

Questions of Form: Foldings, tropisms and large urban bodies

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Abstract

It is proposed that space syntax can be understood as more than a ‘design method’, with the assumptions of transparency and universal generalisability that attach to design methods thinking. Research using space syntax has demonstrated that the built environment itself is an agent of the distribution of activity in public space. This finding begins to push beyond mainstream urbanistic views of the city which on the one hand understand the ebb and flow of the city to be unlimited by ‘space’, and on the other concentrate on purely human-centred ways of understanding the rhythms of urban life. At the same time it begins to resonate with rather different ways of understanding complex material and situated processes in space than we have been accustomed to use. These firstly validate our belief that the environment itself is involved in distributing urban activity, but also begin to highlight different ways we may use to rethink ‘foundational’ instincts and beliefs about the relations between us and the built environment. This paper is a first attempt to explore ideas which begin to suggest both different ways of understanding the human-environment relation, and ways of rethinking societies that places an emphasis on its material and space.

A new concept appears in physics, the most important invention since Newton’s time: the field. It needed great scientific imagination to realise that it is not the charges or the particles but the field in the space between the charges and particles which is essential for the description of physical phenomena... Could we not reject the concept of matter and build a pure field physics?
(Albert Einstein and Leopold Infeld, The Evolution of Physics)

1. Origins of an urban order?

Space syntax is more than an architectural spatial modelling technique; it offers also a way into thinking the environment and our relation to it. But this way of thinking also points to contradictions in our more accustomed ways of thinking about the world, concerning both the levels of the individual or subject and his or her relation to the phenomenal world in which he or she is immersed, and that of the collective or the social and its relation to what we are prone assume is the ‘given’ of nature. By what we do in our research, therefore, we participate in a drama of meaning and significance larger than that of the particular architectural and urban topics with which we are engaged. This issue of perspective on the world and how we see ourselves in relation to it plays a profound role in the way we set up the research project and in the values and interpretations we place on the results of our work. Some of the conceptual dilemmas with which we struggle may well in the end be a *product* of the way we understand these relations between us and world, and are

capable of changing or even disappearing entirely as we make the leap to different frames of thinking.

Data is illuminated by conceptual structures,¹ pattern emerges and the world becomes intelligible; the city as revealed through space syntax research appears as a fabric of movement, of circulation². But space syntax exposes a factor of 'agency' in the material environment itself, and reveals contradictions therefore in the way we bias certain perspectives - particularly those related to the scales of our own action and volition - and the way we understand ourselves in relation to the environmental stuff around us.

The space opened by space syntax therefore, if we allow ourselves for a moment to be lead by it, is one that stands somewhat at odds with mainstream views of urban function. Our default assumption in thinking about movement dynamics in the city at the fine grain, is that it is ruled by the 'space-times' of the to-and-fro of mundane but highly particular and individually motivated movements³. New considerations of the time dimension have then emphasised that the tendencies are to 'space-time compression' and to ever greater speeds and efficiencies of movement⁴. It is considered that this *temporalisation* of the experience of the city is part of the mechanism of an increasing social *individualisation*; increasingly atomised individual agents make route choices cutting across multi-modal traffic networks - and unravelling in the process finely woven fabrics of place which were the product of slower and more place-bound times. They produce by their movements a new temporalised space in technical movement and communications networks, aggregated from individual travel times and origins and destinations over a metropolitan and larger territory.

The picture we get, however, is one which sees first rather robust *collective* movement patterns, coherent *streams* of human and other material at the levels of the fine-grain, tied very clearly to orders which originate in the movement grid itself,⁵ and incorporating scales which are, even at the local scale, above those of 'wayfinding' and of the immediate local perceptual and volitional activities of individuals. The spaces of these collective flows are then *themselves* productive of situated social and place conditions⁶; productive in fact of *forms* impacting on and situating everyday lives in place. Our research agenda consists, I would argue, in the first place, of the isolation and articulation of these spatially generated forms and of their place in everyday social patterns.

The city is a production it seems from our research, to a very significant extent, of processes of flux and movement 'from above', and this is even while considering scales productive of the very *local* of the fabric of the urban centre, and before we really even begin to consider the scales of the metropolitan and eventually the global. The more

¹ The fact is that conceptual structures may be embedded in practices and instruments, as well as in the more explicit theory. Some of them may become invisible to us, part of the 'method'.

² See: Hillier (1996), 'Cities as movement economies', *Urban Design International*, 1(1), p. 41-60; Read (2005) 'Flat City: A space syntax derived urban movement model'; paper to be presented at the 5th Space Syntax Symposium, Delft, in June 2005.

³ This assumption seems to me to stand implicit and explicit in almost all urban ecological thinking - including the spatial assumptions of the Chicago School and the time geography of Hagerstrand.

⁴ See for example: David Harvey (1990), *The Condition of Postmodernity*, Blackwell. Oxford.

⁵ See: Read (2005).

⁶ See: Read (2001) 'Thick urban space', paper presented at the 3rd Space Syntax Symposium, Atlanta, in April 2001; Budiarto and Read (2003) 'Human scales', paper presented at the 4th Space Syntax Symposium, London, in June 2004.

conventional view of a temporalised urban space, aggregated from individual movements, may capture something of the generalised production of a new dissipated and placeless 'space-time' of contemporary life, but misses entirely the actual or potential productivities of that movement, in terms of the way it produces collective *situated* urban-social forms and structures - it misses the way it produces the *particular* of place in the fine grain of those movements. One could say that the conventional view theorises contemporary urban movement abstractly without grounding it - it may indeed over-theorise the to some degree valid case that this contemporary movement is implicated in the loss of ground in contemporary experience⁷.

