reflects a neighbourhood role. The 'supergrid', characteristic of industrial city fabrics, has a physical presence and can be identified as the network of mainstreets overlaying the more general street and block grid of characteristic, dense, European urban fabric.

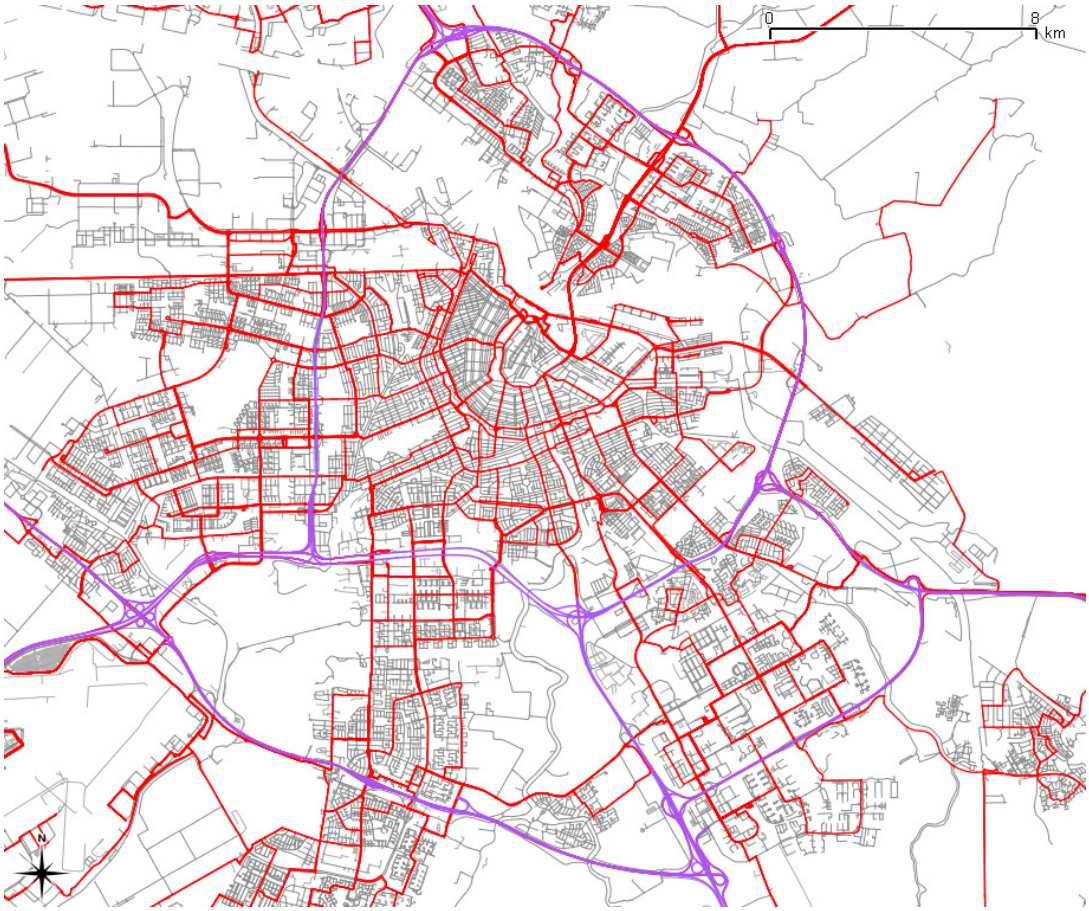


**Figure 1:** Amsterdam supergrid today

In axial maps the supergrid stands out as a joined-up network of generally longer axial lines at a grid scale several times larger than that of the regular street and block grid. The supergrid has been defined before as that grid of very significantly higher traffic that overlays the basic street and block grid of urban fabric. The significance of this grid for space syntax is considerable because while space syntax gets its legitimacy from the fact that its measures correlate with movement rates in urban streets, if there is a pattern of streets strategically constructed for very significantly higher levels of traffic that are also likely, because of the way the fabric is structured, to have very significantly higher space syntax measures, then the fact there is a correlation between high syntax values and high traffic rates locally should not be a surprise. The relation of 'local' and 'global' scales, a powerful feature and important device for the interpretation of fabrics through the model also passes through the supergrid, the relations of 'depth' from the supergrid forming measures like 'intelligibility' or 'synergy'. It was argued we should be looking first at the supergrid as a structuring entity in its own right and a mode of social and technical organisation rather than finding it back indirectly through the graph theoretical manipulation of a mass of axial lines.

