What is urban materialism?
Deconstructing the 'image of the city' in Marxist geography, space syntax and SIRN.

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I, Frederik Weissenborn, confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

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Abstract

The urban question concerns the relationship between urban form and urban social existence. According to Bill Hillier, there are two ways of approaching this question. A 'society-first' approach in which space is seen as a reification of a prior social logic. And a 'space-first' approach in which it is acknowledged that space involves its own emergent morphogenetic processes. This thesis attempts to overcome this binary. It will do so by elaborating a theory of urban materialism in which the urban artefact and the urban social fact are theorised as two irreducible processes of concurrent organisation and creation. Neither thus 'represents' the other, although both may be involved - as constitutive elements - in each other's genesis. The thesis is divided into three parts. A first part explores the work of Marxist geographers Lefebvre, Castells and Harvey and their understanding of the urban question. It discusses how, despite certain theoretical differences, these theories all perpetuate an understanding of urban space as a representation of something else (the mode of production; the historical conjuncture, etc.). This constitutes what Portugali calls the Marxist image of the city. A second part of the thesis explores a principle of formation from which a new image of the city may be developed; one that does not reduce the logic of urban space to a prior social logic. I discuss the materialist philosophy of Baruch Spinoza - in whom representational (or 'hylomorphic') models are critiqued and transcended - paying particular attention to the latter's definition of spontaneous modal autopoiesis and efficacy. A third part of the thesis employs these Spinozist notions in the discussion of the material urban artefact as this is envisioned by Portugali and Hillier. I discuss both theories and integrate them into a general theory of urban artefacticity by way of André Leroi-Gourhan's artefactual philosophy. In this way is outlined a theory of urban materialism predicated on artefactual autopoiesis and efficacy.

Key words
Marxist geography; Materialism; Spinozism; Artefacticity; SIRN; space syntax.

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List of abbreviations

Works by Spinoza

CM Metaphysical Thoughts (*Cogitata Metaphysica*). The abbreviation is followed by a Roman numeral designating the part of the treatise and an Arabic numeral designating the chapter ('CM I 2' is Part I, Chapter 2). The thesis cites from Shirley's translation of Spinoza's complete works (Spinoza, 2002).

TTP, The Theological-Political Treatise (*Tractatus Theologico-Politicus*). The abbreviation is followed by an Arabic numeral for chapter and a page number. The thesis cites from Shirley's translation of Spinoza's complete works (Spinoza, 2002).

E Ethics (*Ethica*). The abbreviation is followed by an Arabic numeral for part and internal references ('EIp28dem' thus refers to Ethics part I proposition 28, demonstration). The thesis cites Curley's translation of the Ethics (Spinoza, 1996). On certain occasions, I include the Latin word for reasons of clarity. When this is the case, I refer to the online version of the Latin text - SPINOZAE ETHICA ORDINE GEOMETRICO DEMONSTRATA ET IN QUINQUE PARTES DISTINCTA, retrieved at <<http://www.thelatinlibrary.com/spinoza.ethica3.html>> on January 15 2016.

Ep Letters (*Epistolae*). The abbreviation is followed by a Roman numeral designating the number of the letter ('EpIV' is letter 4). The thesis cites from Shirley's translation of Spinoza's complete works (Spinoza, 2002).

PPC Principles of Cartesian Philosophy (*Principia Philosophiae Cartesianae*). The abbreviation is followed by Arabic numeral for part and internal references (PPC 1 dem, thus refers to part I demonstration). The thesis cites from Shirley's translation of Spinoza's complete works (Spinoza, 2002).

TIE Treatise on the Emendation of the Intellect (*Tractatus de Intellectus Emendatione*) ('§ 2' is paragraph 2); the thesis cites from Shirley's translation of Spinoza's complete works (Spinoza, 2002).

Works of Descartes

PPH Principles of Philosophy. The abbreviation is followed by Roman numeral for volume and Arabic numeral for page number. The thesis cites from Adam and Tannery's *Oeuvres Complètes de René Descartes* (Adam & Tannery, 1897-1913).

PA Passions of the Soul (*Les passions de l'âme*). The abbreviation is followed by chapter and part. The thesis cites from Cottingham, Stoothoff & Murdoch's translation (Descartes, 1985).

Works by Marx and/or Engels

GI, The German Ideology, Marx and Engels. The thesis cites from the Progress edition, Progress, Moscow, 1968.

GR, Grundrisse, Marx. The thesis cites from *Marx and Engels' collected works, vol. 33.* Lawrence and Wishart Publishing, London, 1991.

CGP, Critique of the Gotha programme, Marx. The thesis cites from 'Marx: Later Political Writings', edited by Terrell Carver, Downloaded from Cambridge Books Online by IP 144.82.108.120 on Thu Oct 01 12:08:08 BST 2015.

CoMa, Communist Manifesto, Marx and Engels. The thesis cites from 'Marx: Later Political Writings', edited by Terrell Carver Downloaded from Cambridge Books Online by IP 144.82.108.120 on Thu Oct 01 12:15:58 BST 2015.

Cap I-III, Capital, vol. I-III, Marx, the thesis cites from Mandel's edition, Penguin Books, London (1990-1992)

Works by other authors

Ph, Physics, Aristotle. The thesis cites from Waterfield's translation, 2008, Oxford, Oxford University Press. The abbreviation is followed by a Roman numeral designating the part, and an Arabic numeral designating the chapter.

DCo On the Body (De Corpore), Thomas Hobbes; the thesis cites from Gaskin's (2008) *Human Nature and De Corpore Politico: Human Nature and The Elements of Law Natural and Politic: With Three Lives: Human Nature Pt. 1,* Oxford, Oxford University Press

ST Summa Theologica, Saint Thomas; the thesis cites from The Complete American Edition, translated by the Fathers of the English Dominican Province, Kindle edition

SCG *Summa contra Gentiles*, Saint Thomas. The thesis cites from the Aeterna Edition, 2014, translated by the Fathers of the English Dominican Province, London, Aeterna Press

DK, Fragment, Parmenides. The thesis cites from the Dielz and Krans compilation of Presocratic philosophies.

DO, On Obligations, *De Officiis*, Cicero. The thesis cites from Miller's translation, Macmillan, New York, 2014.

Acknowledgements

Introduction: Social theory and the 'image' of the city

The central (and most complicated) question in human geography concerns the relationship between society and space. Part of the complexity derives from the fact that this one question involves several other questions. Does space structure social relations? And if so, in what manner? What, furthermore, is the force (or forces) responsible for the ordering of space? And how do these manifest themselves (i.e. is there a 'logic' of space)? These are questions that have been treated by a long line of theoreticians going back to the very beginning of sociology. Indeed in many ways sociology may be said to incorporate a spatial question at its conceptual centre.

One thus finds in Ferdinand Tönnies (1957) the idea that the transition from smaller settlements (villages) to bigger and more complex ones (cities) entails the transformation - in the body politics of the urban populace - from relatively speaking simple forms of social relations grounded in tradition, kinship and interpersonal ties (*Gemeinschaft),* to more complex relations devoid of such attributes (*Gesellschaft)*. Similar ideas are found in Durkheim's theorisation of the transition from so-called 'mechanical solidarities' to 'organic solidarities' (Durkheim, 1997), in Simmel's enquiry into the relationship between *The Metropolis and Mental Life* (Simmel, 1973), and in Weber's *The City* (Weber, 1958).

Whatever their evocation of space, these sociological theories predominantly are concerned with social transformations and so the understanding of the city remains rather tangential - if nevertheless important - to their general exposition. More specifically 'urban' theories, however, evolve from them, as for instance in the case of the ecological paradigm of the so-called 'Chicago School'. Here - in the writings of, Park, Wirth, Burgess, Redfield - the relationship between urban society and urban space is much more pronounced, with a number of sociological qualities conjectured to be derived from the material preconditions surrounding urban social existence (cf. Abbott, 1999; Bulmer, 1984).

Specifically urban characteristics - such as high 'human density' and the greater degree of social relations that this necessarily causes - are conjectured by the ecologists to manifest themselves in sociological phenomena such as the loosening of community ties, social estrangement and anonymity. The link to Simmel, Durkheim and Tönnies is here apparent. So too a connection to Weber for whom modernity is characterised by the bureaucratisation of power and the rise of an administrative class (cf. Tony, 2003). As such, the modern condition may be seen as concomitant to the urban condition.

The idea that society may be imbued with an inherently spatial component in the manner theorised by the Chicago School is, however, not universally accepted. The relatively simple causal chain whereby transformations in space are thought to cause transformations in society is for instance rejected by the field of Marxist geography. This rejection involves several components - there is for instance in Marxism a suspicion of theories, such as Weber's, that hypothesise the development of bureaucracy as a naturally occurring phenomenon related to the 'evolution' of society - but chiefly the rejection concerns the supposed overestimation of space as a driver of sociological change and the associated reduction in the significance of the relations of production to such issues.

One finds this critique unfolded in the work of scholars such as Henri Lefebvre, Manuel Castells, and David Harvey, although these theories by no means are isomorphic; a point to which I shall return. Still, their critique of the Chicago School may be argued to be roughly the same, namely that space itself does not *actively* produce mutations in the body politics (although this is a controversial point as regards Lefebvre; see section 1.2.1) and that only transformations in the economic base - more particularly in the relations of production - may bring such changes about (note, however, that the Marxist position does allow for an *indirect* kind of sociogenesis, one that perpetuates existing patterns).