Of course what one sees depends on the equipment with which one sees; but this alternative view we promote offers at the simplest level an interesting corrective to the conventional wisdom of the more or less inevitable death of public space. It is a view which engages with the mechanics of public space's production and seeks the conditions for that production.

It is, at the same time, a view which can begin to provoke a deeper reflection on crucial questions about the way we encounter our world and about agency, structure, situatedness and perception in relation to the environment. It is a view which, in the first place, points to the way agency shifts from the conscious 'I' and the body of the individual, to somewhere else completely when we begin to consider movement at the scale of the city itself⁸. We tend, as Bruno Latour has pointed out, to delegate agency to our objects⁹; we may in many cases do this without really being fully aware of just how thoroughly our objects are capable of taking on lives of their own and becoming agents in their own right of many of the conditions of our existence. One could say that in the world of 'objects that judge' of Latour, the city-object (with the city understood as multi-scalar movement 'technology' or 'machine') extends our collective power, as technologies do - while actively forming and transforming our collective and individual lives. It takes on this formative and transformative role through the 'systematising' (rather than 'systematic') powers of movement paths or movement infrastructures¹⁰. While so much of contemporary discussion has us skimming over the surface of the city as if it were no more than the plane of our mental activity, our instruments and our research begin to point to the way the space of the city itself, and not just its time, imposes its grip, engaging us in a choreography of place and situated collective existence whose effects are active and socially formative and very profound indeed, and which we for the most part entirely misattribute to other levels of agency.

Our view is one therefore which raises deep questions about how far we can assume a transparent 'subjectively' motivated intentionality in relation to an 'objective' environ-

⁷ See for example: Marc Augé (1995), *Non-places: Introduction to an Anthropology of Supermodernity*, Verso, London.

⁸ Manuel De Landa also points to the dangers of understanding agency at higher scales to be 'aggregated' from levels below. The 'body' can be defined at any scale and has its own law at that scale.

⁹ See: Bruno Latour (1988), 'The politics of explanation: an alternative' in S. Woolgar (ed.) *Knowledge and Reflexivity*, Sage, London; Bruno Latour (1993), *We have never been modern*, Harvard University Press, Cambridge, Mass.

¹⁰ I suppose one may even suggest that the path is our original technology - before writing. It is a short step from here to begin to include the technical networks or infrastructures of other communications technologies in the layering up of the 'machine' into the complete technological 'object' of the contemporary city. See Read (2005).

ment, about the supposed passivity of the environment - which is supposed to be simply there as a neutral frame for our transparently intentional action - and about the exact locus and scope of urban order. It is a view which begins to acknowledge that some of the processes of our constructed technological objects can take on a character of 'natural' force, while opening questions about some of our base-line presumptions of subject and object and society and nature.

2. An order beyond naming?

We live in a world which, on the face of it, is no mystery to us. We are certainly not short of information on its shape and topography, or of the distribution of objects and features and resources on its surface. The challenge of going beyond the limits of what is geographically known are long past, and in fact the attitude and the way of seeing the world that have allowed us to master it so extensively and apparently so completely seems also to have left us with strange paradoxical gaps and contradictions in our knowledge and understanding of it¹¹. And that often at the point where this well-mapped world is closest to us. We find it difficult to reconcile the status of things - including ourselves as sentient and involved beings - and changes in all we see around us. We believe we are related to other beings and things along lines of external relation that leave the internally specified nature of our selves basically unaffected, but that nature in its turn feels fragile and besieged in the precipitous tumult of a world changing often unaccountably and apparently uncontrollably around us. In particular, on the 'subject side', we find it difficult to understand how the autonomous, self-directing self we feel we know, and the world around this self may affect one another, or how we manage to perceive the world around us and form our intentional relations with it.¹²

The paradoxical difficulties continue when we look at, at first sight self-evidently autonomous, things on the 'object side'. We endlessly multiply categories of things, failing conclusively in the end to definitively find 'natural orders' in terms of those things' internally specified essences or 'natures'. These 'natures' of things become even more difficult when we recognise that almost all we see when we look around us at our environment is in fact artefact; by definition therefore constructed in the most literal sense. A bias in our thinking, so apparently natural it is seldom questioned, tends to see it all on the one hand therefore as reflecting something about the social world we live in, taking that social itself to provide the law involved in forming and shaping that environment. But all this stuff around us is also material, and we biological material - and on the other hand it all obeys the 'natural' laws of material things. Whose law in the end holds in all of this? Are we talking of the world of phenomena, or that of noumena?¹³ To what in the end are we and the other social, biological, material things around us subject - and in whose account are

¹¹ An expanding legion of writers are pursuing the contradictions emergent out of what Latour calls the 'settlement' of 'the modern constitution' between the realms of the 'social' and the 'natural'. See: Bruno Latour (1993).

¹² The idea of the location of intentionality in the form of our situated activity (also perceptual activity) by Maurice Merleau-Ponty is raised later.