The supergrid connects urban mainstreets – which also centre neighbourhoods – while the regular street and block grid connects buildings and other facilities within neighbourhoods. The

supergrid also connects neighbourhoods as urban parts into an urban whole of the city, while the street and block grid connects parts at the level of houses or shops into a whole of the neighbourhood. This reflects a nested hierarchical structure, but the diagram in which this hierarchy is constructed is not that of the familiar bounded areas and circles within circles (figure 1) but rather that of grids laid over grids (figure 2).

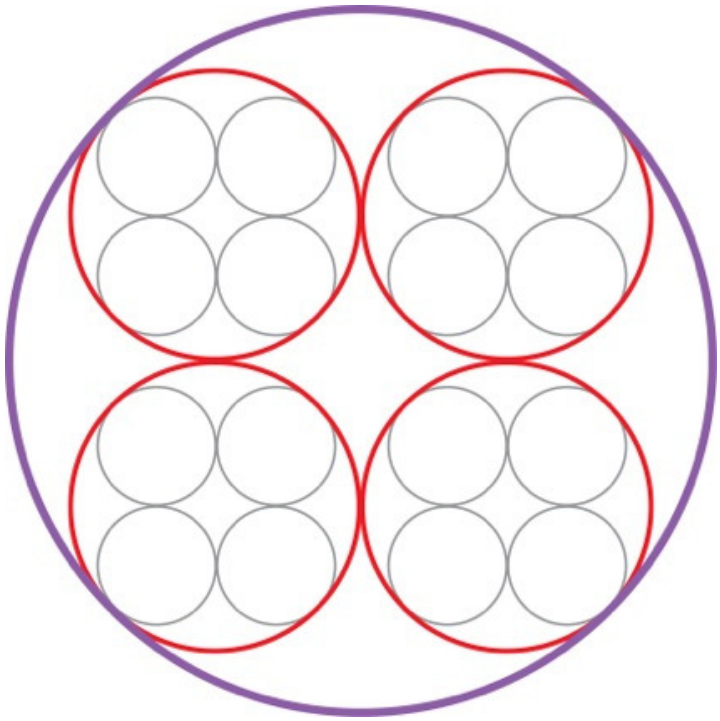

**Figure 2:** Areal definition of inside-outside relations

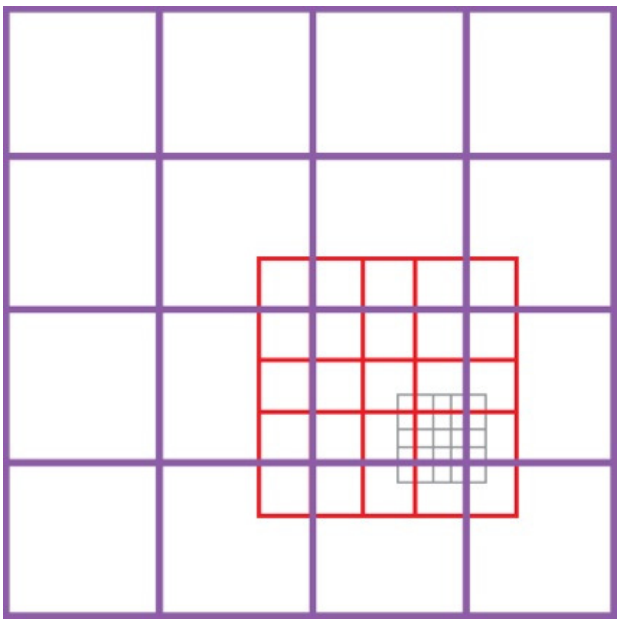

**Figure 3:** Network definition of inside outside relations

In order to understand what structure means here we need to clarify certain relational terms like 'inside' and 'outside'. Whereas inside and outside are understood in figure2 in a background space divided into insides and outsides by boundaries, being in or out of a network is another way of understanding these terms. In the network we have a construction in which system logic and 'context' are internalised. A structure of 'insideness' may be understood in relation to the logic or sense internalised as 'context' in the network and things outside the network will not join in this sense-making logic, though they may make sense in entirely different networks. In multiplying these networks and relating them to each other we have a construction in which different 'contexts' and systemic logics – of neighbourhood and city in this case – may be interrelated at their points of contact or intersection. The experience of being in the city is delivered by the supergrid while the experience of being in the neighbourhood is delivered by the regular grid.