A fairly clear schism thus runs through the human geography of the twentieth century between those that affirm a sociogenetic capacity of urban space and those that reject this. However, as Hillier has pointed out (Hillier, 2008), one also finds some theoretical similarities between these two tendencies. The most important of these is the tendency to treat of urban space as a manifestation of a prior social or socio-economic logic. Hillier thus argues that the otherwise contradictory paradigms of the Chicago school and Marxist geography may be said to approach the urban question from the same angle insofar as 'the form of the environment is sought as the *product* of the spatial dimensions of social processes' (Hillier, 2008: 217; emphasis added). He continues:

> The question about society and its spatial form, in whatever mode or format it is posed, [thus] offers a fundamental choice. It can either be approached from society to space, or from space to society, that is by working from social theory towards the spatial environment, or from the spatial environment toward social theory. To most social scientists it has always seemed self-evident that one must take the former route, since it is surely society that determines space and not space that determines society. *The approach to the city that this generates is one of trying to see the spatial environment as the spatial output, and so as the bi-product, of social, economic and perhaps cognitive processes.* […] This paradigmatic stance clearly applies to the Chicago School modellers, who saw the changing population and land use characteristics of urban areas as the outcome of social and economic competition at the level of individuals and firms. […] It is equally clearly the underlying assumption of the cutting edge texts from Lefebvre, Harvey, Soja, Castells and others referred to above that are in all cases attempts to find the city and its space as the product of much wider processes of economic and social change (Hillier, 2008: 221; emphasis added).

Hillier is not alone in putting forward the argument that certain schools of thought approach the urban question so to speak 'society-first' (his term; *ibid.*). One finds a variant of this argument in Portugali who - discussing Marxist geography in general and the work of Manuel Castells and David Harvey in particular - argues that urban space tends to be theorised as a 'representation' of the economic realm. This representational tendency constitutes the foundation of what he calls - with reference to Kevin Lynch (1960) - the 'Marxist (image of the) city'. He writes:

> The Marxist (image of the) city is a city of big forces, of modes and relations of production, of class struggle between the oppressing and the oppressed, of the

capitalists versus the working class, of the economic infrastructure and the political-ideological superstructure, all obeying the laws of history as revealed by Marx and elaborated by Marxist. Two such images, one of Castells' and the other of Harvey's, will suffice to give you the spirit of this new Marxist city. Castells' (1977) constructs his Marxist city by translating Althusser's nonspatial structuralist-Marxist conception of social structure to a spatial urban structure. *Here the city is the spatial expression, or representation, of the structure of society* as Marx and Marxist have revealed and elaborated. [...] In *The Urbanization of Capital* Harvey portrayed another image of the Marxist city. It is constructed by showing how *the very laws of capitalism as formulated by Marx(ism) entail, as a logical consequence, the specific capitalist urban landscape* as we know it today (Portugali, 2011: 43; emphasis added).

Neither Hillier or Portugali go into any great detail in their critical engagement with this 'representational' Marxist image of the city - how in fact is society thought to represent itself in space? do all Marxists theorise the city the same way? is there an underlying logic to the Marxist image of the city? - nor do they explicitly elaborate another 'non-representational' image of the city (although aspects of this is found in either body of work). Hillier does however discuss the notions of 'form' and 'representation' in a more general sense. There is, he argues, a tendency to conceive of design as something purposeful and in a sense predetermined. Understood as such, form is something that is imposed on matter (which represents it), not something that arises with it.

Hillier traces this idea back to Aristotle in whom a design is something that represents a prior form, or 'purpose', as opposed to something that is generated in an emergent fashion. This has serious repercussions for how design may be conceived in nature - where form is taken to emanate towards the biological being from an ideal world of purposes - but also for how it may be conceived in relation to artefacts. Indeed, in Hillier's rendition, the very idea of design as this is imagined by Aristotle is rooted in an artefactual analogy and so 'design' must be understood in its most expansive sense. 'Aristotle', he writes,

saw nature as a design problem, and sought an answer which would explain how nature managed to design such successful form-function relations. Aristotle answered by making an analogy with architecture. This analogy is so pervasive in Aristotle's accounts of nature that it should be thought of as Aristotle's paradigm. The form of a house, Aristotle argued cannot be explained by a purely material process of laying stone on stone. *This 'material' process had to be guided by a*

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> *pre-existing idea of the form the house was to take.* What is the nature of such ideas and where do they come from? They are, according to Aristotle, purposes. The form of a house arises from human purposes. Forms are therefore expressions of purposes and indeed, in a sense, are purposes. As it is in architecture, Aristotle argues, so it must be in nature, since we find the same agreement between form and apparent purpose. Aristotle then generalises. *Material causes explain little. Final causes are purposes. The source of order in nature must therefore be purposeful design* (Hillier, 1996: 295; emphasis added).

The issue, here, is to do with the relationship between final causes ('purposes'; 'forms') and matter. As Hillier points out, forms are taken to be both analytically anterior and ontologically superior to matter, which on the other hand is theorised as amorphous and so essentially uninvolved in the forming process. This theory has some obvious problems from the perspective of modern science. If all 'designs' are predetermined by purposes then there for instance can be no 'theory of evolution', where random phenotypical mutations are picked up and perpetuated in the deep of the genotypical structure.

Emergent patterns produced by material vibrations also cannot be explained and so recently discovered phenomena such as 'chemical clocks' – where reacting chemical compounds spontaneously produce ordered periodic changes in one (or more) of the compounds- must remain mysterious to an Aristotelian[1]. However as Hillier shows, what he calls' 'Aristotle's paradigm' also may be argued to reduce the artefactual design process - where material pressures may be shown to guide the forming process (cf. Malafouris, 2013) – to an excessively simple principle of formation. This is significant to a theory of society and space insofar as urban form constitutes a kind of artefact.

In trying to overcome 'Aristotle's paradigm' (more generally known in philosophy as the 'hylomorphic schema'), Hillier leverages another theory from the history of science, namely Newton's principle of inertia. The latter, according to Hillier, 'showed how there could be observable order in the universe without invoking some pregiven order which gave rise to it […] *it showed for the first time* how in

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[1] Cf. Prigogine and Stengers, 1984; see also DeLanda, 1991, for a discussion of chemical clocks and for a lucid explication of materialist thought.

the perplexing world of natural forms order could, in principle, arise from a natural process without the existence of pregiven order' (Hillier, 1996: 296 & 297; emphasis added).

This assertion is problematic for several reasons. Newton is not, as Hillier indicates, the 'first' scholar to discuss non-hylomorphic principles of formation (this would be the ancient atomists). Nor is his principle of inertia - which merely stipulates that the speed of a body must be constant and its direction rectilinear unless affected by an exterior force[2] - particularly well-suited to the task of developing a new understanding of design. (In fact, it may be discussed to what extent a design theory may be teased from this principle at all). Where the principle of inertia may be useful, however, is by indicating the necessity of grounding a non-hylomorphic model of design in a principle of random formation. Form thus is not something that comes before - it rather is something arrived at - and so random *formation* must precede *form,* analytically.

Hillier and Portugali's rejection of the 'representational', Marxist image of the city - and Hillier's more general discussion of design - raise certain questions. Is it possible to establish a new non-hylomorphic image of the city and if so, how? If the principle of inertia is inadequate as a model from which such an image may be constructed, then what other principle of formation may take its place? More particularly, how may this 'order without pregiven order', to which Hillier refers, be conceptualised? And how may it be applied to the urban question as a whole, that is: to a problematic which not only enquires into the properties and genesis of urban form, but also into this form's potentially sociogenetic capacity?

A non-hylomorphic image of the city, such as this is defined by Hillier and Portugali, would have to define itself in contradistinction to the Marxist image of the city. As such, it would have to allow for urban form to arise from emergent

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[2] 'The *vis insita*, or innate force of matter', writes Newton, 'is a power of resisting by which every body, as much as in it lies, endeavours to preserve its present state, whether it be of rest or of moving uniformly forward in a straight line' (Newton, 1846: 72).

material forming processes as opposed to from predetermined purposes or 'ends'. In addition to this, it would have to affirm some sort of causal or sociogenetic relation between the material urban artefact and the urban social fact lest the theory of urban space be reduced to a mere theory of form. The question is whether such an image of the city may be defined and if so: how? These are questions that I hope to answer in this thesis.

Aim and structure of the thesis

This thesis will discuss the problem of urban form and formation as this is found on either side of the 'society-first/space-first' divide identified by Hillier. This will involve exploring in more detail the particular way that urban design - or more accurately: urban morphogenesis - may be conceived. However an adequate conceptualisation of the urban question necessarily must encompass the explication of both urban morphogenesis and urban sociogenesis; the logic of the *urban artefact* and that of the *urban social fact*. The way that the architectural city - what I call the 'urban artefact' - affects the formation of social relationships once it itself has taken on formal consistency therefore also must be taken into account.

