



# Flat City; a Space Syntax Derived Urban Movement network Model

Faculty of Architecture  
Delft University of Technology  
Berlageweg 1  
2628 CR Delft  
spacelab@bk.tudelft.nl  
www.spacelab.tudelft.nl

**Stephen Read**

## Abstract

A model of urban movement dynamics is presented, based on a system of overlaid movement infrastructural networks distinguished by movement scale. This model accounts simply for the space syntax 'intelligibility' scattergram, proposing that it is a systematic product of the interaction between two movement centrality effects in two conceptually and functionally separable infrastructural networks. The significance of this model consists in the first place in the fact that it offers a simple way of thinking the relation between the two different but related levels of spatial integration. It is argued that this relation supports situated intelligibility on the one hand and on the other refers to the emergence of particular place conditions. It is argued that it offers an easily conceivable model to replace the objectivist centre-periphery model, which is at present the default but inadequate model for beginning to think the form of the contemporary city. The extendibility of the idea (through the addition of further infrastructural network layers representing higher scales of mobility – and connectivity) also begins to address a fundamental edge problem in the application of conventional space syntax to the metropolitan spatial problematic. It is believed that the model can be adjusted to model other types of city and that in its most general formulation that it may have a generic relevance to the way that urban form may be understood in the way it affords situated environmental action, perception and intelligibility.

## Space syntax as an urbanism – some problems

Space syntax, in its ambition, is a way to the understanding of the complex effects, on the horizontally distributed social body of the city, of its physical infrastructural movement networks. But as a way into a movement network dynamics and to the horizontal modulations effected in the urban-social field by these dynamics, it has two obvious weak features; one is its tendency to treat the urban object as a thing bounded by the limits of the densely built fabric of the centre; the other, to treat all movement spaces equally when it is quite clear that different classes of physical space in the fabric of the city perform quite differently at the levels of urban speed and function and at the level of the human experience of space and time.<sup>1</sup> It tends to perpetuate an error in urban thinking in general which looks at plans of the fabric of urban centres and takes them by default as one homogeneous, bounded place, differentiated spatially in a gradation from edge to centre. In fact today it is becoming ever clearer that the space of the centre is penetrated by mobilities and by their infrastructures which transmit urban speeds, functions and characters that belong to a much wider scope of urban – and that the periphery, the locus of much of this wider urban we are becoming more aware of, itself is becoming increasingly integrally part of an urban social and economic existence that far overflows the limits of the more traditional city.

copyright:

This online paper may be cited or briefly quoted in line with the usual academic conventions. You may also download it for your own personal use. This paper must not be published elsewhere (e.g. mailing lists, bulletin boards etc.) without the author's explicit permission.

But please note that

- if you copy this paper you must include this copyright note.
- this paper must not be used for commercial purposes or gain in any way.

A result is that, while there are indications and moves within space syntax towards the problem – at the level of the social inhabitation of very local areas for example, and at the level of the spatial behaviour of the ‘human cognitive subject’<sup>2</sup> – there is not in space syntax today a very developed account of how mobile contemporary urban populations inhabit the space of contemporary cities. Nor is there an account of the way that urban mobilities and everyday dynamics affect the space of the city in distributed and penetrative rather than localised and centring ways – in the ways therefore that we are aware of when we think of urban mobilities in cities as wholes. There is a tendency therefore, I believe, in space syntax today, also to over-localise the question of the emergence of centrality in cities, to miss and to misunderstand some of the effects of highly distributed network infrastructures on contemporary urban centrality, and indeed to think rather too statically and rather too locally when dealing at a conceptual level with the highly dynamic, and highly distributed, phenomenon of the contemporary city. The net result of all this is, I believe, that space syntax is not fulfilling its potential as a manner of thinking the dynamical forms of the contemporary city. It is not as useful as it could be in guiding creative and design thinking about the forms and problems of contemporary urban life and about possible urban futures. While it is not possible to address all these issues comprehensively here, it is hoped that what follows is at the least a beginning of an expansion of the possibilities of space syntax as an urbanism, firstly in terms of its spatial analytical capabilities (in that the object of analysis will be more clearly defined), and also and more broadly as a way of thinking the city as a ‘movement and encounter technology’ in an urban world where the social is so profoundly mediated, and so continuously transformed and redefined by way of its connective technologies.

#### **A biplex structure of central urban function and experience**

Research on the spatial structures of Dutch cities (and a great deal of project work in the teaching studio since), has brought about a different way of understanding the fabric of the traditional centre.<sup>3</sup> It has highlighted firstly the apparently central role of the so-called ‘supergrid’ in the functioning of many (if not most) traditional city centres, and it has suggested further that there is something generic going on here which may be extended to an understanding of the way we inhabit and situate ourselves in our urban worlds in general.

The supergrid has long been understood in space syntax as a part of the overall grid of the city which acts as a facilitator of longer range movement in the central fabric than the more general grid of the city. The study of Dutch cities noted first of all that the supergrid distributes itself fairly evenly through the entire fabric. This was in spite of complicating factors in Dutch cities which would seem to mitigate against the formation of whole city structures, including the fact that the outward spread of these central cities has been considerably constrained historically. The relative evenness of supergrid distribution seems to have often been a matter of very local ‘fixes’ in the grid. There appears to be a pressure for a certain level of even spread in the supergrid – an ‘engendering’ factor – due no doubt to the need for access for parts from other more distant parts of the city. If this need was not immediately met, the grid was made good – ‘engineered’ – in order to achieve better evenness, and better general access at this higher city-level scale. The formation of the supergrid historically seems to have been a kind of ‘shaking out’, or an ‘engendineering’, which owed more to a kind of generally felt, and generally responded to, pressure or need than to any overall and calculated plan for movement efficiency. This ‘network effect’ of spread and distribution, which is apparent in many other networks whose ‘goal’ is a comprehensive coverage, seems to work counter to that of our intuitive understanding of centrality in centres, which focuses rather on the way that longer distance routes concentrate towards the historical core of these historical cities. Of course to some extent this concentration to the centre is what we see as well, but we should not miss this other tendency – for distribution and evenness in supergrid movement

network formation – or the structure it starts to imply. This structure is of a two level layering in the movement grid of the historical fabric – one level, or ‘shell’ as I will call it later, tending to facilitate rather longer distance movement, the other for very local movement,<sup>4</sup> though the idea of the local will be further developed in a paper to follow, because of course every point on every grid is local.