¹³ The question is an old one: Is there an order and a meaning beyond naming? Perhaps we can accept that there is, but are we prepared to accept that it may be some of this order we are in contact with "while our consciousness is not aware of itself"? (see the section; 'The two-fold integration of form' later in this paper) If so we may be mistaken in the degree to which we think we are creatures of our own transparent wills.

we and what we see around us object?

It is gradually dawning on us that we live in a world which is not naturally divided along the lines of the categorical distinctions we make of it. There is no 'natural' divide between 'the social' and 'the natural', or between what is vital and active, by virtue of a force we have ascribed to God or Spirit or Mind or whatever, and what is as dead and immobile as simple matter has been taken to be. We find instead that we live in a world which is complex, mobile, fluid and fundamentally hybrid, and that produces out of itself and its complex processes - and in what are usually highly contingent situated conditions - emergent formations that owe little to our 'constitutional' systems of ordering. In the real world, with its everyday contaminations and intersections, the sluggish downward drift of entropy is interrupted everywhere by islands of relative permanence around stabilising features and forms, and where we least expect it, turns back on itself into local flows upstream towards negentropic pockets of self-generating order. Times and spaces, which we imagine as regular and regulated within our constitutional framework, in fact and in the real world, bifurcate everywhere.

Our world has been dominated and brought under systems of regulation; under the influence of our systems of thinking and of systematising networks of authority and control. But today we find this world is not responding always quite as it should, as the transparent instrument of our rules and routines. We seem in many places to have reached some kind of limit to the efficacy of the instruments which have allowed us to impose an organising grid of our own on the world. The world itself is more and more answering us back and we have trouble recognising the shape and substance of this other grid imposing itself on us. We call it disorder, and invoke breakdown and chaos. What is happening does not fit our preconceptions of what order should be; it does not fit within the regulated 'namings' we have already established. But we are also slowly beginning to understand that this other world and its grid, not naturally divided into 'the social', 'the material' and 'the biological', is at the same time an integral conjunction on its own terms - transcending these categories in favour of its own emergent orders. Our construction has taken a strange turn; it has acquired levels of complexity, dynamism and scale that allow it to assume some of the characteristics of the wild nature our categorical distinctions were constructed in the first place to tame,¹⁴ and our technical expertise and inventive skills are required increasingly today to deal with the surprising and even destructive orders emergent out of our own construction. At the same time this all-encompassing machine of the technological and institutional world we have created, at great cost and by movement and concentration of vast quantities of resources, still conducts the power and material and money that course through it, in highly controlled ways - and folds us all in a grip that constrains individual life-courses as well as the destinies of whole sectors of the world.

This tension between the centred and the in-between, between hyper-control and risk, begins to characterise all lives and all places and raises fundamental questions which have begun to dominate the discussion in the social and spatial disciplines¹⁵. Many of these questions point to the necessity of engaging a different discourse - one which can connect with the complex orderings of this other grid, with a continuous and emergent form which integrates the world in ways which owe little to our own agency, and which is able to put under stress, and transform in surprising ways, the world we have constructed with our

¹⁴ See: Latour (1993).

¹⁵ See for example: Ulrich Beck (1992), *Risk Society: Towards a New Modernity*, Sage, London; John Urry (2000), *Sociology beyond societies*, Routledge, London.

discontinuous categorical forms ¹⁶.

3. The 'nature' in urban form

We are clearly adjusted culturally, perhaps also as a species, to registering the world - to seeing things - in a certain way; certainly for having a preference for the discrete and distinguishable, for what appears to us as most solid and most real. This seemingly natural affinity extends to order and pattern of all kinds; we are adjusted to discerning similarities and distinguishing differences, and to ordering the world by way of outlines and closed categories. But we also, without remarking it nearly so plainly, follow barely distinguishable trains and traces and rhythms. And we appear, if we look closely, to use these traces to detect and to mark our place in the world, sometimes with such subtlety that we are hard pressed to describe and explain exactly how we do it. We position ourselves unselfconsciously, but with skill and precision, in familiar and not so familiar worlds, and in fact we probably have affinities for pattern that go altogether unnoticed at the conscious level ¹⁷.

Space syntax has its roots in architecture; it begins with an assumption that pattern in the environment matters, that it is worthy of study and that we can ultimately understand something about our world and our place in it through this study. Immediately though, and again, the question of the substance or the medium of this pattern arises. What is the nature of the æther in which we form this pattern in the world, and through which we trace things and beings, processes and outcomes? We know already, because we have been told in good faith by the philosophers, that the same thing can look different to different points of view; the pattern you bring with you seems to matter as much as the pattern you find out there. Whose patterns are we looking at then? Are they in the end just our own; reflections of the projections we make on the world? And whose meanings do we give them? Are they tied to the forms or formulae of the social? the psychological? the urban logistical? the economic? Do they, can they, have meanings which they in some way generate out of themselves? Can they even exist simply in and of themselves?