This is a reconceptualisation of the urban question that will need building towards. In the first part of the thesis, I follow Hillier and Portugali in arguing that Marxist geography theorises urban space as a *representation* of a social before. However I go to greater lengths in explaining how that representational or hylomorphic tendency actually manifests itself in Marxist geographical theory and what logic it involves. This entails discussing in detail the theories of the leading voices on Marxist geography - I explore Lefebvre, Castells and Harvey - and their particular way of conceptualising the urban problem. In this way, the link between hylomorphism and Marxist geography suggested by Hillier and Portugali is concretised.

However my aim with this thesis is not merely critical. It also is to build towards the positive affirmation of a materialist theory of urban form, formation and sociogenesis. Having discussed and critiqued the Marxist geographical paradigm, I therefore elaborate a new materialist understanding of the city; one that does not exclude materiality from the dual processes of urban morphogenesis and urban sociogenesis. This will involve engaging with the material aspect of the urban artefact, for instance the emergent patterns manifesting themselves on its façade and in the deep of its structure. But it also will entail exploring the way these patterns, once realised, become embroiled in pattern-making processes occurring in the urban body politics.

Before this is possible, however, it first is necessary to define the contours of a new non-hylomorphic principle of formation. For the reasons already outlined, I do not follow Hillier in trying to approximate this principle by way of Newton's principle of inertia. Whilst I agree on the general sentiment - that an adequate concept of (urban) form must be rooted in an essentially random and emergent process of formation - I simply do not find this principle well-suited to the task. Instead, I construct another principle of formation by exploring Spinoza's discussion of modality and power as this is found in his *Ethics*.

There are several reasons why Spinoza's ethical philosophy is relevant to this task. For one, Spinozism is an ontology that openly rebukes hylomorphism. Spinoza thus refers to the hylomorphic schema as 'puerile and frivolous' (Ep. XIII), and as 'nonsense' (Ep. LXVI), arguing that the doctrine rests on a 'weak foundation'(Ep. XIII). But more importantly, Spinozism also elaborates an original philosophical model for moving beyond such philosophical 'frivolity'. I discuss this model and its internal mechanics in the thesis' part II.

Crucial to my discussion of Spinoza's principle of formation will be the notions of geometry - which Spinoza defines in a 'genetic' way - and essence and power. These are three concepts which are intimately related in the philosophical system of Spinozism. Indeed, a *modal essence* may be said to correspond to a *genetic*

principle and this principle to a *force* (or aptitude) whereby a series of bodies are involved in a corporeal assemblage. However essential power not only pertains to already existing bodies. It also is a force whereby new corporeal constellations may be explored. In this way, colliding bodies are empowered with an ontogenetic force and so the notion of an amorphous material substrate is rejected.

Having established the contours of a Spinozist principle of formation in part II, part III approximates a new, materialist image of the city. Crucial to this task will be Hillier's space syntax theory and Portugali's theory of Synergetic Inter-Representation Networks (or 'SIRN'). As I show, space syntax and SIRN constitute theories in which urban form is both *autopoietic* - meaning that it is involved in its own genesis - and *sociogenetic,* meaning that it has a real affect on the social group. As a consequence, society and space are fundamentally *irreducible* - one does not follow from or 'represent' the other - but they nevertheless may be involved in *co-determinant processes* of creation.

I discuss Hillier's and Portugali's theories in the context of André Leroi-Gourhan's more general philosophy of artefacts, arguing that his complex and highly original conceptualisation of the relationship between artefact and social fact may benefit the enquiry into urban form. Leroi-Gourhan's theory furthermore differentiates between artefactual *structure* and artefactual *surface,* something which is significant to this thesis insofar as space syntax theory may be said to refer to the structure of the city (more particularly its street network) whereas SIRN concerns itself with the surface (or 'face') of the city. The contextualisation with Leroi-Gourhan thus makes it possible to unite both theories within a general theory of urban materialism.

Thesis motifs

A series of themes, or *motifs*, run through the text. These motifs - which often overlap - are relevant to the overall argument of the thesis but will be more

apparent in certain parts than others. I discuss them briefly here. *A first motif concerns the ideas of 'matter' and 'materiality'.* The notion of matter first of all is relevant to the thesis insofar as it may be seen as the medium in which abstract social patterns - the immaterial 'structures' which society consists of - are embodied and reproduced. As Hillier writes:

> the real driving idea [behind the society-space question] seems to be that space has become the covering term for a concern for the materiality of human existence: the embodiment of the mind in the body, the spatialization of the body in relation to others, the daily world of encounter and place, the formation, separation and overlapping of groups and the manifestation of the 'relations of production' and 'relations of power' in the material world (Hillier, 2008: 223).

However the notion also is relevant insofar as materiality may be said to represent a central element in the elaboration of a non-hylomorphic understanding of design and formation. 'Materialism' in this sense refers to the emergent logic whereby a given set of bodies come together, spontaneously, in a self-organising assemblage. As Bennett (2010) points out, this kind of *philosophical materialism* contrasts sharply with the *dialectical materialism* found in Marx (and by extension: in Marxist geography) and so the meaning and significance of what 'materialism' actually *is* comes to constitute a contentious subject; one which may imply vastly different things.

A second motif concerns the notion of 'space'. After the 19th century – during which a concern for history (and thus time) was a prevalent problem - the issue of space came into focus and became problematised as a major concern in the 20th century. This problematisation took on many forms including physical, existential and social-political. Einstein problematised the notion of space from a physical point of view, breaking down – among other things - the Kantian distinction of time and space as separate categories of experience. Later, Heidegger would problematise the same issue phenomenologically, and although his focus is predominantly with the relationship between being and time (the latter in effect conditioning the former) he also has things to say about the relationship between

space, dwelling and human nature. (A similar problem is explored in more depth by Bachelard)[3].

Such studies are predominantly oriented towards the human appreciation of space. Others, as we shall see, have looked into its socially structuring and hegemonic aspects; its social appropriation. It is predominantly with such enquiries that this thesis shall be concerned, although the two approaches sometimes overlap. As a term and a problem 'space', therefore, has come to signify many things; a fact that can create some conceptual confusion. Crang and Thrift (2000) go as far as speaking of different 'species of space', differentiating between philosophical, anthropological and literary spaces. They note:

> 'Space is the everywhere of modern thought. It is the flesh that flatters the bones of theory. It is an all-purpose nostrum to be applied whenever things look sticky. It is an invocation which suggests that the writer is right on without her having to give too much away. It is flexibility as explanation: a term ready and waiting in the wings that song-and-dance-act one more time. The problem is not so much that space means very different things – what concepts do not – but that it is used with such abandon that its meanings run into each other before they have been properly interrogated' (Crang & Thrift, 2000: 1).

This thesis explicitly concerns itself with the materiality of the urban artefact rather than with 'space'. The choice of nomenclature is significant. It focuses the enquiry on the materiality of the city – including discussions of how particular patterns (or 'morphologies') are brought about in urban space, as well as discussions of how such morphologies affect patterns of social behaviour - however, it excludes the more speculative variety of enquiries such as those into the categories of reason and into the phenomenological affect of 'lifeworlds'. This allows the thesis to sidestep the problematic question of what 'space' is, shifting the focus from space to the urban artefact as a thing in and for itself. It also

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[3] Later still, the phenomenological concern for being and space come together in Slotedijk's ambitious – but also sprawling and idiosyncratic – study into 'spheres' (Sloterdijk, 1998-2004).

ensures that the enquiry into socio-spatial formations can be focussed on specifically urban formations, thereby excluding the study of regional or global ones.

A third motif is that of 'artefacticity'. Both Hillier and Portugali speak of the field of spatial studies as a 'sciences of the artificial' (cf. Portugali, 2011: 229; and Hillier, 1985). This refers to a term introduced by Herbert Simon (1969), but I would suggest that Hillier and Portugali go much further than him in their interpretation of what a science of the artificial might be. Simon's notion of artefacticity in fact largely is concerned with organisational problems and how these may be resolved in the face of uncertainty; not with the actual morphogenetic process that begets an artefact or with the sociogenetic forces that proceed from it[4]. This makes it ill-suited to the treatment of urban space as a thing in itself.

A more satisfactory theoretical forebear may be found in Leroi-Gourhan's philosophy of artefacts but this link strangely is not developed by either Hillier or Portugali (although Hillier includes a quote by Leroi-Gourhan as an epigraph to his and Hanson's *The Social logic of Space*[5]). Leroi-Gourhan goes to great lengths in trying to understand the genesis of the artefact and its impact on various forms of proto-social behaviour. As such he distinguishes the artefact from the social fact - neither is reducible to the other; both involve their own logics - but he also tries to think them concurrently, i.e. as overlapping forces deployed in a field of open-ended formation. This reframing of the sociological question has significant consequences for social theory insofar as it turns the artefactual into a research subject in and for itself. Applied to space, it amounts to what Hillier calls 'turning space itself into an object of thought in its own right' (Hillier, 2008: 223).

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[4] Cf. Simon, 1947 & Simon, 1957.

[5] The quote, rendered in the original French by Hillier and Hanson, reads: 'The foremost human trait is perhaps less the creation of tools than the domestication of time and space, which is to say, the creation of a human time and a human space' (Hillier and Hanson, 1984: i; my translation).