1. The supergrid in the total (local) grid of Amsterdam

What is somewhat surprising at first sight is the, in most cases, rather clear definition, functionally and perceptually, of the supergrid – this in spite of its integral links with the local grid. This seems in fact to be a matter of more than just lines of visibility and continuities signalled by angles of connection with succeeding spaces, though these no doubt play a formative role in setting up the basic structure in the first place. There is a very recognisable difference in character between the two grid levels, which has to do with the way they are experienced phenomenally in movement. One appears to stay effortlessly on track because the track is clearly marked – and I think I can say this only slightly speculatively – by more than the static ‘signs’ on the road; one stays on track by way of an experiential differentiation that has to do with an engagement of a space-time produced in movement with a space-time of the environment which includes the movement and activity and their products (see below) which already find a place there. There is a ‘folding’, in movement, of subject and environment at a phenomenal level – lending an integration to whole networks and the ‘subjectivities’ they contain – which is not fully captured by simple cause and effect logics applied to static elements of the environment and their effects on the moving subject.

A point that worked to confirm this first impression of movement infrastructural definition – the relative ‘flatness’, coherence and distinctiveness of movement infrastructure ‘shells’ (in these traditional environments at least) – was the unambiguous jump in intensity of the movement on supergrid routes; movement here is substantially higher – sometimes by an order of magnitude – than movement rates on the more local streets. In fact the survey of movement rates – this is possible to do by means of a quick scan of the streets themselves – is still our preferred method for determining supergrid streets in real situations. This means that our definition of supergrid streets refers also to this jump in real movement rates considered locally.

On the basis of these simple observations an hypothesis was set up; that the critical structure as far as the movement machine of the urban centre was concerned, was a layered bplex structure of flat grids,<sup>5</sup> its layers differentiated by speed and intensity of movement (considered locally), by the space-time experience and affordance

of each, and by the scale of the general movement in each.<sup>6</sup> These grids overlap – separated ‘vertically’ into overlapped shells, they are nonetheless still in many situations in the traditional fabric connected on the regular horizontal plane – and they infect/infect each other differently in different places depending on the exact state of this connection.

Since grids are always experienced locally, it is the relative intensities of the activity of each of these grids which is registered rather than their absolute intensities.

### **The production of local specificity**

I have described to this point therefore how two reasonably clear and distinctive shells of connective movement ‘technology’ appear to emerge in the fabric of cities like Amsterdam without this having been necessarily an explicit goal of planning. I propose that this is a critical structure for both the production of local specificity, and for the way the inhabitation of shells serves as the beginnings of an understanding of emplacement and situation, which I will discuss later.

It is taken that the art or science of urban analysis is the determination or explication of local specificity, and it is proposed here that the elements contributing to the emergence of this local specificity (in the fabric of the centre at least) are: 1. the stuff flowing in the supergrid; 2. the stuff flowing in the local grid, and; 3. the infection/infection of the flows of each grid due to the horizontal interpenetration between these two grid shells. In setting up the model as an instrument for thinking, and to found its dynamic working, it is presumed firstly that these two grids are in states of evenly distributed intensity of use – the flows that they convey owe nothing to each other and are distributed evenly (or falling off from centre to edge where the grid has a natural edge at the scale at which the analysis is done). I have called this flat, distributed state of network flow intensity virtual centrality to indicate that it is an underlying undifferentiated field state from which individuated actual centrality emerges.<sup>7</sup> It is then presumed that the ‘actualisation’ of local specificity consists firstly in the way the flows in each of these grid shells interact with the other – establishing what I call a vertical ecology between shells; an ‘ecology without borders’ where the presumed ‘border’ through which interactions occur, is not between areas segmenting one horizontal plane,<sup>8</sup> but between differently constituted population flows inhabiting network grid shells separated ‘vertically’ into quite distinct space-time rhythms and experiences. These grids may be connected still in the regular horizontal urban plane and the vertical ecologies thus enabled, establish conditions of actual centrality, precise and specific to particular local places, which are then further actualised as specific concrete places by way of shop-fronts, houses, road verges, parking places, signage, and all the other material stuff of the urban scene – which all, in spite of its often apparently chaotic disorder, remains indexed to the exact centrality conditions and to the virtualities which underpin place.<sup>9</sup>

It is probably at the level of differentiating between quicker and slower space-time rhythms and states and establishing a ‘feel’ for the virtual orders behind the apparent chaos of the visible scene<sup>10</sup>, that so-called ‘human cognitive subjectivity’ is most obviously at work, though we can continue to doubt how much of this subjectivity is cognitive when mobile subject and mobile surroundings engage with each other as they do in the real world. In most cities, the effects of grid shell levels and their ecologies becomes quickly stabilised by the way actual centrality conditions are translated into and indexed to the real visual and built stuff; by the shops and houses, by the different ways roads on the respective speed levels are built, by the tram tracks and busses, the white and yellow lines and signage on the supergrid for example, as well as by their significantly different use intensities. When it is then understood that significant identifying ‘places’ in traditional urban fabric are for all intents and purposes variously differentiated, locally specific, points on the supergrid<sup>11</sup> – and that the

supergrid is already the primary network for getting around the city – the ‘problem’ of urban intelligibility at the level of the centre seems to become somewhat circular and trivial. However the way social and economic micro-conditions are established by vertical ecologies (both in and out of the inner city fabric) and how they vary from place to place as a result of very particular differences in the ways these ecologies are set up, remains profoundly interesting and is the subject of ongoing research.<sup>12</sup>