Ian Hacking reminds us that in fact real science is full of examples of found patterns, proverbial lost children (or embarrassing sore thumbs) of science, hanging around the laboratories waiting for someone to give them back their relations in the big constructed metaphor of Science, to give them their places in the world¹⁸. All knowledge may be constructed, but we should not make the mistake of ascribing to the world our own uncertainties - or certainties for that matter. There is a style of doing science - perhaps we should simply call it 'research'¹⁹ - which takes on the slippery middle ground at the interfaces of the official divisions of social and natural, of subjective and objective, of constructed and given; that is prepared to look at the nature in our constructions and the construction of our nature²⁰. There is a style of doing science that goes out looking for

¹⁶ I am thinking in particular here of Bergson's two multiplicities; the continuous and the discontinuous. See: Keith Ansell Pierson, (2002), 'Introducing time as a virtual multiplicity', in *Philosophy and the Adventure of the Virtual*, Routledge London. For an argument on the need for a new methodology in sociology see: John Urry (2003), *Global complexity*, Polity, Cambridge.

¹⁷ See: Tor Nørretranders (1999), *The User Illusion: Cutting Consciousness Down to Size*, Penguin, London.

¹⁸ See: Ian Hacking (1983), *Representing and Intervening*, Cambridge University Press, Cambridge.

¹⁹ See; Bruno Latour (1998), 'From the World of Science to that of Research?', in *Science*, Spring 1998.

lost and stolen children, and tries to make homes for them²¹.

Many of these dilemmas have affected architecture more, or certainly a lot more obviously, than a lot of other disciplines. Architecture deals in making thought concrete. For better or worse, it imposes and imprints our ideas, our constructions, on the material world where they more often than we like, or would like to admit, take on a life of their own. Architecture got into trouble assuming that social patterns and the sort of architectural space it dealt with were in some unproblematic way reflections of each other. It worked on the basis of this assumption to quite literally build social structures. And it succeeded, but not really in the way it intended. What it did do was turn architecture to the service of the official order which by this time, in its social democratic, socialist and liberal modes, was pervasive and controlling beyond anything most kings and emperors had managed to achieve in the past. Its violence as an instrument of fixing in space crude versions of the official social order (and revealing in the process and all too plainly some of its internal contradictions and heavy-handedness) lead the social disciplines to react by denying any positive role at all for space, and building their own mystifications of a despatialised social order.

Space syntax at this time was following its own nose and discovering some intriguing ways of characterising environmental forms, which seemed, from the empirical evidence at least, to tie in with some aspects of real-world social patterning in complex architectural or urban space²². The picture they were building though was of a rather different type of form and a different kind of space than architects had till then been used to; instead of the crisp finished outlines of the hylomorphic, what they were learning to deal with had a far more genetic character and treated form as active and emergent. Instead of understanding space as extensive, and as an empty vehicle that could do no more than contain and describe fixed forms, what they were doing was investigating the ways extensive orders arose systematically out of intensive spatial processes. The most interesting factor in these processes was their apparent productivity; the fact that the results tended to converge on emergent but quite exact 'forms'²³. These forms in their turn, rather than representing in any simple literal way the final state of real-world spatial systems, seemed to indicate potential states towards which real-world states tended. This loose and genetic logic of form was found to be surprisingly well suited for thinking about those aspects of architecture and cities which were themselves active and loosely determined - like their patterns of social activity.

Space is one of those ideas that often seems more likely to lead us astray than to enlighten, and the space that space syntax deals in needs careful consideration. Space syntax has been criticised for dealing with physical form and physical space and social issues together - for a crude physical spatial determinism in fact²⁴. This is a criticism that

²⁰ See Latour (1993).

²¹ "Ideas about cultural or social construction have dead-ended because they have insisted on bracketing the nature of the process." - Brian Massumi, in: Massumi (2002), *Parables for the Virtual*, Duke University Press, Durham NC. p. 12.

²² See: Hillier and Hanson (1984), *The Social Logic of Space*, Cambridge University Press, Cambridge.

²³ These forms are most compellingly revealed by the 'Axman' software, constructed as an analytic tool using space syntax ideas. These 'forms' illustrate beautifully the logic of the 'singularity' as a product of an 'attractor' in potential or 'phase' space, as described by Manuel De Landa. The technical apparatus was invented by Poincaré and is now a standard instrument in the investigation of emergent orders out of complexity See: De Landa (2002), *Intensive Science and Virtual Philosophy*, Continuum, London. ch. 1.

is on the one hand a misunderstanding of the real position and on the other valid in so far as it is indeed a common understanding within much of the space syntax community itself that we deal in a social logic of simple physical space. What we deal with explicitly in fact is a space of local affordances for movement - from which we produce globally 'singular', emergent effects by manipulation in the computer. It is all too easy at this point, and a fault of much of space syntax in practice, to understand our maps as directly representing a functional order of the city²⁵. In fact these maps themselves stand two steps away from representing the active factor and are only indicators to - very important and revealing indicators to - the urban order they reveal. This order is the one of the material continuity and integration - its status as a 'body' in fact - of urban movement.

The conception of such an 'urban body' derives from no social or sociological theory; what convinces us of its status as 'body' is an imaginative perception trained by the camera and by time-lapse photography and cinematography, and the capacity for seeing movement that these technological aids to sight have given us. It is the images of Potsdamer Platz²⁶ in the Weimar era and of Los Angeles and Miami from the air at night, and movies like *Koyaanisqatsi*²⁷ that have given us the capacity to understand the way the metropolitan urban field is integrated through movement. This body of movement is a self-activating convergence in space; an indication of the 'nature' in our constructed city; a product of the capacity of the world to integrate itself²⁸. Space syntax attempts, and with some success, to increase the resolution of our perception and analysis of this body, especially at the lower urban and local scales.