A last motif concerns the schism between realist and anti-realists ontologies. This schism revolves around an epistemological question concerning the possibility of knowing the things in this world, and more particularly: whether it is possible to know them as they are in themselves, not just as they appear to us. After Kant - who made the human understanding of the world dependent upon the conditions under which it observes it - the inaccessibility of the thing-in-itself (*Ding an sich*) has been a prevalent assumption. (It is for instance in this anti-realist soil that a philosophical paradigm such as phenomenology - which concerns itself with our access to the phenomena of this world - and its concern for 'lifeworlds', grows). In recent years, however, the *a priori* rejection of the possibility of knowing the thing-in-itself has come under pressure, for instance in the work of DeLanda.

According to DeLanda, one may in fact know the thing-in-itself as long as one knows how it is produced. As he writes apropos the hydrogen atom: 'The identity of any real entity must be accounted for by a process, the process that produced that entity, in this case, the 'manufacturing' processes within stars where hydrogen and other atoms are produced' (Delanda, Protevi & Thanem, 2005: 66). One thus may be said to understand the nature (or essence) of the thing as long as one understands the ontogenetic process that has begotten it. This is a genetic definition of 'essentiality' that one also finds in Spinoza and so in this sense both DeLanda and Spinoza may be said to be 'realists'.

1. Deconstructing the Marxist 'image of the city'

1.1. Introduction

As I show in the thesis introduction, both Hillier and Portugali point to a deep theoretical tendency running through Marxist geography although they speak about this tendency in different terms. Portugali thus writes about a 'Marxist image of the city' in which space 'represents' an anterior socio-economic logic. Hillier, for his part, argues that Marxist geography expresses a 'society-first' approach to urban theory which is taken to conceive of the structure of urban space as a 'product' of processes that are essentially social.

Despite these semantic differences, the two arguments can however be thought of as complementary. It is, to all intents and purposes, the same problem that they identify - that the material urban artefact is taken as a representation of something analytically prior; that it does not involve a morphogenetic logic proper to itself - even if the terminologies differ. Still, the explication of the problem remains limited. Neither Hillier or Portugali devote much energy to exploring the issue, in effect relegating the Marxist image to a problem of secondary importance. This leaves a series of questions unanswered. What is the Marxist image of the city? What concepts does it involve (and exclude) and what is their interrelation? It is these questions that I explore in this first part of the thesis.

I approach the problem of the Marxist city much in the same way as Hillier and Portugali, exploring the works of the authors that they identify as exponents of the Marxist image of the city: Henri Lefebvre, Manuel Castells, David Harvey (I exclude Edward Soja for reasons that will become apparent). This has the advantage of ensuring some commonality between our enquiries at the same time as it allows me to extend and expand upon the findings revealed in their analyses. Yet the explication of these three scholars is more than mere mimicry. As I will show, the combined output of the three Marxist geographers constitutes a theoretical triad which establishes a particular view of certain issues that relate

to the material city. It is this view that constitutes the Marxist image of the city and which must be understood.

The analysis unfolded in this chapter proceeds by comparing and contrasting the work of Lefebvre, Castells and Harvey. This approach in fact is not new. Indeed, the juxtaposition of said scholars is attempted by several other authors, including Katznelson (1992), Gottdiener, (1997), Merrifield (2002), and Elden (2004). As is to be expected, there are certain commonalities between these discussions and mine. The stark differences between Lefebvre and Castells generally are highlighted. As is the more respectful– but still critical – relations between Harvey and Lefebvre. However, while certain commonalities apply, the mentioned authors do not point – as I do - to the particular conceptual triad that, I argue, is established between the works of the three authors. Nor do they highlight the way these concepts generate between themselves a particular way of framing the urban question.

It is difficult to establish with any exactitude the moment of a paradigm's conception. Yet the initial impulse for the Marxist image of the city arguably can be traced back to Henri Lefebvre' 1970 *La Revolution Urbaine*[6]. In this book, Lefebvre puts forward two propositions that later are picked up and expanded upon by Castells and Harvey: i) an understanding of urban space as an important factor in the material and ideological reproduction of the labour force (urban space as a form of 'collective consumption'); and ii) an assumption that urban space has become a source of value extraction and exploitation (urban space as 'a second circuit of capital'). These two concepts form part of a conceptual apparatus that supports the central thesis of the book which is that the historical formation of urban space follows economico-political currents unfolding in the deep of the social sphere (urban space as a manifestation, in the final analysis, of 'the mode of production').

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[6] Note, however, that earlier concerns for urban space are found elsewhere in his *oeuvre* including in his *Pensée Marxist et la Ville,* 1972*; Le Droit a la Ville,* 1968*;* and - to a lesser extent – in *Production de l'Espace,* 1974; by many considered to be Lefebvre's defining work (although this is arguably changing now)*.*

It is between these three propositions –the material city as a source of collective consumption, the material city as a second circuit of capital, the material city as a representation of socio-political processes - that a particular view, or 'image', of the city is created; a dialectical materialist understanding of the order and affectivity of urban space. Some important differences pertain, it must be emphasized, between the three thinkers (in particular between Lefebvre and Castells). Yet Lefebvre's profound influence on Harvey and Castells is unquestionable and both in fact acknowledge this much. It therefore is possible to speak about a shared view, or image, of material urban reality, even if this image contains some internal conceptual contradictions. Indeed, these very contradictions in a certain respect animate the image of the city from within, driving it forward.

One final point must be made before proceeding with the analysis of the Marxist image of the city. It pertains to the problem of scope. The particular focus of the thesis – i.e. its concern for the material urban artefact and the way that this has been theorised by Marxist thinkers - necessarily excludes a number of Marxist geographers whose findings relate to either regional or global geographies. While the findings of such geographers might be valid and insightful, the scope of their enquiries exceeds the material city and as such are outside of the scope of this thesis. For that reason, this chapter will not explore the otherwise important contributions of theoreticians such as, Buch-Hanson & Nilsson, (1977), Brenner (2014), or Wallerstein (2004). (It is true that the forces that they theorise sometimes converge in and suffuse cities. Yet the focus, ultimately, lies elsewhere: with the region, the planet or the world-system).

These preliminary considerations establish the focus of this first part of the thesis. They also outline its structure. In what follows, I first discuss in separate chapters the urban theories of Lefebvre (1.2.1), Castells (1.2.2.) and Harvey (1.2.3.), exploring their specific theoretical systems and the concepts that these are constructed around. Unlike Hillier, I therefore do not include the work of Soja in

my theoretical exposition. This decision is made on the grounds that Soja's theory of urban space does not radiate from Lefebvre's *Urban Revolution* to the same extent as Castells and Harvey arguably do. Whilst Soja's work is no doubt informed by Lefebvre, it is, to all intents and purposes, a post-modern theory about urban space and not, as the others – although this is a controversial point; see section 1.2.1 - a socio-economic theory about cities. It is for this reason that I exclude it. Note also that unlike Portugali, I do include Lefebvre in my exposition. The reasons for this are obvious and call for no further justification.

Having discussed the theories of Lefebvre, Castells and Harvey, I then turn to the problem of Marxist geography's particular 'image of the city'. In explicating this image, I discuss two tropes that I argue underpin it: 'hylomorphism' (1.3.1.) and 'anti-positivism' (1.3.2.). I first show how, despite their differences, Lefebvre, Castells and Harvey reduce urban form/formation to a hylomorphic schema ('space does not involve its own logic'; 'space is an expression of something else'). I then show how an anti-positivist approach to urban space prevents them from attributing any real efficacy of space ('space is not directly efficacious').

Concluding, I discuss how the analysis of the Marxist image of the city may inform the construction of a new one, i.e. one that is not hylomorphic and that does affirm, directly, spatial efficacy. Following Hillier, I argue that a non-hylomorphic image of the city must be predicated on a stochastic principle of formation, one which emphasises the emergent creation of form from random material collisions. However, I also discuss why this image cannot be, as it is in Hillier, Newtonian. This facilitates a transition to the thesis' part II in which I elaborate a principle of formation and efficacy from within Spinozism.

1.2. Marxist geography and space

1.2.1. Lefebvre: the socio-spatial dialectics and the revolutionary potential of the urban moment

Lefebvre's body of work is unique in modern French philosophy. Spanning close to seven decades it registers the philosophical, political and cultural tendencies of an era while also amplifying and distorting them[7]. One thus finds implicated in Lefebvre's thinking a multitude of theories and concepts prevalent in 20th century French thought, including: various strains of Marxist thought (initially in line with the party line of the *Parti Communiste Français*, but later on in opposition to it); existentialism (in particular its humanistic aspects, although it appears that Lefebvre at one point referred to existentialism mockingly as 'excrementalism'; Elden, 2004: 20); phenomenology (in particular the technoscepticist aspects of Heidegger's thinking and his notion of 'dwelling'; and by extension Bachelard's discussion of a spatial 'poetics'); not to mention an ongoing dialogue with Hegelian philosophy.

This eclectic focus can make for captivating – sometimes dazzling - reading. Lefebvre's continued allure some 25 years after his death may at least partly be attributed to this. However, Lefebvre's theoretical output, it must be added, also sometimes is obscure, his reasoning abstruse. Some – e.g. Merrifield (2006) - excuse this as expressive of Lefebvre's utopian project; a style designed to deliberately forego the dangers of rationalistic-scientistic reasoning. For others – this author included – the eclectic style detracts from what is otherwise an original and (with time) hugely influential contribution to the understanding of the relationship between space, class relations and political hegemony[8].