### **The ‘difference machine’**

The idea of the vertical ecology is used here to spatialise this type of relationship and interaction between populations, and differentiate it from one which is often assumed in thinking about communities. Relationships between communities are usually assumed on what I have been calling the horizontal level; communities – like the rich and poor communities whose neighbourhoods border each other that Richard Sennett talks of<sup>13</sup> – have relations across a border which becomes in his terms the positively educative and ‘creatively disorderly’ interface between the two populations. The relationship is one where the geographical margin of one community touches or merges with that of another. What is different about the relations between populations in a vertical ecology, is firstly that the communities involved are defined at different scales. The community using the supergrid is that of the larger city; that using the local grid is that of the neighbourhood. The second community is nested, in other words, within the first.

The second difference is that the ‘border’ ‘between’ the two communities is centred within the neighbourhood. Interrelationship with what is ‘not-community’ happens not at a marginal site, or at the unstable edge between sites, but at a central one, and one that establishes a space that is central and identifying for the neighbourhood community involved – while at the same time being part of that pre-individuated virtual centrality of the whole city. Interface or ‘creative disorder’ if you like, takes a central place in the spatial organisation; the creative friction of difference is part of the standard set-up of neighbourhood – of this kind of inner-city neighbourhood at least. An ‘urban-social form’ is created in the relationship which we recognise as the neighbourhood street or the high-street. It is here that the urban part-whole relationship is actualised and made real – locally, and in one real space. This space becomes a ‘concrete universal’ – one of those spaces that draw together and integrate the heterogeneous components that constitute real places – that Edward Casey talks about in his analysis of place.<sup>14</sup> An important point is that this is a diagram and is subject to the ‘compression’ and loss of resolution of detail that is a characteristic of all diagramming. Our more conventional diagrams of neighbourhood and community do this as well – but some of the anomalies that emerge out of our conventional diagrammings of community and neighbourhood are due to more than a loss of resolution – they are due to inadequacies of the spatialisation diagram itself. We have of course built our inadequate diagrams of community – substantially changing many of the local dynamics of places, but not I would argue overthrowing a very basic way we are spatially ‘in the world’.

In talking about the creative potential of the interface between different populations, I am referring firstly to a discourse on difference and the public domain which has become central also in the discussion of public space.<sup>15</sup> Mouffe, for example, advocates an ‘agonistic pluralism’ where the public sphere is conceived as a site of difference and disagreement, but one which offers opportunity to the less powerful to stake their claims. She sees agonistic politics as a journey of development and transformation through engagement, which depends on maintaining open links between different cultures and interests. Identities can be formed through agonistic confrontation, while social engagement can generate new coalitions and understandings and new hybrid identities. Richard Sennett has brought this discussion to public space as such, arguing that the ‘disorderly’ urban spaces of mixing make new social

transformational possibilities visible and generate cultures of engagement, inclusion and hybridisation that work against exclusivity and tribalism.<sup>16</sup> He tends to maintain a – romantic I feel – attachment with the marginal and with the ‘border zone’ in this discussion and misunderstands the way a public space may centralise, rather than marginalise, this engagement, maintaining a visible openness in the space of the city as a matter of regular dynamic urban structure. I would argue that the main street in the traditional fabric works in such a way, centralising and spatially ‘institutionalising’ hybridity, as opposed to the way the gated enclave for example, spatialises and fixes insularity and defensive tribalism. It is in these kinds of examples that the political dimension of the distribution of visibility in the city is realised.

Secondly, I refer to a discourse on time, difference and emergence out of philosophies of formation and becoming.<sup>17</sup> I see this vertical ecological model as the beginnings of an attempt to develop an account of the creative workings of circuits of material and information and their interfaces and interactions in the urban surface – and also as an attempt to engage, from the spatial and situational side, with a “sociology that examines the diverse mobilities of peoples, objects, images, information and wastes; and of the complex interdependencies between and social consequences of, these diverse mobilities.”<sup>18</sup> I see this as an attempt to begin to examine and articulate the power of the time of Bergson and the difference of Deleuze as an ‘engine of becoming’ in the urban surface, and in a world of accelerating contemporary mobilities.<sup>19</sup> The ‘urban-social forms’ of which the neighbourhood high-street is no doubt just one of many, are ‘creative evolutionary’ emergent formations out of particular configurations of mobile relations. The relations and the objects and effects they integrate cross boundaries of scale, of the urban in its more narrow definitions, of subject and object and even of our primary categories of culture and nature. These hybrid constructions are places (again in Edward Casey’s terms), establishing points of crossing, relay and exchange between diverse networks; points which also enable displacements by providing emplacements.

The global and the metropolitan for example are real factors in the space of the city only to the extent that the displacements they depend on are enabled by all the other circuits which service them – Saskia Sassen considers the role of other material and human resources, even including the immigrant workers servicing the offices in which the transactions of global high finance take place.<sup>20</sup> There are transformations, translations and transductions at points of crossing between different levels and scales of movement and displacement, of which here the neighbourhood high-street serves as a first simple example. We see these processes of crossing, interpenetration and the actualisation of particular urban realities, out of complex processes, systematised (partially and incompletely) at an urban level – at a level which actualises the urban – by mobility and connective infrastructures, as our chief subject of research.