But if we are dealing with something more interesting and more hybrid than simple physical space we are not exactly dealing with straight-forward social space either. We operate somewhere between the social spatial dimensions of communication on the one hand and emplacement on the other. We are talking in fact about the way dynamic material processes embedded in the world may produce large scale integrations which do not depend for their existence on our naming of them. The way is opened through this 'body', and its incorporation into our technical-theoretical apparatus, to understanding the urban-social environment as a dynamic and socially productive²⁹ interweaving of nested, overlapped and situated movement patterns. The urban-social system here becomes one of exchange and interface between social composites, whose categories are those of the scales of their circuits within the city.

In building our understanding of this urban sorting device, we are also finding and engaging with an active order whose dynamism drives the creative capacity of the city to systematically produce the qualities we recognise as urban. We are dealing with a dynamic that causes urban worlds to take on actuality and come to life.

The model of the environment taken as a distribution in extensive space of bodies and objects, all with their own forms and meanings in and of themselves, does not account

²⁴ See for example: Edward Soja (2001), 'In different spaces', in *Proceedings of the 3rd Space Syntax Symposium*, Georgia Institute of Technology, Atlanta.

²⁵ In fact these maps are an indication to that order, and don't reflect the order directly themselves. See: Read (2005).

²⁶ See for example: Brian Ladd (1997), *The Ghosts of Berlin*, University of Chicago Press, Chicago.

²⁷ Directed by Godfrey Reggio (1983).

²⁸ This is not to say we don't have some kind of handle on this factor - only to say that we are hardly fully in control of it.

²⁹ Productive of social situation in particular embedded conditions. See: Read (2001); Read (2005).

in any similarly productive way for the logic of its growth or use. To look only at things distributed in extensive space is to miss their relatedness; it is to miss the movement in it all. It does not catch the emergence of the 'body' out of its own momentum. The links philosophically and conceptually to ideas of morphogenesis and the dynamic formation of biological and eco-systems³⁰ are not coincidental but are not what pushes the development of the idea forward. That is instead a concern with the description and problematisation of the built environment, not as built idea, or utopia or distributed form, but rather as a process of formation in the real world,³¹ all the time held up and compared to actual states of that environment on the ground.

This form also differs quite fundamentally from the forms generated by urban and traffic modelling for example in that emergent form doesn't rely for its emergent or 'productive' state on information (origin and destination states for example) from the outside the genetic space of the form itself. Space syntax deals with pure form, and singular 'potential'³² states are the self-generated consequences of the intrinsic orders of serially connected fields of elements. It looks for properties and states that are a consequence of form and nothing else in these modelled systems and then uses its models to demonstrate the intrinsic order of the built environment. The form in fact is topological, qualitative, referencing its own variations, an analogue of a field of emergence and self-referential transformation rather than a description³³. The study of morphogenesis in biology has already taught us that actual biological form is tied to a dynamic genetic space;³⁴ it is supported by and emerges out of the integral movements and momentum of processes of formation and development. Space syntax is trying to demonstrate a similar formal logic connected to the dynamics of emergence of complex environmental arrangements - and conversely to the emergent forms of dynamic activity within complex built forms.³⁵

4. The two-fold integration of form

In fact this genetic form and space of emergence has a considerable if not ancient history. The ambition of Einstein in the quote which heads this paper was to develop a field theory of the phenomenal world. He understood it was necessary to shift attention away from the world of things and abstract forces to the structure of space itself. A view which saw a world in terms of a linear continuous change and forces acting at a distance, was replaced by one which saw a world of discontinuous change and proximate relationships - where "the field here and now depends on the field in the immediate neighbourhood at a time just past

³⁰ See for example: C.H. Waddington (1957), *The Strategy of the Genes*, George Allen and Unwin, London; Brian Goodwin (1994), *How the Leopard Changed its Spots*, Charles Scribner's Sons, New York.

³¹ Both in terms of the emergence of physical forms and of 'states' of that environment.

³² The word used by De Landa, (2002) following Deleuze, is 'virtual'.

³³ Maurice Merleau-Ponty points out in *The Structure of Behaviour* that form adds no new factor to biology - it is a factor of organisation, nothing else. See: Merleau-Ponty (1983), *The Structure of Behaviour*, Duquesne University Press, Pittsburgh Penn.

³⁴ See: Waddington (1957), Goodwin (1994). It is this dynamic space which is known in the philosophical literature as the 'virtual'. See: De Landa (2002).

³⁵ In particular the similarities can be seen in the way space is conceptualised in these systems, with its attention to 'degrees of freedom' as well as constraint, generating topological 'attractors' within a 'phase space' of pure possibility - and then emergent actualisations driven forward as tendencies by events within this space.

... [which allows] us to increase our knowledge of the field by small steps.”³⁶ This move, and the implications of it, have powerfully influenced our ways of understanding the world since, reanimating an ancient debate on the relative primacy of object or process³⁷ -this time shifting the advantage back to the process side. Some of the implications of this move included a significant ‘softening’ of the ‘hard’ sciences - its ‘de-mechanisation’³⁸ if you like - while showing a way forward to the ‘hardening’ of the ‘soft’ through the supplementation of statistical methods by dynamic systems and morphogenetic ones. An absolute time and space and Euclidian geometry are replaced by a space-time that is constitutive of the events themselves and a geometry that is implicated in the genesis or emergence of the event. The ‘implicit form’ of Simondon³⁹, the ‘epigenetic landscapes’ of Waddington⁴⁰ and the ‘perception as form’ of Merleau-Ponty,⁴¹ all fall within this tradition, as do the spatialities of being of Heidegger, of power of Foucault and of language of Wittgenstein or Saussure.