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[7] For this reason, Remi Hess - his French biographer - has referred to his work as the 'adventure of the century'. Remi Hess' 1988 biography is called *Henri Lefebvre et l'aventure du siècle*. As referenced in Elden 2004.

[8] 'As anyone who has read [Lefebvre] will attest', Stuart Elden – a Lefebvre scholar - writes, 'his was not the most fluent of styles'. As regards at least some of Lefebvre's

While Lefebvre's style can be difficult, there nevertheless is a sense that his *oeuvre* as a whole follows a meaningful pathway. Concepts introduced in one book often are followed up and expanded on in subsequent books. In this way, the arc of Lefebvre's thinking may be plotted and the outline of a greater theoretical endeavour gauged. Central concepts include: a triadic dialectics stipulating a particular kind of becoming; the notion of alienation as brought about by societal, technological and spatial changes; the practice of everyday life and its relation to a specifically urban utopianism; the series of so-called urban revolutions. I discuss these briefly here, before devoting my attention to the study of Lefebvre's theorization of the urban revolutions and the triad of concepts which underpins it.

Lefebvre's spatial dialectics involves three discrete moments through which the dialectical process is said to circulate: the lived (Fr: *vécu*), the conceived (Fr: *conçu*) and the perceived (Fr: *perçu*). These are the archetypal components of Lefebvre's conception of space; the proto-elements of which it is constructed. Actual space - space as it appears to a corporeal, social subject - is that thing that materialises or condenses at the intersection of these discrete forces. As such it is something qualitatively different from Kant's spatial category (space as experiential container). It therefore also changes as the forces that animate society are reconfigured. Each society will involve the three spatial moments in different mixtures and the particular mix will express (and reinforce) the socio-spatial relations of that society.

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books, this lack of fluency, according to Elden, is directly related to Lefebvre's writing process. 'Lefebvre sometimes used a typist to transcribe monologues on topics, which makes sense of the way in which his work is repetitive, digressive and meandering. It also perhaps explains the way he was able to produce books so quickly, some of which were written for purely financial reasons. Many of these typists were 'women he desired or loved', for whom he would improvise his ideas, and he claims that his best books are ones he spoke rather than wrote. Other books were written longhand and then typed, before being covered with additions and comments in Lefebvre's hand' (Elden, 2004: 5).

Lefebvre sees the modern world as increasingly homogenised and rationalized, arguing that modern western societies produce spatial formations that make political control easy at the same time as they alienate Man from his proper nature. This spatial programme, he argues, is couched in scientistic language but is essentially hegemonic. As such, it comes to constitute another issue of class exploitation different in its expression, but not its essence, from those explored by Marx and Engels. Lefebvre sees the homogenisation of space expressed in many actual spatial formations, including in the construction of new French cities (the so-called "nouveaux ensembles urbaines"), in the work of le Corbusier, even in the work of the Bauhaus.

What unites these formations is their affirmation of conceived (or 'abstract') space over lived space. From this abstract or virtual space a space of real exploitation radiates, and it is this concurrently exploitative and alienating spatial practice that is thought to characterize modernity. As Lefebvre writes: 'The more carefully one examines space, considering it not only with the eyes, not only with the intellect, but also with all the senses, with the total body, the more clearly one becomes aware of the conflicts at work within it, conflicts which foster the explosion of abstract space and the production of a space that is other' (Lefebvre, 1991: 391).

Urban utopianism is the name Lefebvre gives to the counter-hegemonic and revolutionary spatial practice which he associates with a specifically 'urban' moment in historical time (the 20th century). This also is where the notion of the critique and practice of everyday life comes in (see Lefebvre, 1947, 1961, 1968, 1981). Both concepts represent subversive, *praxis*-driven forms of being which express a capacity for obstructing – circumventing even - the hegemonic production of modern urban space. Emphasising *praxis* over conceptualisation, they represent forms of what Lefebvre calls 'metaphilosophy' (Lefebvre, 1965), that is: practical tools for going beyond speculation. A spatial *Aufhebung,* or *dépassement.* An 11th thesis on Feuerbach, but for space.

Today, the practice of everyday life mainly is associated with Lefebvre's discussion of urban space. However, as Elden points out (Elden, 2004: 110-26), the concept in fact applies to both rural and urban socio-spatial existence. The subversive aspects of rural everyday practice are particularly prevalent in Lefebvre's discussion of Rabelais (Lefebvre, 1955). Here one finds a discussion of the festival and the feast as proto-revolutionary breaks with a particular social order. These are moments where the mores of society can subside and something unfamiliar reveal itself. Similar notions later are taken up in Lefebvre's discussion of the Paris Commune and in his engagement – though not always happy – with representatives of the *Situationist International* movement.

This revolutionary aspect of Lefebvre has been argued – convincingly I think - to manifest a Nietzschean affirmation of difference and differentiation[9]. Utopian spaces therefore are spaces that negate standardization and (simple) repetition and affirm difference. More specifically, they seek to break down the production of what Lefebvre calls 'minimal difference' (essentially a difference that is manageable from the point of view of the establishment, one that sustains a hegemonic order at the same time as it affirms a difference), replacing with this the production of 'maximal' (i.e. revolutionary) differences. Utopian spatial practices therefore are argued to express a revolutionary political potential, outlining not only a different type of space but a different type of society.

Such overtly political-economic analyses become more important in Lefebvre's engagement, towards the end of his career, with the State. In the four-volume *de l'Etat* – still not extant in an English translation - Lefebvre explores the logic of the State and of the rise of what he calls the 'State Mode of Production' (or 'SMP', cf. Lefebvre, 1976-78). According to Lefebvre, the SMP is manifest in political systems that grant minor concessions to popular will at the same time as implement strategies to defer revolution. This is the expression of a confluence of state interests and capital interests and may be seen in many policies, including

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[9] See for instance Elden, 2004; and Kipfer, Goonewardena, Schmid and Milgrom, 2008.

the New Deal[10]. (It is interesting to note, here, a similarity between Lefebvre's concern for the SMP that reproduces itself through spatial practices, among other things, and Castells' concern for a State Monopoly Capitalism, working in a similar fashion (see section 1.2.2); this overlap remains, as far as I am aware, unexplored).

The last works by Lefebvre turns partially away from such political considerations and towards a more philosophical enquiry into rhythms. In two books - *Elements of Rhythmanalysis* (Lefebvre, 1992) and *Rhythmanalysis of Mediterranean Cities* (Lefebvre & Régulier, 1996) - the many rhythms converging in quotidian urban space are explored and analysed. These include geological, biological and technological rhythms in addition to social rhythms and indeed it is the manner in which such otherwise divergent rhythms come to overlap that constitutes the centre of the enquiry. Whilst representing an unfinished chapter in Lefebvre's work, the books open up exciting new problems in Lefebvre's thinking: what are the rhythms of space? how do they interact with other (social, biological, technical) rhythms? However the notion of rhythm sadly remains one of the least explored aspects of his thinking (perhaps because of resistance from certain Lefebvre scholars)[11].

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[10] As Elden writes: "[…] social liberalism, according to Lefebvre, does not fundamentally challenge the prevailing logic, but attempts to facilitate some redistribution without addressing the underlying issues. In other words what we have is the state appropriating the results of exploitation in order to partly redress the balance after the event. The American New Deal in the 1930s vastly increased the scope of the federal state, and Lefebvre suggests that along with fascism it was one of the first glimpses of this new model [i.e the SMP] (Elden, 2004: 223).

[11] The merits of the rhythmanalysis books continue to divide scholars. Elden thus characterises the work on rhythmanalysis as 'Philosophically sound and politically aware, […] a fitting end to his career' (Elden, 2004: 170). To Merrifield, however, the work on rhythmanalysis 'signals an ancient scholar's farewell, his last gasp, an indulgence we can forgive, even when we know very little adds up or extends what he's told us already. Rhythmanalysis was Lefebvre's personal right to city, a right he perhaps should never have shared' (Merrifield, 2006: 75).

As is apparent from this quick review, Lefebvre's *oeuvre* contains many overlapping strands. For a long time, the standard approach was to explore these independently of each other, thereby compartmentalizing Lefebvre's thinking. Among other things, this resulted in certain authors, like Harvey, engaging specifically – and it is argued by some: exclusively – with the politico-economical aspects of Lefebvre's thinking, whereas others, like Soja, tended to emphasise the more philosophical aspects of his *oeuvre.* In recent years, however, the trend has been towards integrative approaches to Lefebvre's work, that is: to readings which explore his output as a 'total work'. This tendency for instance may be seen in works by Elden (2004), and by Goonewardena, Kipfer, Milgroom & Schmid (2008) and has come to be referred to as the "third wave" of Lefebvre scholarship[12].