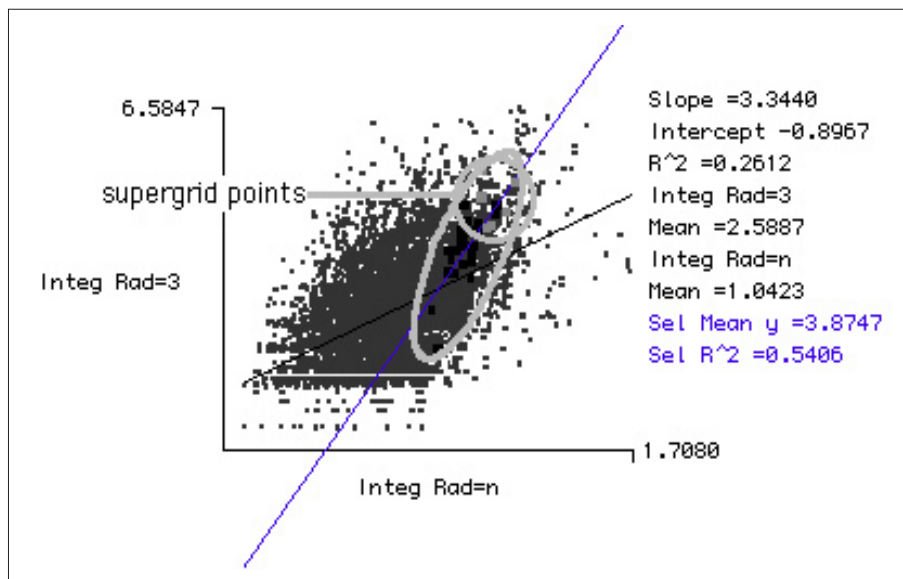
The lesson here is that cities need to be seen less as distributions of locations to which categorical attributes are applied, and much more as forces and flows which move diverse components around, and from which, because of their constant reactions, transductions, mergers and symbioses, a creative transformation continually proceeds – continually forming and transforming conditions in an urban surface which consists of enabling and partially systematising infrastructural network shells.

#### **The relation with ‘conventional’ space syntax**

I believe that this construction I have set-up of the two overlaid grids or shells of movement infrastructure, comprising the central urban fabric, explains rather simply the effects one sees in the scattergrams we use in space syntax for urban structural analysis. I will illustrate by looking at the ‘intelligibility’ scattergram by way of the viewpoint opened up by this model. I will then go on to derive two new measures

which draw out the variables this model points to as being relevant for urban function.

The 'intelligibility' scattergram is taken to reveal structure or form in the built environment, where form available locally reflects or correlates to some degree with form in the wider fabric. How that form is read by the 'subject' or 'agent' is not made particularly explicit, but it is regarded as significant that such a correlation occurs – and makes plausible the idea that 'global' form is revealed in local form. The scattergram compares the 'global' structural measure 'integration radius n' on the horizontal axis against its more local equivalent 'integration radius 3' on the vertical.



2. The 'intelligibility' scattergram of the Pijp

The example shown is of the Pijp inner city neighbourhood in Amsterdam where one sees the 'typical' shape of the intelligibility scattergram for an intelligible neighbourhood; the range of points (compared to the range for the whole centre) on the horizontal axis is smaller than that on the vertical axis and a correlation around a steeper regression line than that of the centre as a whole is revealed for the neighbourhood itself. The characteristic shape of the scattergram for an intelligible neighbourhood emerges simply because any group of lines that are highly physically interconnected will tend to a smaller range in their 'global integration' values than for their 'local integration' values. This is a factor of the relation of the lines being measured (related already amongst themselves through their high level of interrelatedness) to a much greater number and variety of elements in the case of the 'global' measure compared with the case of the local measure. If we now pick out supergrid spaces (in the Pijp) in the scattergram it is clear that they cluster around the top end of the whole neighbourhood cluster. This is not particularly surprising given that these are in general long or longish lines strongly linked to other long lines which as a group integrate the whole city centre fabric. The other lines are strung out below this top cluster, their declining values tending to fall with their decreasing length. Again this is not particularly surprising given that 'local integration' correlates with the space syntax measure of 'connectivity' and 'connectivity' tends to correlate, in groups of highly interconnected lines, with metric length.

If we consider for a moment real intelligibility in real central urban fabric, through the viewpoint opened by the model I am developing, it is plausible that it may be related firstly to having a clear and coherently articulated supergrid, one that can be learned quickly by moving around and using the space of the city, and secondly

to the 'depth' (number of changes of direction) of spaces in the local grid from the supergrid. What we want in an intelligible fabric is a coherent network of identifiable places (produced as I have already suggested on the supergrid through the interaction between supergrid and more general spaces) linked through the dominant movement network at city centre scale, and a generally low 'depth' (number of changes of direction) of the local grid from that network. This is the basic form we find in central areas of Amsterdam.

In fact the profile of intelligible areas outlined here is slightly but significantly different to that defined through the 'intelligibility' scattergram. A long 'tail' – the string of other points trailing off from the top cluster of supergrid points in the scattergram – is generally given by a range of longer to shorter lines. In the example given here the two lowest points are also very short lines. In contrast, what is implied by the 'clear supergrid and shallow area' profile is more a (relatively) high global integration/high local integration profile. This presumes first that a well integrated supergrid (one that integrates into one movement experience all the significant places of the centre) will in general consist of a 'cluster' of topographically distributed but topologically clustered (linked) lines. This distributed 'cluster' will correspond to the network of distributed or 'virtual' supergrid centrality described earlier and will perform the integration function for the central city as a whole, knitting it all together as a pattern of movement and experience. Secondly, shallow areas, well linked to the supergrid, will tend, as I have already pointed out elsewhere,<sup>21</sup> to be rather orthogonal grids and to have high levels of 'connectivity'. They will tend also, for reasons to do with orthogonality and with strong linkage to the fabric through the supergrid, to have high levels of 'local integration'. Although I won't try to argue a necessary link between intelligibility and activity levels here, it is plausible when we think of our experience of urban areas that such a link may exist – and I have already shown elsewhere that there is in Dutch cities a very powerful correlation between the average values of 'local integration' (and 'connectivity' by the way) for topographical areas and the average on-street pedestrian activity levels for those areas.<sup>22</sup>