The impetus for this fertile new way of thinking was the revolutionary work in electromagnetism and relativity by Maxwell, Faraday and then Einstein, work that promised to allow us to deal in a new way with complex situated processes and the momentum of formation and emergence. A different, active space moved analysis from a study of fixed objects in a neutral space to an examination of complex relations and their products. A number of philosophers of the last century had begun to distinguish between these different types of order, in a way which found interesting resonances with emerging theorisations of matter and its organisation in a new so-called ‘science of complexity’. There is today an emerging theorisation of an integrating space that stands apart from the extensive space we know so well; the one that which divides and makes distinguishable the things we see around us. This other space is in fact the condition of these things’ ‘becoming’ as things in the world in the first place.⁴²

This space also reconfigures the whole subject-object relation in that it places us fully within a material worldly process which dynamically constitutes our experience, activity and intentionality, and the becoming of the world of things for us.⁴³ This space, which has come in philosophy to be called ‘the virtual’, is the space of the movements and momentum of the integration of the world into itself; a space which underlies and makes possible the space of things which we perceive as our objective world. It is the space productive of the conditions that things find themselves in; the space of their situation and immersion in a world of other things.

Henri Bergson, and others like Merleau-Ponty after him were clear that this space and the operation of the world between two spaces is implicated in processes of perception at a very fundamental level - the world as it appears to us is a product of the very becoming of things out of their relations and movement.

³⁶ Einstein and Infeld (1938), *The Evolution of Physics*, Simon and Schuster, New York. p. 146-7.

³⁷ As seen in the speculative philosophies of A.N. Whitehead, Henri Bergson, C.S. Pierce and others.

³⁸ See for example: Prigogine and Stengers (1984), *Order out of Chaos*, Bantam, New York.

³⁹ Known to us through the writing of Gilles Deleuze; for example, Deleuze (1994), *Difference and Repetition*, Athlone Press, London.

⁴⁰ See: Waddington (1957).

⁴¹ See: Merleau-Ponty (1983).

⁴² See for example: Deleuze (1994); De Landa (2002).

⁴³ See Merleau-Ponty (1983).

The philosopher who has done the most to raise the question of form in relation to the environment and perception and behaviour is Maurice Merleau-Ponty. His form deals directly with the relational and the genetic.⁴⁴ He defines forms as “total processes whose properties are not the sum of those which the isolated parts would possess... there is form whenever the properties of a system are modified by every change brought about in a single one of its parts, and on the contrary, are conserved when they all change while maintaining the same relationship among themselves.”⁴⁵ Form here is an organisational principle; he insists that form expresses “the descriptive properties of certain natural wholes” and to introduce it is in no sense to introduce an additional entity into the world⁴⁶. Merleau-Ponty argues for the ability of form to integrate different levels of reality, drawing the world we have partitioned between subjective and objective realms together again into a whole for consciousness. He sees form as a structure of relations, becoming then a structure for consciousness; consciousness knows the world in movement along the lines of structure. Form is therefore doubly integrating, it is the means by which we draw the world together in order to know it. Intentionality appears as one of the dimensions of form; belonging to the formal realm of phenomena or behaviour.⁴⁷

It can be difficult for the ‘scientific mind’ or at least the mind trained in the precepts of the Cartesian/Kantian distinctions, and the transparencies of Locke, to accept this Spinozan loss of the direct and transparent agency of Mind, but research and recent thinking about perception and consciousness support Merleau-Ponty’s thesis. Indeed Merleau-Ponty was on top of the neurological and behavioural evidence which even when he wrote *Structure of Behaviour*, supported his counter-intuitive proposal. Tor Nørretranders, in *The User Illusion*, reviews the evidence, pointing out the huge role sub-liminal consciousness plays in our everyday activities, whether it is riding a bicycle or getting around a city. He points out also the downright weird - if we believe in the reflective lucidity and transparency of the Mind - consequences of the so-called ‘missing’ half-second in perceptual consciousness. Brain activity which produces bodily action begins before intentional awareness, and before the ‘decision’ which was ostensibly the action’s origination - almost half a second before! If this were not so the poor processing speed of our brains would not let us keep up with the world around us. And in fact fully conscious ‘consciousness’ plays no part in the initiation of by far the greatest part of bodily action.⁴⁸ The objectivist error lies in equating our everyday consciousness of things with a much richer and not altogether conscious situatedness, and to ignore those points where we are in contact with the world while our consciousness is not aware of itself⁴⁹. “Consciousness is a much smaller

⁴⁴ Form is therefore neither simply material nor mental. It is both real and abstract - ‘virtual’ in Deleuze’s terms. Merleau-Ponty uses it to transcend the dualism - defining both the phenomenon and behaviour in its terms. According to Merleau-Ponty, it “saves us from the alternative of a philosophy which juxtaposes externally associated terms and of another philosophy which discovers relations which are intrinsic to thought in all phenomena.” See also: John F. Bannan (1967) *The Philosophy of Merleau-Ponty*, Harcourt, Brace and World, Inc., New York. p. 42.