## Other urban rescalings

This grid as a 'structure of rescaling' is not the only such structure to be found in our urban worlds. In another recent paper the global and world cities (Sassen 1991; Friedmann 1986, 1995; Beaverstock et al. 1999) Saskia Sassen calls 'architectures' and 'infrastructures' (Sassen 1991:xxx) of economies integrated over much larger geo-political regions were highlighted. Peter Taylor followed Jane Jacobs (Jacobs 1969) in 'putting cities first' and focusing on how urbanisation has progressed since cities first appeared about six or seven thousand years ago. The world-city idea incorporates and supports an idea of successive world-economies that "always [have] an urban centre of gravity … as the logistic heart of [their] activity" (Braudel 1984:27).

At the centre of one of these world-economies was seventeenth century Amsterdam, but while Taylor's analysis concentrates on the relation between a network or system of cities and exponentially increasing numbers of proximate relations between people in the city to create "completely new social worlds of human experience" (Taylor 2012:418), Jonathan Israel reminds us that this was not all Amsterdam was doing. While Amsterdam was building its world-city network and hegemonic world-economy it was simultaneously drawing on the dynamism of an earlier construction of a coherent system of waterways covering most of the cities in Holland, Zeeland and Friesland, at something approaching what was to become the national scale. This network interlinked different urban economies and facilitated the rapid circulation of goods and passengers between cities (Israel 2002).

This complicates the world-city argument in an interesting way. Amsterdam was no longer acting simply as a city at the centre of its world-city network, but as a node at the 'intersection' of two networks, one of them a network of Dutch cities more coordinated and coherent than there was to be found anywhere else in Europe (Israel 2002:16). Israel argues for the 'creativity' of this intersection between a proto-national state and a world network. Across this intersection flowed not just money and people, but knowledge, invention and other assets developed in other Dutch cities. The United Provinces lacked many of the attributes of a modern state, but, according to Braudel "it certainly cannot be said that the Dutch government was non-existent" (Braudel 1984; 193-5; 205). There were considerable organisational structures set up in these early modern networks of economy and government and while Peter Taylor talks of the 'creativity' of relations contained within urban walls what these sorts of structures of multiple networks 'intersecting' in the city emphasise are the crossing of different economies and cross-valency, cross-scalar relations at the point of intersection.

## A diagram of multi-valency, complexity and creativity

We could draw parallels between the mechanisms of the supergrid as a 'city-neighbourhood' network and the world-city-nation-city networks. The 'diagram' of this is of the world-city network meeting the nation-city network in early modern Amsterdam; what happens in the world-city network is brought into relation with what happens in the nation-city network with creative urbanising consequences in the vitality and multi-valency of the city. At the inner-city scale the supergrid and the street and block grid act as networks of the city on the one hand and the neighbourhood on the other and the creative urbanising consequences here are the mainstreets themselves where the vitality and multivalency of another quite different urban centre is formed.

One of the creative consequences, we have argued, is simply the place itself as both concept and central place. We see 'world' and 'city' in Peter Taylor's world-city network emerging in ways analogous to the ways 'city' and 'neighbourhood' emerge in city-neighbourhood and neighbourhood-house networks respectively. The 'world' is here (to someone in it) a condition of being in a network and between cities, while the city is (to someone in it) a condition of being in a network between neighbourhoods, and the neighbourhood is a condition of being in a network between houses.

In fact the notion of 'grid' here clarifies an aspect of networks that Jacobs emphasised more than Taylor; that rather than cities coming first, it was actually networks that were first. Jacobs is clear that cities emerged as a consequence of networks (Jacobs 1969) and they grew oriented to networks – in much the same way in principle as the elements like neighbourhoods and houses are oriented to the grids in the structures of supergrid and regular grid. The condition of 'node' can disappear altogether as we interpret concentrations of urban mass, people and the urbanisation process itself as produced in the creative, central place forming potentials in the *intersections* of grids. Rather than being a node in world and nation networks, Amsterdam was a production of the intersection of these grids; rather than neighbourhoods being nodes in a city network, they are productions (or at least their vital mainstreet centres are) of the intersections of city and neighbourhood networks.

What we see emerging in this discussion is an arrangement of 'levels' in the form of 'horizontal' networks or grids in which the nodes are effects of intersection or interface with other networks or grids in 'vertical' relations with each other. The grids themselves originate historically and specifically. World-city networks emerged in relation to particular world-economies, and they were – and are today – the 'infrastructures' of those economies. Supergrids – or city-neighbourhood networks – have, I have argued, emerged in relation to an urban 'economy' of mainstreets and are again the 'infrastructures' of those economies. These two cases represent entirely different logics of economy, but perhaps that is the point. The creativity Jacobs and Israel refer to is not a product of one logic but of the crossing of two or more. What maintains the coherence of the respective logics are the particular 'infrastructures' or 'levels'; what constitutes the 'creativity' is the multi-valency in things we like to think of as nodes. The places these nodes represent are not a product of one logic but of two or more – as real things always exist in states of what Jacobs would call 'organised complexity'.