The first space syntax measure I want to propose therefore is one which I have called 'area integration' which makes use of the powerful link between average 'local integration' and average activity levels. This could be programmed, I would suggest, by giving each line in the axial map a value based on the average of the 'local integration' values of all the lines within a certain distance (perhaps a metric distance which corresponds roughly to the 'neighbourhood scale' of the city under consideration) of that line. The metric distance here needs to be measured through the grid. At present we use another rather poorly programmed version based on a topological distance of two or three from the line in question, but as this topological distance often takes one quite far out of the immediate scale of the neighbourhood, results are not always consistent. This measure has proved nevertheless to be a powerful first indication of areas of high local activity and of the kind of vibrant and lively urban qualities that we associate with the traditional city at its best. It is the first analysis we normally do on fabrics which don't reveal their secrets easily and has surprised on more than one occasion – indicating an underlying spatial basis for activity levels where that basis was not immediately to be read by the trained eye in the plan.

The second measure is one I have called 'integration gradient' which is designed to detect the variations in 'local' and 'global integration' values of lines considered locally. The point is to try to find local maxima of these values and to thereby highlight the supergrid within the fabric. Supergrid spaces will tend, we have seen, to have high 'global' (and 'local') integration values relative to other spaces local to them. The method seems to work reasonably well in our, again poorly programmed, version provided there is a reasonable spread of adjacent and interlinked lines so that the value can show up correctly. We regard this measure as of rather academic interest

since, as I have already mentioned, we prefer to find the supergrid by surveying (or quickly scanning) real movement rates on the street. It is even possible to rather accurately guess the supergrid in plan by following continuities through the fabric, using its property of topologically clustered-topographically distributed, to trace it through the more regular fabric.

The other point that needs some discussion here is the rather fundamental one of the relationship of the biplex structure I am proposing to the axial map – which I have already suggested treats urban spaces equally which are not equal in functional and experiential terms. The supergrid and the local grid are to some degree self-similar, but operate at two different scales; it is easy to see that the axial map of the supergrid will comprise in general longer lines than the axial map of the local grid. These longer lines will also, as the supergrid, be topologically clustered; they are linked together into a more or less tight bundle in topological space while being distributed topographically through the whole map. The ‘already-structured’ nature of the central urban grid that Hillier talks of,<sup>23</sup> is about this – the way a subset of the lines of the axial map form themselves a coherent web overlapping and integrating the whole. To claim that the biplex structure itself is what delivers form in the axial map may be to miss some of the subtlety of urban form – nevertheless it seems clear that the axial map is pointing to the biplex structure, and the different scales of the geometries of the two grids, rather than using the relevant structure directly to reveal the way it supports urban function and the structure of urban experience.

The axial map, while beginning to differentiate the way the different geometries of the two different grids articulate two different ways, speeds and scales of being in the city, still treats these two speeds and scales of being on the same equal plane – even when it is clear in our experience of the city that they do in fact differentiate, and that their differentiation is one of the chief ingredients of central urban form and intelligibility. Their differentiation is also a requirement for the vertical ecology which underpins the emergence of the urban-social form of the neighbourhood main or high-street, and I will be outlining a speculative proposal later; that urban-social forms in general may be products of ecologies of relations between horizontal layered and differentiated shells of network connection and movement.

### **Two provisos**

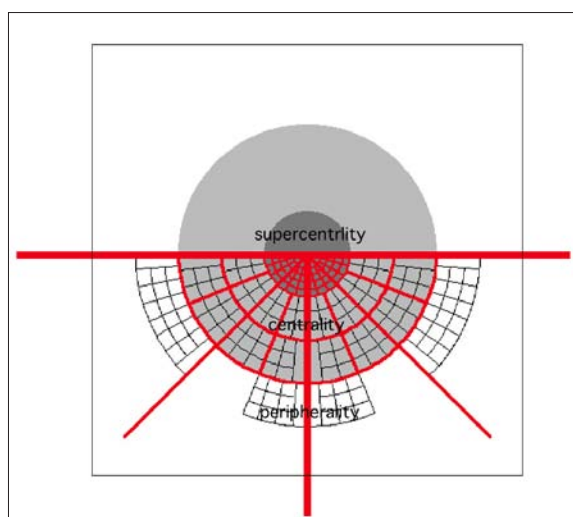
Cities are not systems, frozen into an immanent logic, rather they are sets of systematising networks<sup>24</sup> which give a provisional ordering to urban life. Ambiguities and even ruptures in these networks, the consequence of a contingent history, are part and parcel of the urban, and lend specificity, not to mention colour and interest and occasional frustration, to urban experience. Following the clearly marked Kalverstraat, the person who knows Amsterdam well can take a few side streets, pass a well-known bookshop and emerge as if by magic at the top of the Leidsestraat – while following the supergrid might not be either as clear as it should be, or lead the urban walker on such an engaging detour. Happy and unhappy accidents all form part of urban spatial organisation and in spite of systematisation and the integration of subjectivities into clearly marked grids, one can still get lost.