⁴⁵ Merleau-Ponty (1983) p. 47.

⁴⁶ Merleau-Ponty (1983) p. 51.

⁴⁷ In Merleau-Ponty’s terms intentionality is perception. It is the “consciousness, through which from the outset a world forms itself around me and begins to exist for me. To return to the things themselves is to return to that world which precedes knowledge, of which knowledge always speaks.” See: Merleau-Ponty (1962), *Phenomenology of Perception*, Routledge, London. p. ix; Bannan (1967) p. 11.

⁴⁸ See: Tor Nørretranders (1999), *The User Illusion*, Penguin, New York.

⁴⁹ Julian Jaynes quoted in Nørretranders (1999) p. 174.

part of our mental life than we are conscious of, because we cannot be conscious of what we are not conscious of.”⁵⁰

5. Beyond representation

There is no talk of representation in any of this, no metaphor; no subjective reconstruction of the objective; no homunculus or map or mirror inside the head. Perceptive consciousness is not an imitation of things by the nervous system that some way or other produces a double of what is perceived. The mind-matter problem is of our own manufacture, and when the problem is a product of our own initial assumptions then it is reasonable to look at those assumptions and to reconsider their validity in the light of a different thinking. Merleau-Ponty argues against that isomorphism which makes of consciousness a thing in the objectivist tradition. Consciousness is not a thing, it is a state, a condition; generated in the momentum of movement, at the same time conscious (or perceptual) and real, existing between, and opening up the spaces of the possible (virtual) and actual⁵¹.

Structure as perception replaces representation as the fundamental mode of encountering the world, as form replaces the atom as the fundamental unit of existence. This form is the relational entity within which the ‘individual’ is constituted,⁵² while at the same time the ‘individual’ becomes for consciousness by way of its formal structure. In both cases it is the relation and its role in establishing form that has ontological priority. Out of relations, ‘individual’ formations emerge - formations that if they were not simultaneously for consciousness would of course be imperceptible - as no doubt many are.

The ‘individual’ is a unity emerging out of an underlying level of relations. We learn from the new disciplines of complexity and dynamical systems that we need to think less in terms of linear causes - more in terms of emergent and convergent processes within fields of relations.⁵³ The part and the whole are simply different aspects of integral processes - different perspectives in fact on the same process. Higher levels of order are unifications of, and reorganise, lower levels. They are not two orders external to each other but two levels of relations, the second of which integrates the first. The ‘individuals’ we are talking about here are not new beings or things with their own internally specified significance, but new integrations, with their meaning and significance emergent from the integration. They cannot stand by themselves and are inseparable from the underlying ‘pre-individual’ orders they integrate. Perception as consciousness is one of these integrations, a product of the momentum of the world along lines of structure and of our immersion in this process. “The body in general is an ensemble of paths already traced, of powers already constituted; the body is the acquired dialectical soil upon which a higher ‘formation’ is accomplished, and the [mind] is the meaning which is then established.”⁵⁴

⁵⁰ Non-objectivist does not mean non-realist. See: De Landa (2002).

⁵¹ We need to note here that the possible (virtual) and actual may both be dimensions of the real. See De Landa (2002)

⁵² See: Peter Pesic (2003), *Seeing Double*, MIT Press, Cambridge Mass.

⁵³ Reading between Deleuze (1994) and De Landa (2002) on the one hand and Cohen and Stewart (1994) on the other; ‘singularities’ (‘simplexities’) and ‘concrete universals’ (‘complicities’ that work as ‘concrete abstractions’) specify these emergent and convergent processes which are the same process seen from different perspectives. See: Cohen and Stewart (1994), *The Collapse of Chaos*, Viking, New York.

⁵⁴ Merleau-Ponty (1983) p. 210 - Merleau-Ponty uses “soul”. The ‘complicities’ spoken of by Cohen and Stewart (1994), and the ‘concrete universals’ or ‘quasi-causes’ spoken of by De Landa (2002), are both

What we find in the world are situated 'moments', 'events', 'individuals' - integral situations encountered in movement, which in their form or structure are capable of great generalisation. Each situation is formally the analogue of many others, and what our experience in the world generates are global aptitudes rather than repeatable gestures, inscribed in our actions and our physical (neural and muscular) memories of them,⁵⁵ and generalised, as forms. These forms become learned, habituated, practiced, their paths understood as relations and sequences in their pure or topological form; capable of being morphed, adapted and retraced creatively in new situations. The body, with its intersensory cross-referencing and its proprioceptive capacity, is both mobile perceiver, storage bank of practiced movements, and frame of reference; it "is that strange object which uses its own parts as a general system of symbols for the world."⁵⁶

The form of the environment - insofar as it is a form for perception - needs to be understood then in terms of the forms of the habitual or intentional movements and aptitudes which act against it⁵⁷. Its space is that of the body perceiving - in motion. When the starting point is the integration of the subject and his or her movement in the world, then the object of study becomes an indecomposable structure of behaviour. And it is in the category of form that such an indecomposable structure exists.

The attempt to describe the environment in a space which is already behavioural is one which is also at the foundation of space syntax, though the full implications of that move are sometimes forgotten - or never really fully fathomed. Further, the role of structure as a factor that operates in depth in the environment, drawing together the local and the more 'global' is one that has dominated this study of the built environment - and has raised some of the most important questions and issues that have preoccupied space syntax since its inception. In particular, the question of the relation of 'part' to 'whole' and the way 'global' structure may become 'retrievable' to the moving subject in the local. We have learned through the study of urban form that extra-local structure indeed becomes available, to variable degrees in different environments, in local structure.