It would be a mistake to ignore entirely this recent development of Lefebvre scholarship. And whilst I do not necessarily agree with all exponents of the third wave - I am for instance skeptical of the work of scholars such as Merrifield which at times comes across as uncritical and sycophantic - the 'total' approach to Lefebvre's work does reveal important insights into his thinking which otherwise had been overlooked. (There also is something to be said about reading Lefebvre's *oeuvre* in its entirety insofar as he himself insists on reading Marx in this way). Even so, this thesis will not engage in any significant way with the third wave, opting instead to operate within the confines of what third-wave scholars call the first, economistic wave of Lefebvre scholarship. There are several reasons for this decision.

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[12] The call to explore the entire work of Lefebvre is made particularly poignant by the fact that Lefebvre himself insists on reading Marx – arguably his most important theoretical forebear - in this exact way. This includes rejecting the problematic differentiation between an early humanist Marx and a late 'scientific' Marx. Counter to Structuralist Marxists like Louis Althusser – with whom Lefebvre had a well-documented strained relationship – Lefebvre insists that the philosophical-humanistic concerns of the early Marx (regarding alienation and "species-essence") in fact are not negated in the later Marx' concern for the distributive logics of political economy. The trouble that Althusser has had with actually identifying the specific moment of the supposed epistemological break [Fr: *coupure]* in Marx would seem to further validate this assertion.

First of all, it excludes the concern for so-called 'planetary urbanism' – an increasingly influential aspect of third-wave scholarship – which has come to be associated first and foremost with the writings of Brenner and Schmid (e.g. Brenner & Schmid, 2012). The exclusion is necessary for reasons of focus. Despite highlighting important aspects of globalized economic and ecological concerns, the paradigm of planetary urbanism is a paradigm which tends to affirm the perspective of the global over that of the city itself. Indeed, in some respects, it may be said to be more closely related to so-called "world-system theory" (primarily associated with the work of Immanuel Wallerstein) than with specifically urban theory (if by urban theory one means theories that deal specifically with urban space).

Secondly, working within the confines of first-wave scholarship makes it possible to emphasise and explore the theoretical dynamics established between the theories of Lefebvre, Castells and Harvey. This dynamic is animated in the first instance by the work of Lefebvre, and for this reason it makes sense to take his work as the point of departure. But it unfolds along a contradictory-dialectical gradient that adds new understanding to the concepts developed by Lefebvre. It is in fact possible to conceptualise the Marxist image of the city as an instance of triadic dialectics, something which no one has so far done. It is a curious side effect of third-wave scholarship that the dialectics between Lefebvre and previous scholars is affirmed – see for instance Elden's excellent discussion of the influence of Hegel, Marx and Nietzsche on Lefebvre's thinking – whereas the dialectics mobilized by Lefebvre and other thinkers tends to be ignored.

This, I suggest, is a mistake. If nothing else because it fails to acknowledge the *zeitgeist* of an era – a moment in time where the urban question suddenly became an important and independent field of research. The fact that some of these enquiries later collapsed does not take away from the fact that this was an important and exciting field of research at the time. In what follows, I focus on the explicitly 'urban' (rather than 'spatial') work of Lefebvre as this is found in *La*

Revolution Urbaine (1970) and *La Pensée Marxiste et la Ville* (1972). More specifically, I do not deal with Lefebvre's philosophical discussions of 'space' – the geometrical space of Descartes, the experiential space of Kant - but focus strictly on his discussion of material urban structures and their morphogenesis. This is done with a view to draw out and contextualize Lefebvre's writing on cities. But also to prepare the discussions of Castells and Harvey by introducing concepts that they later will take further still.

The definition and role of urban space is not a simple problem for Lefebvre; a fact that creates some conceptual problems. It is for instance not clear what the exact relationship between society and space is thought to be. On the one hand, it is held that 'space is at once result and cause, product and producer' (Lefebvre, 1991: 142)[13]. This indicates a symmetrical relationship between society and space. However, on the other hand, space also is said to be 'a (social) product' (Lefebvre, 1991: 26), that is something that is produced by the spatial practices of a social group. More specifically still, it is stated that 'every mode of production with all its subvariants produces a space, its own space' (Lefebvre, 1991: 31). That would seem to indicate that space is, as Hillier and Portugali hold, a product or a representation of a prior socio-economic logic and that the relationship between society and space is therefore asymmetrical rather than symmetrical. This is a paradox.

Some will argue that the notion of dialectics, and the idea that otherwise contradictory forces condition each other reciprocally, resolves or bypasses this paradox. Such an argument might be consistent with Lefebvre's philosophy, and it certainly is not unheard of (or indeed contradictory) to theorise a reciprocal conditioning between society and space. But to this reader at least, the dialectical argument is severely undermined by Lefebvre's assertion that every mode of

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[13] This sentiment is echoed elsewhere. "Urban reality", Lefebvre writes, "modifies the relations of production, without sufficing to transform them. It becomes a productive force, like science. Space and the politics of space 'express' social relations, but equally react back on them" (p. 25; p. 15). Quoted in Merrifield, 2006: 86.

production necessarily produces a new space. Even if space is granted some sort of capacity for acting back on society, which it is, this affirmation nevertheless assumes some kind of analytical primacy of society. There might be reciprocal conditioning between society and space within certain historical or civilizational 'windows' (the modes of production.) But ultimately space is destined to be fundamentally reconfigured whenever society is transformed due to contradictions emanating from the mode of production and ultimately from the relations of production. Its essence therefore is social.

Whatever the answer to the question of the spatial dialectics across Lefebvre's *oeuvre* as a whole, such analytical problems are less prevalent in the particular book around which the analysis of this thesis is focuses: *The Urban Revolution.* In this book, which also happens to be among the most lucid of Lefebvre's texts, the particular qualities of material urban space are argued unequivocally to be conditioned by the mode of production and indeed to be essentially reconfigured with each new mode of production. (This proposition in fact is the very premise of the book). Here, it is beyond doubt that urban space is a representation of an analytically prior socio-economic logic even if – as always – it also has a capacity for interfering with the social[14].

To understand how Lefebvre conceptualises the production of urban space in *The Urban Revolution* one first must understand the way he conceptualises society and societal transformations. Dialectical materialism (sometimes also 'historical materialism', although the senses of the two terms are not absolutely identical) states that historical societies are the products of contradictions arising in the socioeconomic realm and more particularly: within the 'mode of production'. Societal transformation is thus conjectured to be driven forward by conflicts stemming from the way social groups organise production (e.g. Slave-Master; Serf-Lord; Labour-Bourgeoisie). As Engels writes:

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[14] Elsewhere, in the *Production of Space,* Lefebvre puts forward a similar argument, asserting that 'the shift from one mode [of production] to another must entail the production of a new space", Lefebvre, 1991: 46).

> Historical materialism […] designate[s] that view of the course of history which seeks *the ultimate cause* and *the great moving power of all important historic events in the economic development of society*, in the changes in the modes of production and exchange, in the consequent division of society into distinct classes, and in the struggle of these classes against one another (Engels quoted in Slattery, 2003: 43-44; emphasis added).

The industrial mode of production therefore is born from contradictions arising within the feudal mode of production, and the feudal mode of production from contradictions inherent to the ancient mode of production, *etcetera*. This dialectical process must, according to Marx, eventually produce first a socialist mode of production, then a communist mode of production, thus bringing to its conclusion the arc of history. Whilst the different classes will all participate in bringing forth these societal revolutions – it is essentially their dialectical relationship to each other that precipitates a new mode – the working class nevertheless is thought to be the vanguard in these matters, thereby making it a revolutionary subject. Figuratively speaking, revolution will radiate from the shop floor to the rest of society, like rings spreading in the water.

Lefebvre agrees with the basic premise of this analysis: that contradictions occurring in social relationships are the driver in the evolution of human societies. But he disagrees with the conclusion that it will be socialism that will replace industrial capitalism and that the shop floor will be the epicentre of dissent. He also emphasises the role of space in the historical transformation of societies; a factor that Marx and Engels only discuss peripherally. Counter to Marx, Lefebvre believes industrial capitalism to be superseded not in a socialist society but in an 'urban society'. As such, the mode of production replacing 'industrialism' will arise from contradictions extant in urban space rather than at the sites of industrial production. It therefore will be *spatial forces* linked to the process of urbanisation – rather than *economic forces* linked to the process of industrial production – that will precipitate the process leading to the insurrection and subsequent emancipation of the exploited classes.

However, space does not just hold an emancipatory potential. According to Lefebvre, it also may be utilised as a strategic tool for hegemonic domination, thus making it an issue of contention and class war. Writing in the 1960s - approximately 100 years after the publication of *Capital* - Lefebvre observes how capitalism had not imploded and given way to socialist society. If anything, it appeared to have been consolidated despite the socio-cultural upheavals of the first and second world war. 'By 1960', he writes,

> something extraordinary happened which I wanted to explain as a Marxist. The Revolution had failed; it had not taken place. There had been two world wars. What had occurred in Russia had given rise to Stalinism ... There was the enormous massacre of the Second World War, and, with the Liberation, one expected a major event and a renewal; but that did not happen either. So, by 1960, there was an emptiness. The Reconstruction was complete, so what filled the gap? (Lefebvre, quoted in Katznelson, 1993: 95)

According to Lefebvre, what had 'filled the gap' between the capitalist mode of production and social discontent was 'space'. 'What has happened', he writes, 'is that capitalism has found itself able to attenuate (if not resolve) its internal contradictions for a century, and consequently, in the hundred years since the writing of *Das Capital*, it has succeeded in achieving 'growth'. We cannot calculate at what price, but we know the means: *by occupying space, by producing a space'* (Lefebvre, 2003: 21; original emphasis.)*.* The spatial formations particular to capitalist society had in other words perpetuated that particular mode of production with urban space in a sense 'prolong[ing] the fundamental tendency of the present' (Lefebvre, 2003: 4).