Having set out the biplex movement network model for the social-spatial form and dynamic functionality of traditional centres, we have to immediately introduce one more proviso. This is not a static and invariant ‘difference mechanics’ of the central city; in fact the ‘machine’ in its purest form is found only in a narrow band around the historical centre of Amsterdam and in patches in other cities. But in its pure form it serves also as a datum against which to measure the variations on that basic mechanism which typically occur in the Dutch city. I need to also remark here that it is in this band (as well as in the ‘supercentral’ historical core of course) that we encounter the urban we use as a datum for thinking about qualities of cultural diver-

sity and vividness, small-scale economic vibrancy and intensity, and a visible and varied street life.

In the first place, things typically become complicated (and intensified) in the historical medieval core of the city by the concentration of so many lines from the supergrid network around this point, as well as by the strong nodal connection to regional rail and bus networks (through Central Station in Amsterdam for example). We begin to see generated a concentration of activity on a whole-area basis in these highly central or *supercentral* places. The supercentral place is at one and the same time: a concentration point in the supergrid network; a place well connected to regional infrastructures, *and*; often an area with conditions of openness, transparency and high grid interconnectivity at the local scale (i.e. a relatively simple orthogonal grid with a high average local integration value). In these conditions, the distinctiveness and differentiation of the supergrid in the fabric begins to break down as high levels of activity start to permeate through the local grid. In fact the medieval core of Amsterdam is not an ideal or highly typical supercentral place in terms of these very local conditions, or in terms of the integration of the historical core into the supergrid network as a whole. The strongest centrality conditions in Amsterdam's core are a consequence of the strong links to the region, and the functional profile of this place supports this analysis, suggesting stronger functional links to the region (and indeed to the world – through Schiphol airport and the European rail network) than to the rest of Amsterdam.

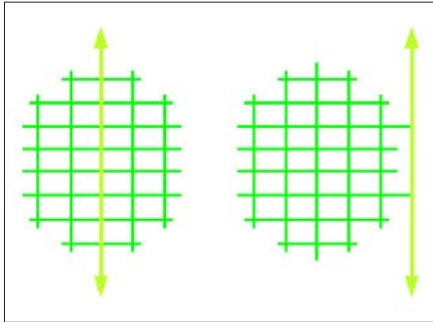
So, as one moves towards the historical core of the city, the basic mechanism outlined, typically in many Dutch historical centres, shifts towards a blurring of the distinctiveness of the supergrid, and the emergence of an *integral condition* of supercentrality, where all the strongest conditions of the local, the central city (delivered through the supergrid), and the regional (delivered through movement networks which typically are not represented in the axial map) are overlapped and absorbed into one area. Typically, intense levels of activity occur, as multiple and diverse lives and activities overlap with each other. This is the kind of centrality we are all accustomed to from our best experiences of urban central cores.



3. Supergrid  
variation in the centre

As one moves away from the core however, the opposite tendency occurs; the supergrid network becomes more and more distinct and defined, the interconnectivity between supergrid and local movement grids diminishes, and the supergrid and local grids begin to disengage from each other. The overlap between these networks begins to unravel and local-scaled grids become *unequivocally* local while super-

grids become more and more *specialised*, losing that hybridity and difference factor which creatively changes and charges these places.



4. Centred and de-centred neighbourhoods

One can see here the emergence of the condition of peripherality, where that peripherality is defined not as a quintessential condition in relation to or by reference to an historically produced centrality, but as a condition out of the ecologies produced by a simple set of movement and communications networks. Centrality and peripherality become not simply accidents of history over which we have no power, but products of particular definable movement and communications network infrastructures and their relationships, which we have the power, if the will be there, to establish or to change.

#### **The inhabitation of shells and intelligibility**

We think far too statically about, and spatialise with simplistic horizontal ecologies, the ways that people inhabit the city and the world. If people inhabit pathways, even before places, and have the power to shift, almost at will between distinct connective infrastructures, then the question is one of a dynamic structuring in movement and connection vertically between networks, as much as horizontally within them. I have already suggested elsewhere that our primary way of navigating the city involves not so much horizontal movement as a stepping in and out of different vertically-layered shells – these shells corresponding to differently scaled levels, simultaneously physical and mental, of mobile emplacement.<sup>25</sup> In the example of the central city I am discussing here, and purely in relation to the two lowest-scaled shells, one is either in the movement grid of the neighbourhood, or one is in the perceptually coherent and ‘marked’ movement grid of the city (actually one is in both at the same time on the neighbourhood high-street). The question of knowing the city is one of learning these grids. Most inhabitants of cities will know a few neighbourhoods and most of the city-scaled supergrid. At and beyond the limits of their knowledge they will use maps or ask directions. Typically therefore, one would move from A to B, if that journey involved both city and neighbourhood grids, by moving first to the supergrid, using the supergrid to home in on the destination, and then stepping into the local grid again, if necessary, to complete the journey. Notice that this movement is bodily and embodied before being cognitive; our bodies folding activity and intentionality into the structure, and using the structure as an affordance rather than as a difficulty to be overcome or a puzzle to be solved. Places are places on the way, points of relay and transfer – which are by the way transformed by one’s passing.

The question of emplacement or situation therefore becomes referenced to shells of the space-times of populations in movement. I have suggested that subjects engage with the ‘population mobilities’ of these shells. They become part of a convergence or integration of network and subjectivities in motion. Individual movements in place are indexed to these shells, and the space-times of individuals and the maps we make of them need therefore to be referenced to these shells. Note that the supergrid in the fabric of the more traditional centre has this special property of allowing one to be indexed to the centre as a whole and simultaneously to the local neighbour-

hood area. The shift between being perceptually oriented to the one or the other though is a positive shift, in the same way the switch one makes between one image and another when looking at an optical illusion (between the duck and the rabbit in Wittgenstein's famous example) is a positive switch. Situation and embodiment in motion, framed in these terms, profoundly alter the terms of the question of human individuality and intentionality, and shift the centres of gravity of 'structure' and 'agency' to the point where they become not poles apart, but superimposed and overlapping points of view on an integral condition of existence.