Is a science of situation necessarily a science of perception? Can the perceptual encounter with the world be simply equivalent to the situated being of the world (as Umwelt)? Certainly it seems to be for the Foi of Papua New Guinea, or the Pintupi of Central Australia⁵⁸. What about us? - does the same apply in a culture already partitioned along the culture-nature divide? What do we do with the findings of a research on form, a research that it seems may doubly reintegrate subject and object, matter and mind? If form, besides being 'as perception', indeed integrates the different levels (and

more recent attempts to characterise this kind of order.

⁵⁵ Memories become paths already traced, and can have generalised (topological) and particular manifestations, of which the first is primary (continuous / virtual) and orders and formalises the second (discrete / actual).

⁵⁶ Bannan (1967) p. 93.

⁵⁷ Insofar as these are perceptual movements, they occur in the famous 'missing half second' (see also Massumi (2002) p. 195), and are part of that stream of habitual actions, which become consciously intentional by means of a vetoing or subtractive act - see also Nørretranders (1999). Incidentally; Thomas Kuhn argues that what he had "been opposing in this book is therefore the attempt, traditional since Descartes but not before, to analyse perception as an interpretive process, as an unconscious version of what we do after we have perceived." See: Kuhn (1970), *The Structure of Scientific Revolutions*, University of Chicago Press, Chicago. p. 195.

⁵⁸ 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.

dualities) of reality, can we go still further? Is it possible that we may come to see that the becoming of the world 'for itself' and the becoming of the world 'for us' are in fact the same process? - can we in the end leave perception behind as we have just left behind cognition, as a problem in the study of a differently, hybridly, 'objective' environment, and then find both back in the study of form and transformation? This is a speculative proposal, but one which is crucial for the way we understand the purpose of and interpret the results of the research we do.

We are locked in our thinking about the environment into a 'common-sense' mode of reasoning which sees human action and activity in the environment as being mediated by way of 'objective' features in that landscape, represented (one way or another) in Euclidian space. We do not register the variations in our movements referenced to themselves, or the ephemeral notations traced by and in this space as we proceed through the environment - or if we register them we do not recognise them as features of 'objective' significance. We register with even less significance the formal trace of the intention that precedes us, or the particular space in which this intention is inscribed. But in fact the way we orient is more tropism than cognition. There is no doubt we can use landmarks and Euclidian space maps (cognitive or paper) when getting around in the environment, but the point Brian Massumi makes is that these interrupt orientation - for the most part we are getting around on an auto-pilot that very often does not even make an impression on our visual memory. We make use of maps when orientation fails. Cognitive and paper maps are simply drawn in the wrong space to be seamlessly integrated into the traceries we make in movement - consulting them requires work and translation and we will avoid that as long as it is possible. We reference our movements first by way of our proprioceptive and intersensory faculties - as movement referenced to its own variations - and only after that and when needed, to a backup system of visual cues and cognitive mapping⁵⁹.

These bodily topologies are found back in the forms that accommodate these movements. If we seek the space of the city we find it in the space of our elementary bodily movements and the affordances the city offers for those movements. The location which we think of in Euclidian space as indexing movement, in fact becomes itself indexed to movement and its variations. The places we inhabit become indexed to individual actions and movements. This much is not hard to imagine: it is not a city plan we inhabit, it is this place; a product of this activity of orientation and displacement. And the 'force', or rather the field, which pulls it all together into this particular individuated place is a form drawn in a personal and collective space indexed to its own variations rather than to any absolute coordinate system.

Location in the built environment is according to this view a 'singularity',⁶⁰ produced out of the spaces and times of movement and relating. It deals in pure form, foregoing an externally defined space and the need for metaphor and representation. It deals in singular states produced out of a self-referential folding of movement onto itself. The form itself integrates through its own productive processes, putting the subject, in movement, in the fold, and at the precise point where the world becomes for consciousness. This is only strange if we forget that our customary modes of describing location within a coordinate system has nothing directly to do with the experience of that location or with the relation in experience of that location with other locations; this is only strange if we regard perception of place as an interpretive process, as an unconscious version of what

⁵⁹ See: Massumi (2002) p. 177-207.

⁶⁰ See: De Landa (2002) ch. 1.

we understand of that place after we have perceived.

How do we deal with all this as a science? Science itself is still going through and absorbing changes which began more than a century ago. When the foundations of our science specify a break between mind and the world, the question at a philosophical level is: how do we restore the integrity? The form of the city consists not in the frozen architectures of the discrete, but in those of its living continuity. The philosophical implications of the particular research we do goes beyond questions relating to the visibility and discrete architecture of our built environment. For if mind is indeed in the world, caught up in the momentum of its becoming, then the prize for understanding the form of our immersive environment is nothing less than an understanding of the form of consciousness itself - and in relation to an uncertain, risky, increasingly media-*ted*, digitalised, and dis-located urban future, the prize is an understanding of the necessary conditions of our situated relations with those hybrid collectivities in the world that integrate society and nature. With this knowledge we could begin to think about the nature of our environment and its transformations in a substantial way.