According to Lefebvre, this hegemonic capacity to arrange space is not particular to 20th century capitalism. While there is a sense that certain socio-spatial processes are coming to a head at this particular moment in time - chiefly due to a fine-tuning of spatial techniques or 'practices' - this does not imply that the spatialisation of socio-economic power and sociocultural mores is a new phenomenon. Indeed, space, according to Lefebvre, is something that always has been expressed by the different factions of society although with varying degrees of perfection. For this reason, different modes of production can be

analysed through their spatial output as well as through their associated spatial practices and ideologies.

This approach is significant from a methodological perspective insofar as it allows Lefebvre to go through the spatial manifestations of different societies, finding in these the clues to the social logic of the particular social formation. More particularly, it makes it possible to develop a 'typology' of urban form, i.e. to show how different forms of urban space correspond to the historical periods theorised by Marxism. This in turn allows Lefebvre to build towards his own revolutionary moment - the urban revolution - in accordance with the dialectical logic of society and space.

Lefebvre begins his explication of spatial typologies with what he calls *the political city*; a term that refers to the urban space particular to ancient Greece and Rome. This excludes from his analysis a whole series of earlier societies - e.g. hunter-gatherer societies, the so-called 'Asiatic' societies of ancient Egypt and China - something that is obviously problematic but which does not seem to concern Lefebvre much[15]. Why? In all likelihood, the choice to start his analysis with the political city is inspired by Marx and his conjecture that the first class-divided society must be found in ancient Rome and its large, slave-dependent estates: the *latifundia* (Marx, 1964). For Lefebvre as for Marx, the *latifundia* thus provide the dialectical impulse that is to cascade through history as a source of both domination and revolution.

What are the characteristics of the political city? They first of all are related to the relationship between countryside and city. Lefebvre argues that a *dependent* but fundamentally *asymmetrical* relationship is formed between the town and the countryside in the ancient political city. The aristocracy thus was based in the city but would live off of surplus value produced in the countryside. Consumption therefore was urban but production rural. Key to the maintenance of this

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[15] . 'I am going to take the risk', he writes, 'of locating the political city at the point of origin on the space-time axis' (Lefebvre, 2003: 8.)

relationship was, according to Lefebvre, the establishment of various forms of control - military, political, and ideological - all of which were placed in the city. Lefebvre 'political city' therefore is characterised by being a site of domination and administration more so than production and trade.

Trade of course existed in the political city, but according to Lefebvre it was not yet a central mode of distribution and thus was not entrenched in the form of urban space. Rather than being produced for trading, most products were produced with the subsistence of the landowning elite in mind (they were, in the technical sense of the term, 'goods' rather than 'commodities'). This meant that trade existed but was of a relatively speaking, lesser importance to urban life than political power and administration. Production, on the other hand, only would become an important part of the urban economy in the feudal age when skilled labour would flock to the cities. For the time being, it was a largely rural phenomenon.

The administrative ethos of the political city manifests itself in its relationship to the countryside but also in its particular sociological and spatial profile. 'The political city', Lefebvre thus writes, 'was populated primarily by priests, warriors, princes, 'nobles', and military leaders, but administrators and scribes were also present' (Lefebvre, 2003: 8). For this reason, the city itself was 'inconceivable without writing: documents, laws, inventories, tax collection. It [was] completely given over to orders and decrees, to power' (Lefebvre, 2003: 8). A place for 'priests, warriors, and nobles', the ancient city is characterised by the production, reproduction and celebration of power. This sociological profile is translated into a particular urban type. The latter manifests itself in spatial forms such as the *agora* in Greece and the *fora* and *stadia* of Rome (where 'power' could be explored in more immediate and visceral ways) not to mention in the presence of legal courts and religious temples.

As such, the political city may be thought of as a 'superstructural city' which, *qua* largely dissociated from the economic base, devotes itself to the *reproduction* of

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power rather than the *production* of goods[16]. So strong is the concern with power that other kinds of socioeconomic activities - such as trade - are ignored or even excluded from the political city, and so while the spatial logic of the latter is defined *positively* by power and ideology, it also is defined *negatively* by the defence it mounts against other forms of socio-spatial activities. As Lefebvre writes in a somewhat functionalist tone:

> The political city *resists this with all the power at its disposal*, all its cohesiveness; it feels, knows, that it is threatened by markets, merchandise, and traders, by their form of ownership (money, a form of personal property, being movable by definition) (Lefebvre, 2003: 9; emphasis added).

The disintegration of Rome spells the end of the ancient mode of production and also of the political city. As the empire collapses, so does the urban form particular to its socio-political hierarchy. This is a somewhat problematic moment for dialectical materialists insofar the ancient mode of production is not superseded dialectically - that is through contradictions arising from the mode of production - as much as it merely collapses. Rather than being transcended by a new mode of production, production therefore reverts - during the early Middle ages - to a form of labour based on individual peasantry (a form of labour that in fact had existed before the *latifundia*).

Still, these transformations are not entirely without a social logic. The nature of Rome's collapse was, Marx and Engels argue, informed - if not caused - by the purely administrative relations maintained between town and countryside. 'Rome', they write, 'indeed, never became more than a city; its connection with the provinces was almost exclusively political and could, therefore, easily be broken again by political events' (Marx and Engels, GI, 90). In this sense the particular attributes of what Lefebvre calls 'the political city' - i.e. the separation of

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[16] Harvey supports this analysis arguing that the ancient political city 'functioned as a political, ideological and military force to sustain a particular pattern in the social relations of production (particularly with respect to property rights). The city had little or nothing to do with production itself. Many of the functions of the city during this period have to be categorized as superstructural' (Harvey, 1973: 304-05)'.

production and reproduction between countryside and city - may be argued to have contributed to the collapse of the ancient mode of production even if it was not its direct cause.

The vacuum left by the ancient mode of production finally is overcome in medieval Europe where the emergence of the feudal mode of production - what Marx sometimes calls 'the Germanic period' (cf. Saunders, 1986: 19-20) - is thought to precipitate the transition to a new socio-economic period and a new city. *In economic terms*, this transition is argued to manifest itself in an relative increase of individual ownership of the means of production (relatively speaking, the serf has a greater degree of ownership of his lot than the slave does of the soil on which he toils) and thus in a transformation of the relations of production. *Spatially*, the transformation of the relations of production are thought to pave the way for what Lefebvre calls 'the merchant city'.

In these transformations, the interdependent relationship between town and country - which had been established in the ancient city but which disintegrated in the wake of Rome's collapse - once again returns, but, Lefebvre argues, in a different form. In the ancient mode of production, the relationship between town and country had been one of dependence but not contradiction. The locus of *production* had in other words remained rural even if *consumption* of surplus value was predominantly urban. According to Lefebvre, this changes in the Germanic period, with an increasing proportion of productive activity moving to the cities - predominantly in the form of manufacture - and so the city emerges as a centre of production opposing, in a certain sense, that of the countryside.

Again, Lefebvre proceeds from an analysis of socio-economic transformations to the analysis of a particular sociological and spatial profile. As urban manufacture and exchange became more prevalent, a new subdivision of the social sphere is thought to occur, as seen most poignantly in the emergence of guilds and in the genesis of a burgeoning bourgeois class. These social transformations also manifest themselves in the form and function of urban space. No longer merely

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the seat of political and administrative power, the city thus is argued to develop and incorporate in its structure facilities related to production and trade, such as marketplaces and guildhalls (although Lefebvre only seems to discuss the latter indirectly).

The emergence of this new urban 'type' is not conjectured to be either instant or total. Rather it is argued to unfold through the progressive inclusion of existing spatial forms; the already established (political) city thus at once radiating *towards* and prolonging itself *in* the suburbs that surround it. As market towns located at the periphery of the political city become integrated into the urban fabric, the qualities of the city - its type - also are changed. No longer is trade excluded (or 'resisted') from the city, in fact it becomes the primary characteristic of the new urban type. 'Commercial exchange', writes Lefebvre,

> became an urban function, which was embodied in a form (or forms, both architectural and urban). This in turn gave urban space a new structure. The changes that took place in Paris illustrate this complex interaction among the three essential aspects of function, form, and structure. Market towns and suburbs, which were initially commercial and artisanal -Beaubourg, Saint-Antoine, Saint-Honore - grew in importance and began to struggle with centers of political power (institutions) for influence, prestige, and space, forcing them to compromise, entering with them in the construction of a powerful urban unity (Lefebvre, 2003: 10-11).

Lefebvre conjectures the type of urban space to change once more with the rise of the industrial mode of production. As always, this typological transformation is predicated on transformations in the mode of production. The dynamics of this transformation are well-known but can be summarised here. In early industrial society, new technologies are developed - first: various forms of spinning machines and mills; later: the steam engine - and in their vicinity new relations of production are made possible and entrenched in the fabric of society. More particularly, the manufacture of goods becomes increasingly socialised and less skilled; something which puts the exclusivity and confraternity of the guild system under pressure.