We need to distinguish the 'simplicity' of different networks – themselves built and converging historically to a state of being (near) generic 'levels' – and the multi-valent 'complexity' of the differences contained in nodes. The 'simplicity' concerns the establishment, with different networks, of 'levels' built for their intelligibility as much as for anything else. These 'levels' have a 'metageographic' (Lewis & Wigen 1997) character, establishing geographic and geo-political entities like 'world' and 'nation' and city and neighbourhood in the examples above. We can

start to treat the intersection of 'world network' and 'nation network' in Amsterdam as an issue of the simplicity of the intersection of two intelligible levels of human geography leading to spiralling demands and new work and divisions of labour in the emerging nation and city. This construction of levels is itself historical and a construction and a 'system' in terms I will develop further. Amsterdam's urbanisation and development could be seen as a creative product of this intersection.

And we are not simply talking about levels of different economies, but different cultures, societies and ways of life as well. The ways of life of the jetsetter on the one hand and of the urban citizen on the other are different to each other yet both coherent, both viable. Both are historical constructions related to specific 'levels' and networks. I will expand this idea later in terms of 'movement cultures'. These 'cultures' will inhabit specific grids, implying different 'speeds' and ranges of movement and a different set of movement technologies.

## 'Projects' of new 'modernities'

These different 'levels', networks and 'infrastructures', supporting different coherent logics of economy, culture, society and ways of life, were also 'projects' of particular times. The industrial period of the Western European city was a time of the expansion of the city and this expansion and the economies and societies – the production and consumptions logics and logistics this engendered – demanded a new urban speed and scale, one Walter Benjamin for example has described. The supergrids, trams and metro systems characteristic of this period were a project of restructuring and rescaling carried out with enormous public investment to open new areas for urbanisation and investment (Harvey 2001). The exemplary case is of course Haussmann's Paris, where the strategy of driving a joined up network of boulevards through the urban fabric to open it to city-wide traffic was also used to connect emblematic public buildings and railway stations. This city-level network supported new logics and logistics and defined a new public face of the city that stood in contrast to what went before, and to the quiet backstreets joined directly with it that were in a sense a relic of the previous city.

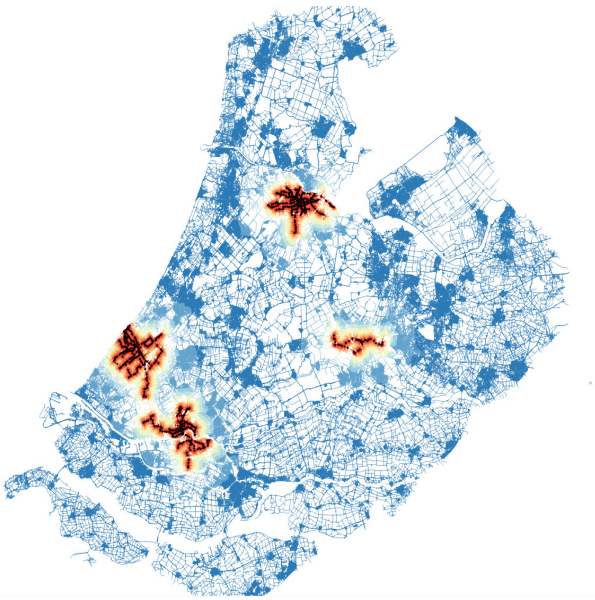

**Figure 4:** The tram networks today. An industrial city 'project'. We should note that it is a resource that undergoes a retrofitting transformation into metropolitan places in its condition today, existing in a metropolitan 'project'.