The environment is structured in and for movement and into levels which correspond perceptually with affordances for connection and movement. One may become lost in any of the levels but a good strategy to become unlost, I would suggest, is to find the next level up. In the local grid that means finding the supergrid – which in an intelligible neighbourhood, I have already suggested, is very few changes of direction from the local grid. In the supergrid it could be finding the railway station – or a bus or a taxi which will take one there – or even making a call on one's mobile telephone! Our world is a world in movement and structured in and for movement. We are emplaced in movement. We misunderstand and misrepresent the problem of intelligibility, not to mention perception, when we consider these issues statically.<sup>26</sup>

#### **The city as a technology of movement and emplacement**

It is clear today that the urban has overflowed the limits of the traditional urban centre. It is even more clear that the instrument by which this overflow has been effected, is in the first instance the infrastructures of movement and communication that have spread themselves over the surfaces of the metropolis, the megacity region, the global region and the world. It is clear once one begins to think about it that the city has always overflowed its limits, and that this overflow is the engine of the city's growth and development.<sup>27</sup> Underlying the model I have outlined here of the traditional centre, is a presumption that both our experience of specific urban places and the nature of the urban object itself are founded in the movements we and others make through it, and the way we encounter other people and things there in interfaces structured in movement. Our preconceptions of what the urban is though have remained static while the urban itself has shifted and adjusted itself to new layerings of infrastructure and connection and the new dominant movements within those infrastructures. If the city of our preconceptions is no longer the city we inhabit, it is because we see the objects, associate them with a city of the past which produced superficially similar objects, and discount the real relations and dynamics of our lives today.<sup>28</sup> As far as today's urban is concerned, we need at the very least to incorporate the regional freeway and rail networks into our analysis and our research continues on this point.<sup>29</sup> Beyond this we need to understand how telecommunications, instantaneity, and the media in general impact the shape of the vital, creatively evolving city. Our research is also taking on this point.<sup>30</sup>

We have always placed ourselves and understood our place in the world through the ways we moved in it – whether that movement was bodily through real movement channels or 'virtual' through communications channels, and today we begin to see the urban itself as a technology – consisting of a dense layering of shells of technological mobility and communications infrastructure; all designed to extend our reach into the world; designed for living at ever higher scopes, scales and speeds. Much contemporary thinking on the issue of connectivity focuses on the so-called 'virtual' networks of the world wide web, telecommunications and data-communications networks, including those of global financial transactions, mobile telephones, the distribution of information through broadcast and printed media and the pervasive reach of promotion and advertising. We believe that these networks need to be seen as part of, and as grounding themselves in, a respatialised urban ecology which

includes the more traditional communications channels of bodily mobility, and the mobility of all the brute physical stuff traversing our landscapes.

### **Urban ground**

It is into an already mobile and fluid and communicative place that the effects of the new flows of data and information come back down to earth. It is into bodily experience and lived time, already extended and transformed by mobility technologies and the older communications channels that we now take for granted, that all this other newer stuff becomes submerged and embedded. There is an integral, indestructible (in spite of rather shallow claims to the contrary) continuity between the 'virtual' and 'physical' urban worlds – a continuity in situated evolution, over and above all the revolutions in mobility and communicability – of the phenomenal, information-rich and legible urban world; as an accretion of layers of communication, that in their layered density form a ground that simply does not exist as a static pure-locational thing or surface apart from them. The lower scaled movement grids fulfil a vital role in this layering, founding in place the experience we understand as place. This is so even while the quality of that experience is transformed, and explains why, with the breakdown of the typical two layer structuring of the urban fabric in the last century, we have come to experience our new urban world as 'placeless'.<sup>31</sup>

We need to understand our global and metropolitan cities as an effect of all this layering of communication and mobility, as a consequence of an accumulative and evolutionary process of extension, through physical, informational and electronic space – and the technological systematisation of this extension – rather than being either on the one hand architecture, or on the other, simple systems of nodes in globalising networks.

Expanding, overlapping and systematising networks of communications and flow, set up a different class of ecology; one which does not depend in the classical way on relations and exchanges over static boundaries, but on the ways that different horizontal layers and modes of relations and flows intersect and interact with each other. The urban world becomes a layering of communicative shells, producing depth and mass in the interval and at the intersection between shells. The globalised, metropolitanised city is what emerges out of this interval of intersection, and the productive activity that takes place there. Social reality cannot be distinct from all these scapes and the way we engage with them. It is necessarily produced, inflected and actualised in their intersections, and in the way they constrain and enable; the way they open relations as well as effecting their closure and 'institutionalisation' at diverse levels of scale. At the same time these scapes, in their "stratifications and tangles"<sup>32</sup>, draw together affects and effects into highly specific urban moments of integrated hybridity – those 'concretely universal' places I mentioned earlier. We produce a horizontal and spatial society at this level,<sup>33</sup> whose relation with the vertical structures of our more conventional sociologies needs to be more fully worked out.

How can one conceive the production of the urban body today – something with mass and substance that in our contemporary state of urbanisation we can no longer simply understand as pure artefact, constructed of a transparent mentality and in proportions which reflect our own? – something we can no longer either understand as a system of dematerialised relations that function in a graph space of pure abstraction? What is the nature of an urban society or of a social city in a world of increasing connectivity and mobility? The ideas outlined in this paper aim to set up a framework to start thinking about the way we can begin as a practical matter addressing the problem of urban form today and for the future.