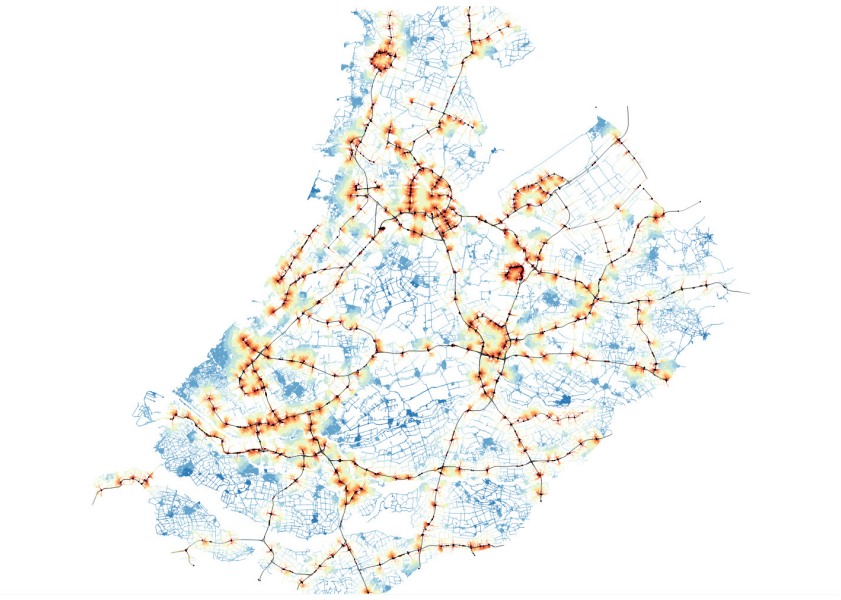

**Figure 5:** The highway network today. A post-industrial, consumer city 'project'.

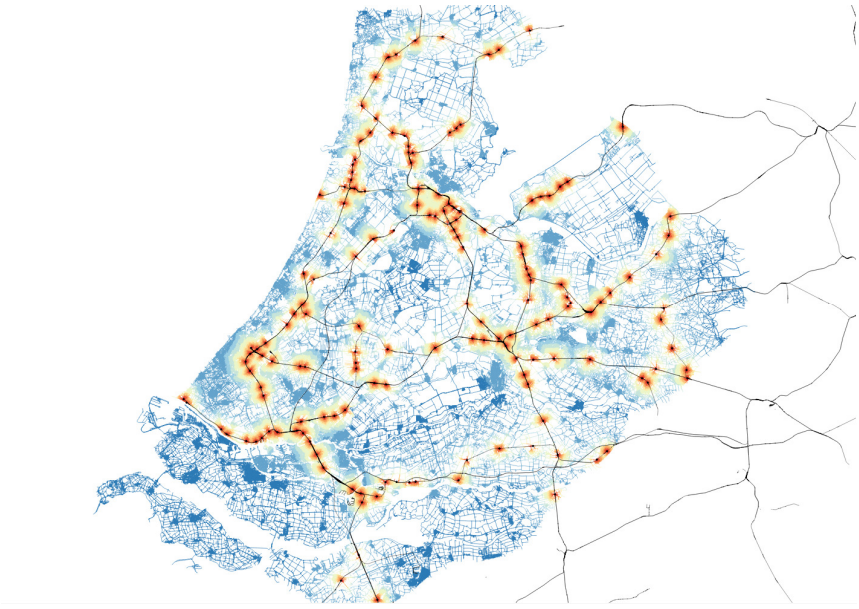

**Figure 6**: The railway network today. An industrial city 'project' designed to serve a national economy. As a contemporary metropolitan project it has been retrofitted to serve metropolitan commuters and European travellers.

This pre-second world war mode of urbanisation was structured differently to car-based urbanisation. Whereas the neighbourhoods and centres of industrial urbanisation were distributed on, and oriented towards, the supergrid and public transportation networks within the industrial city, those built after the war were distributed on and oriented towards inter-city commuter highways and railways. Here the emblematic case is the New Deal highway building of the United States. The highway, the motorcar and suburban living joined together in a socio-technical way of life as the supergrid, public transportation and industrial neighbourhood living had 50 to 100 years previously.

Intercity links had of course existed before, and had in the industrial era linked cities up in

national networks as parts of national economies. Mercantile cities had before that been linked in trading leagues that had been the dominant powers of the 11th to 16th centuries. The post-war intercity building was different and corresponded with the emergence of suburban economies, cultures and ways of life (Fishman 1987; Jackson 1985). In other words it corresponded again with a new speed and scale of the city as the city grew to metropolitan size. This again involved massive public investment which opened up new territories for urbanisation and investment (Harvey 2001). Although the motorcar was a feature of urban life before the middle of the twentieth century, it was not until after the second world war that it became a mode of everyday mass transportation, and the specific transportation networks associated with this mass transportation mode began to be systematically built (Schipper 2008; Berman 1982), while these new grids attracted and attached themselves to new technologies – a motorcar affordable to most people – and a new suburban way of life.

These distinctions between a city built more or less on a 'neighbourhood' grid, one built on a supergrid and one built on a grid of national highways retrofitted to a metropolitan functionality, corresponds with a distinction Peter Taylor draws between a first (mercantile), second (industrial) and third (consumer) modes of 'modernity' (Taylor 1991). Urbanisation proceeds according to large 'projects' we can associate with moments of crisis and reconstruction in history. Capitalist crises provoke responses which open new opportunities and new territories for development and we can associate these, according to world systems theorists, with phases of the development of capitalism. Harvey has already suggested the 'need' for each of these 'rescalings' was provoked by a crisis in capitalism and that we can characterise these projects as 'spatial fixes' (Harvey 2001).

## Speeds, scales, urbanisation typologies and modality environments

I argued that 'level' and 'scale' acquire very clear practical meanings (and realities in this interpretation. Scale is often thought of as size, but it has also been used to distinguish what we could call 'levels of analysis'. However, what these levels are is not very clearly understood or articulated. Many have warned against the reification of scale (Agnew 1993) and some believe they don't exist as anything real at all (Marston et al. 2005). What I have described however is clearly more concrete than a 'level of analysis'. David Prytherch contributes a reality check, pointing to "Wal-Mart's 'geography of big things' [given in] the outsized spatiality of the big box and the global commodity chains in which it is embedded" (Prytherch 2007). Wal-Mart's global operations depend on a tightly coordinated sociotechnical organisation, in which goods, people and machines are distributed and scheduled. The space-time of this organisation is maintained by a 'culture' of managerial, administrative and technical operatives who enact complex sequences and interconnections and guarantee the material and informational transactions that flow across it. But the scale in Wal-Mart's 'geography of big things' is something this sociotechnical system inherits from a more 'generic' network of global places into which Wal-Mart's global operations are, and must be, fitted. It is this more generic geography that world-city networks and supergrids have pointed us to.

This is not a "nested hierarchy of bounded spaces of differing size, such as the local, regional, national and global" (Delaney & Leitner 1997:93). I showed how our understanding of the spatialisation of cities and neighbourhoods by a diagram of nested areas needs to be supplemented by another diagram of overlaid grids. Space and 'bigness' are no longer defined in bounded entities at all but in actual infrastructures representing and enacting grids of metageographic levels and places. Levels and scales inhere in the grids themselves, through the places enacted and known in them. This 'verticality' of levels is scale as we understand and live it in our everyday lives. We don't deal with a continuous reality which is then broken into

distinctive discontinuous entities by our knowledge and language – the discontinuities are constructed at an ontological level and exist in the world.

Different levels corresponded to different types and modes of urbanisation, which can be seen as the accretion of 'urban material' on different grids. Different urbanisation modes produced on the one hand the dense inner-city fabric characteristic of the European industrial city and on the other the diffuse inter-city urbanisation of the post-industrial city (Read 2013 forthcoming). There is a clear discontinuity between these different modes, historically with different phases of city development, but also normatively with the construction of a supergrid-networked neighbourhood for example on the one hand as opposed to a highway-networked suburb. This differentiation of urbanisation into different processes integral with different historically constructed grids introduces a practical scale into our consideration of urbanisation and concretises Taylor's phasing of modernities.

Different modernities become linked with specific projects of infrastructure building. They become associated with the different technologies, cultures and ways of life we see emerging in these. They are each a 'spatial fix' in which economies of accumulation are enacted. Different modernities become associated with different 'movement cultures' – different complexes of grid, technology and way of life – that emerge as characteristic in that phase of modernity. Examples are the industrial city, economy and society on the one hand in which the supergrid, public transportation and industrial neighbourhood living joined together in a socio-technical way of life, and that of post-industrial consumer city, economy and society in which the highway, the motorcar and suburban have joined together in a different socio-technics and a different spatial fix.

The socio-technics here not those of the 'network society' Castells describes (Castells 1996) which is a product of a generalised 'technology' – in this case one that is high-tech and 'virtual' and releases us from our bonds to concrete places (Wellman 2001; Castells 1989; 1996). What we have suggested instead is that technologies have a hand in the concrete differential nature of all spaces and that we are enabled and emplaced through these spaces. Technology is pervasive and naturalised in modern lives. They are organised and woven through lives as infrastructures which afford "the basic facilities, services, and installations needed for the functioning of a community or society … without which contemporary societies cannot function" (Edwards, 2003:187). Infrastructure delivers social organisation in "socially communicated background knowledge, general acceptance and reliance, and near-ubiquitous accessibility" (Edwards, 2003:187) and organise things into a distinct 'modern world', delivering capacities that have become naturalised. According to Star and Ruhleder, infrastructure has five properties: it is embedded in other structures; it is transparent; it has reach or scope; it is learned as part of membership of a 'community of practice', and; it shapes and is shaped by the conventions of that 'community' (Star and Ruhleder 1996). Infrastructures are 'material culture', learned as part of membership in communities, while this knowledge is by extension a prerequisite to membership.