- 1 I am thinking here of the way all axial lines are treated equally in using the Axman software as an instrument of urban analysis.
- 2 There are questions about the assumptions underlying the idea of the 'human cognitive subject'; whether for example this subject may be behaving cognitively or more tropically (at least most of the time) in movement. See Brian Massumi (Massumi (2002), *Parables for the Virtual*, Duke University Press, Durham NC). See Tor Nørretranders (Nørretranders (1999), *The User Illusion*, Penguin, New York). The 'human cognitive subject' is invoked for example by Bill Hillier (Hillier (2003), 'The knowledge that shapes the city', in: *Proceedings of the 4th Space Syntax Symposium*, University College London, London).
- 3 See: Read, S. (1999), 'Space syntax and the Dutch city', in: *Environment and Planning B: Planning and Design*, vol. 26, pp 251-264; Read, S. (working paper), 'The patchwork landscape and the 'engineered' web; Space and scale in the Dutch city', Available on request; Read (2001) 'Thick urban space', paper presented at the 3rd Space Syntax Symposium, Atlanta, in April 2001; Read, S. (2003), 'Learning from Amsterdam; Axes and centres in the dynamic city', in: Carmona M. (ed.) *Globalisation, Urban Form and Governance 6*, Delft University Press, Delft; Budiarto, L. and S. Read (2003) 'Human scales', paper presented at the 4th Space Syntax Symposium, London, in June 2003; Kusumo, C. and S. Read (2003), 'Building on geometries of intelligibility', paper presented at the 4th Space Syntax Symposium, London, in June 2003.
- 4 Parts of Paris and parts of Rotterdam show a tendency towards a triplex structure in the very local fabric – as indeed do others once one starts to include the 'periphery' into the consideration of the production of the local.
- 5 This is clearly something of a simplification as any model will be. See the section 'Two provisos'.
- 6 The time I am thinking of here is the duration of Henri Bergson: "In reality there is no one rhythm of duration; it is possible to imagine many different rhythms which, slower or faster, measure the degree of tension or relaxation of different kinds of consciousness. ... To conceive of durations of different tensions is perhaps both difficult and strange to our mind, because we have acquired the useful habit of substituting for the true duration an homogeneous and independent Time." (Bergson (1988), *Matter and Memory*, Zone Books, New York) p. 207.
- 7 I draw here on ideas from Peter Pesic (Pesic (2003), *Seeing Double*, MIT Press, Cambridge Mass.) and Manuel De Landa (De Landa (2002), *Intensive Science and Virtual Philosophy*, Continuum, London). This notion of virtuality is also talked of as the 'continuous multiplicity' by Bergson, the world as a web of fluid relations, as opposed to the 'discontinuous multiplicity' which is the world of discrete objects that we see around us (see: Keith Ansell Pierson, (2002), 'Introducing time as a virtual multiplicity', in *Philosophy and the Adventure of the Virtual*, Routledge, London).
- 8 As they would be in the urban ecology of 'natural areas' of the Chicago School for example. These Chicago School ecologies retain a power over contemporary thinking – Richard Sennett for example, in a lecture at the Berlage Institute in Rotterdam in 2004 used this idea to describe the meeting between two communities in New York City.
- 9 See: Read (2001).
- 10 The continuities of the 'continuous multiplicity' of Bergson which underlie the discontinuities of the visual scene.
- 11 See: Budiarto and Read (2003).
- 12 See: Read (2001). Bruyns PhD work at Delft
- 13 See for example: Richard Sennett (2004), 'The city as an open system'. Paper presented at the Leverhume International Symposium 2004, London School of Economics, London.
- 14 See: Edward Casey (1996), 'How to get from space to place in a fairly short stretch of time', in, Steven Feld & Keith Basso (eds.), *Senses of Place*, School of American Research Press, Santa Fe, New Mexico.
- 15 See for example: Mouffe, C. (2000), *The Democratic Paradox*, Verso, London; Young, I.M. (1990), *Justice and the Politics of Difference*, Princeton University Press, Princeton NJ; Sennett, R. (1992), *The Uses of Disorder*, Norton, New York.
- 16 Sennett (1992).

- 17 The process philosophers I am thinking of include Whitehead, Bergson and Deleuze.
- 18 See: John Urry (2000), *Sociology beyond Societies*, Routledge, London, p. 1
- 19 See for an overview: Ansell Pearson (2002), De Landa (2002).
- 20 See: Saskia Sassen (2002) 'Locating cities on global circuits', in, *Global Networks, Linked Cities*, Routledge, London.
- 21 See: Read (2003).
- 22 See: Read (1999).
- 23 See: Bill Hillier (1999), 'The hidden geometry of deformed grids' in, *Environment and Planning B: Planning and Design*, vol 26, pp 169-191
- 24 See: Bruno Latour (1988), 'The politics of explanation: an alternative' in, S. Woolgar (ed.) *Knowledge and Reflexivity*, Sage, London.
- 25 See: Budiarto and Read (2003).
- 26 See: Merleau-Ponty, M. (1983), *The Structure of Behaviour*, Duquesne University Press, Pittsburgh Penn.; Gibson, J.J. (1986), *The Ecological Approach to Visual Perception*, LEA Publishers, Hillsdale NJ.
- 27 See: Read, S. (forthcoming), 'A brief history of flights to the periphery and other movement matters', in, *Spacelab1: Visualising the Invisible*, Delft University Press, Delft.
- 28 See: Read, S. and G. Bruyns (forthcoming), 'The urban machine', in, *Spacelab1: Visualising the Invisible*, Delft University Press, Delft.
- 29 The PhD work of Gerhard Bruyns for example.
- 30 The PhD work of Marta Mendonça for example.
- 31 See for example: Marc Augé (1995), *Non-places: Introduction to an Anthropology of Supermodernity*, Verso, London.
- 32 See: Henri Lefebvre (1991), *The Production of Space*, Blackwell, Oxford, p. 402
- 33 See: Urry (2000)