Infrastructural knowledge is a "form of life" (Wittgenstein 1958), in which the different elements and practices in the network make sense by virtue of their mutual interrelationships in a cultural or life 'paradigm'. Here we understand the notion of paradigm in the sense Thomas Kuhn uses it, as a set of practices (and associated material elements) that bind a 'community of practice' (Kuhn 1962). In this sense infrastructures integrate the practices and elements of a community or society and become environment to them. "To live within the multiple, interlocking infrastructures of modern societies is to know one's place in gigantic systems that both enable and constrain us" (Edwards 2003; 191). "Building infrastructures has been constitutive of the modern condition, in almost every conceivable sense. At the same time, ideologies and discourses of modernism have helped define the purposes, goals, and

characteristics of those infrastructures. In other words, the co-construction of technology and modernity can be seen with exceptional clarity in the case of infrastructure" (ibid).

A 'movement culture' is a mode of transportation and all the things that are part of a transportation mode-oriented way of life through the way they are prepared for access by way of that mode of transportation – a motorcar 'movement culture' with the shopping centres and malls, airports, entertainment facilities, roadside eating places, all with appropriate parking and dropping off and drive in facilities. Or a railway commuting way of life with the station car park, station cafes and restaurants and mini supermarkets and reading rooms with free wifi (we wish). A 'modality environment' uses the 'infrastructure grid as level' as its datum. Scale is reflected by that level, but also in the relative 'bigness' of some of the things attached to the infrastructure, accessed relative to that datum. In the case of the motorcar modality environment, the datum will bring the shopping centres and malls, airports, entertainment facilities, roadside eating places together into one environment. Note that some of these things will be parts of the old industrial city (like the centre or waterfront) retrofitted to be available relative to that datum – notice, for example, all the road building that has been going on to make Amsterdam's new waterfront available from the ring road.

## Towards understanding organised complexity

Our attention has gone to the fundamentals of what we may understand as network theory and space syntax has pointed us in our view to some largely unconsidered aspects of that theory. We are all familiar with the idea of nodes and edges and of the systematicity of such constructions. On the one hand we hold to this systematicity, defining 'levels' in which consistent and coherent logics apply; on the other we acknowledge that such systematicities are a factor of the network and that we need to consider the consequence of being out of one network and in another – and the possibility of systems of systems. We have shown how scale inheres in these networks and how their 'simplicity' and intelligibility leads to multi-valency and complexity where they meet and intersect. We have proposed that it is in these points of 'complexity' that vital central places appear. We have also used networks rather than an areal logic to define inside and outside, showing how this may be an important factor in defining the environmental relations that define the structures of our worldly inhabitation. We have then used this conceptual equipment to propose there are 'movement cultures' which combine grid, technology and way of life, integrating scale, network, places into topologies in which lives are lived.

These cultures and the 'modality environments' they occupy are a complex organisation of human and technical factors and the purpose of this paper has been to begin to outline some of the organisational and spatial principles associated with these. It is our view we will be able to take this further to define a model in which we will be able to investigate socio-spatial effects like social integration and fragmentation, energy use and sustainability, on real world communities.

We have tackled some problems with our conventional modelling of urban processes:

1. the tendency to understand technical networks as accessibility – or transmission (flow) – devices. Putting networks first would indicate another understanding altogether. The node in the network is not a point to which accessibility is facilitated, rather the node is an effect of and is produced in the network.

2. the tendency to understand the human factor in terms of individuals who make choices (rational or subjective) about their actions. Understanding choices as made within a 'grid of objects' belonging to a particular way of life introduces social and cultural differentiation. A 'grid

of objects' is a material culture associated with a particular way of life. It incorporates its own 'movement culture' and a 'modality environment' which can be related to particular and historical 'projects' of social and economic renewal.

## References


Agnew, J. 1993. *Representing Space: space, scale and culture in social science*. In: place/culture/representation, edited by J. Duncan, and D. Ley, Routledge. London and New York: 251-271

Beaverstock, J.V., R.G. Smith, and P. J. Taylor. 1999. *A Roster of World Cities*. Cities. 16.

Berman, M. 1982. *All that is solid melts into air*. New York: Penguin.

Boden, D., and H.L. Molotch. 1995. *The compulsion of proximity*. Edited by R. Friedland, and D. Boden. NowHere: Spac , Time and Modernity. Berkeley: University of California Press.

Braudel, F. 1984. *Civilization and Capitalism, 15th–18th Century*. Vol. 3, The Perspective of the World, translate by Sian Reynolds. New York: Harper & Row.

Castells, M. 1989. *The Informational City: Information Technology. Economic Restructuring. and the Urban Regional Process*. Oxford: Blackwell.

Castells, M. 1996. *The Rise of the Network Society. The Information Age: Economy, Society and Culture Vol. I*. Oxford: Blackwell.

Delaney, D., H. Leitner. 1997. "The political construction of scale." *Political Geography* 16(2): 93-97.

Edwards P.N. 2003. *Infrastructure and Modernity: Force, Time, and Social Organisation in the History of Sociotechnical Systems in Modernity and technology / ed*. T.J. Misa, P. Brey & A. Feenberg: 185-225.

Fishman, R. 1987. *Bourgeois Utopias: The Rise and Fall of Suburbia*. New York: Basic Books.

Friedmann, J. 1986. *The World City Hypothesis, Development and Change.* 17: 69-83

Friedmann, J. 1995. *Where we stand: a decade of World City research in World Cities in a World System.* edited by P.L. Knox, and P.J. Taylor. Cambridge: Cambridge University Press: 21-47.

Hård, M., and T.J. Misa. 2010. *Urban Machinery: Inside modern European cities.* Cambridge Mass. MIT Press.

Harvey, D. 2001. "Globalization and the 'spatial fix." *Geographische Revue* 2: 23-30.

Harvey, D. 2006. "The political economy of public space" In *the Politics of Public Space*, edited by S. Low, and N. Smith. London; Routledge.

Heelan, P. 1977. "Hermeneutics of Experimental Science in the Context of the Life-World." In *Interdisciplinary Phenomenology*, edited by D. Ihde, and R. M. Zaner. Martinus Nijhoff: The Hague.

Ihde, D. 1991. *Instrumental Realism: The Interface between Philosophy of Science and Philosophy of Technology*. Bloomington: Indiana University Press.

Ihde, D. 1997. "Thingly hermeneutics/ Technoconstructions." *Man and World* 30: 369-381.

Israel, J.I. 2002. *The conditions for creativity, prosperity and stability in the cities of the Dutch Golden Age, in Generating Culture: Roots and Fruits*. The Hague: Deltametropool / Ministerie van VROM (Forum).

Jacobs, J. 1969. *The economy of cities.* Vintage, New York.

Jackson, K. 1985. *Crabgrass Frontier: The Suburbanization of the United States*. Oxford: Oxford University Press.

Kuhn, T. 1962. *The Structure of Scientific Revolutions*. Chicago: University of Chicago Press. Second edition 1970.

Lewis, M. W., and K. E. Wigen. 1997. *The Myth of Continents, A Critique of Metageography*. Berkeley-Los Angeles: University of California Press.

Marston, S., J. P. Jones III, and K. Woodward. 2005. "Human geography without scale." *Transactions of the Institute of British Geographers* 30: 416-432.

Prytherch, D. L. 2007. "Urban Geography with Scale: Rethinking Scale via Wal-Mary's 'Geography of Big Things'" *Urban Geography* 28(5): 456-482.

Read, S. A. 2012. "Meaning and material: phenomenology, complexity, science and 'adjacent possible' cities." In *Complexity Theories of Cities have come of Age*. Edited by J. Portugali. E. Tan, and E. Stolk. Dordrecht: Springer: 105-127.

Read, S. A., M. Lukkassen, and T. Jonauskis. 2013. "Revisiting 'Complexification', Technology and Urban Form in Lefebvre." *Space & Culture* 16(3): 381-396.

Read, S. A., 2013 (forthcoming). *The space in space syntax*

Robinson, J. 2002. "Global and world cities: A view from off the map" *International Journal of Urban and Regional Research* 26(3): 531-554.

Sassen, S. 1991. *The global city*. Princeton University Press. Princeton. NJ.

Schipper, F. 2008. *Driving Europe. Building Europe on roads in the twentieth century.* Amsterdam: Foundation for the History of Technology & Aksant Academic Publishers.

Star, S.L. and K. Ruhleder. 1996. "Steps toward an ecology of infrastructure: Design and access for large information spaces." *Information Systems Research* 7(1): 111-134.

Taylor, P. J. 1999. *Modernities: A Geographical Interpretation*. Polity Press: Cambridge.

Taylor, P. J. 2012. "Extraordinary Cities: Early 'City-ness' and the Origins of Agriculture and States." *International Journal of Urban and Regional Research* 36(3): 415-447.

Wittgenstein, L. 1958. *Philosophical Investigations*. New York: Macmillan.