It is Lefebvre's argument that these essentially economic transformations come to contradict the social and spatial logic of the merchant city - effectively pushing industrial production away from the latter - and so a new stage in the dialectical process of urban revolutions begins. This stage is thought to be predicated on the demand for natural resources in production. As the availability of sources of energy (such as coal and water), and raw materials (metals and textiles) become increasingly important to production, this demand begins to act, as it were, as a 'pull' on capitalist production thus shifting the focus of investment towards the new industrial towns (typically founded in the vicinity of such resources)[17]. In this way, the merchant city is contradicted *economically* as well as *geographically* by the foundation of the great cities of the industrial revolution.

The restrictive access to the guilds and the traditions of the aristocracy also are argued to play an important role in this transformation. The feudal mechanisms for social stratification – generating and perpetuating internal contradictions - are also overcome with the emergence of the industrial town. 'With the rise of industry', Lefebvre writes, 'the extension of the market, the advent of the commodity world - in short, with the new importance taken on by the economic sphere, by capitalism - the old towns […] had to make room for something else. All their compartmentalizations - physical walls, guilds, local oligarchies, restricted markets and controlled territories - had to be dismantled' (Lefebvre, 1992: 344.)[18].

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[17] 'We know', writes Lefebvre, 'that industry initially developed near the sources of energy (coal and water), raw materials (metals, textiles), and manpower reserves' (Lefebvre, 2003: 13). Saunders writes something along those lines contending that capitalist manufacture is 'propelled out of the corporate towns and was at the same time attracted into the countryside where there was water power to drive the new machinery and labour power to work it' (Saunders, 1986: 8).

[18] Marx - deploying an economic rather than spatial perspective - makes a similar observation. He writes: 'The money capital formed by means of usury and commerce was prevented from turning into industrial capital by the feudal organization of the countryside and the guild organization of the towns. These fetters vanished with the dissolution of the feudal band of retainers, and the expropriation and partial eviction of the rural population. The new manufacturers were established at seaports, or at points in

This dismantling of the merchant city does not cause a return to the ancient political city, that is: to a situation where the countryside and the city stand in an essentially contradictory relationship to each other. In fact, the spatial processes unfolding alongside the industrial mode of production are argued to abolish this contradiction altogether. The merchant city is not *negated* as much as it is *transcended*; urbanity exploding as it were outwards from the city towards the rest of the world. The industrial town thus 'conquer[s] the city, penetrate[s] it, break[s] it apart, and in so doing extend[s] it immeasurably, bringing about the urbanization of society and the growth of the urban fabric that covered what was left of the city prior to the arrival of industry' (Lefebvre, 2003: 13-14). The antagonism between countryside (*thesis*) and town (*antithesis*) is thus resolved in the *synthesis* of the industrial city.

Lefebvre's discussion of the properties of the industrial city are few and hardly very illustrative, something which makes the characterisation of this type the weakest in his typology. Lefebvre appears to be more interested in the historical stage that the industrial city leads towards than in the city itself. This stage is characterised as a 'critical zone', and corresponds - perhaps not incidentally - to the time in which he himself writes.

> The industrial city (often a shapeless town, a barely urban agglomeration, a conglomerate, or conurbation like the Ruhr Valley) serves as *a prelude to a critical zone.* At this moment, the effects of implosion-explosion [i.e. the concentration of people in the city; the expansion of urbanism towards the countryside] are most fully felt. The increase in industrial production is superimposed on the growth of commercial exchange and multiplies the number of such exchanges. This growth extends from simple barter to the global market, from the simple exchange between two individuals all the way to the exchange of products, works of art, ideas, and human beings. Buying and selling, merchandise and market, money and capital appear to sweep away all obstacles (Lefebvre, 2003: 14; emphasis added).

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the countryside which were beyond the control of the old municipalities and their guilds' (Marx, Cap I, 915).

While the industrial town is characterised as a 'prelude' to 'critical zone', that zone itself constitutes the precursor to his 'urban society'. As such, it represents the last stage of historical development situated immediately before the completion of the dialectical process.
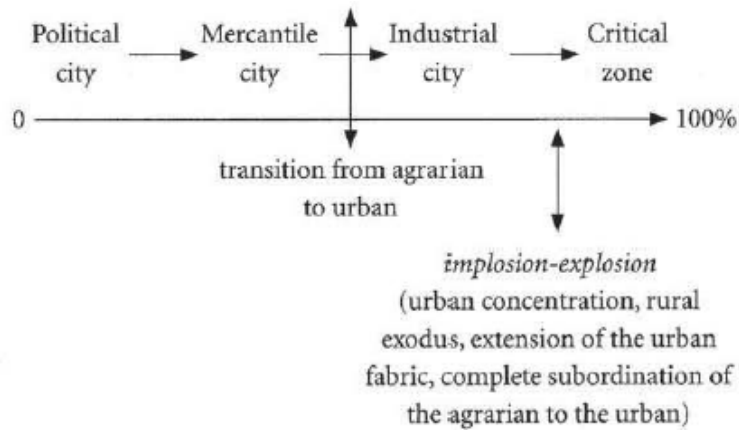
Figure 1: Lefebvre's 'time-space axis', describing the dialectical movement from the political city, via the mercantile and industrial city to the critical zone (or 'urban moment') of the 20th century. Source: Lefebvre, 2003: 15.

Lefebvre provides both an economic and a spatial characteristic of this precursory state. In economic terms, it is characterised by the funnelling of an increasing amount of surplus value into what he terms a 'secondary circuit of capital' - this is a circuit which in Lefebvre's definition includes *financial assets* such as stocks and bonds, and *built environment assets* such as urban blocks and complexes - at the expense of the primary circuit of capital (i.e. investment in industry)[19]. Exploitation and speculation thus become aspects of the built environment, something that they had not been before.

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[19] Writes Lefebvre: 'I would like to highlight the role played by urbanism and more generally real estate (speculation, construction) in neocapitalist society. Real estate functions as a second sector, a circuit that runs parallel to that of industrial production, which serves the nondurable assets market, or at least those that are less durable than buildings. This second sector serves as a buffer. It is where capital flows in the event of a depression, although enormous profits soon slow to a trickle. In this sector, there are few 'multipliers:' few spin-offs. Capital is tied up in real estate. Although the overall economy (so-called domestic economy) soon begins to suffer, the role and function of this sector continue to grow. As the principal circuit-current industrial production and the movable property that results begins to slow down, capital shifts to the second sector, real estate.

In a sense, the post-industrial city reverses the relationship established during the age of the industrial city between urbanisation and industrialisation. As Katznelson observes: 'Industrialization no longer produces urbanization as its servant; just the reverse' (Katznelson, 1993: 97.). The consequences are significant. According to Lefebvre, the transformation in the relationship between urbanisation and industrialisation does not just affect industrial production. It also affects the 'reproduction of labour power' - that is: the conditions under which the urban proletariat lives, consumes, procreates and dies – with workers having to migrate from the city centre to suburban 'new towns'.

The exodus of workers is significant to Lefebvre. In it he sees a conflict between a rent-seeking bourgeoisie and a rent-paying proletariat; one that must spawn resistance, and in time: create the preconditions for a revolution. This coupling of revolutionary dynamics and urban space in fact are not entirely new to Marxist thought. In the 19th century, Engels noted how the capitalist mode of production drove unskilled labour into the city centre of Manchester (Engels, 1845). Due to the high valuation of land in the city centre, workers were forced to congregate in cramped and increasingly squalid conditions in blocks withdrawn from the main thoroughfares. This according to Engels created a dual city: that of the bourgeoisie and that of the proletariat.

However, Engels did not explore in great detail the 'squeeze' on the working class created by these spatial conditions nor did he extend, like Lefebvre, his analysis to the revolutionary potential of urban space. As such, his theory does not reach the same level of concern for space that Lefebvre's does. According to Lefebvre, the tendency discussed by Engels is exacerbated in the 20th century city, where a greater number of people inhabit urban space thus creating a

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It can even happen that real-estate speculation becomes the principal source for the formation of capital, that is, the realization of surplus value. As the percentage of overall surplus value formed and realized by industry begins to decline, the percentage created and realized by real-estate speculation and construction increases. The second circuit supplants the first, becomes essential' (Lefebvre, 2003: 159).

greater potential for conflict and revolution. As Lefebvre writes: 'If space as a whole has become the place where reproduction of the relations of production is located, it has also become the terrain for a vast confrontation' (Lefebvre, 1976: 85).

It is, according to Lefebvre, in this light that one must understand the rise of positivist spatial sciences. As the interests of capital align with the city as a site of habitation, the necessity to control the urban population also increases. Carnivalesque and revolutionary aspects of the urban life must therefore be negated or at least blunted, and predictability and docility promoted. This, according to Lefebvre, is the real task of the architect and the planner which thereby become class agents. Planning is therefore thought to be predicated on a counterrevolutionary agenda which is hidden beneath a rationalistic veneer. (As such, it is expressive of what Marxists call 'ideology', i.e. the drive to mask economic disparities and prevent revolutionary behaviour[20]).

The urban revolution therefore is stymied by an urban ideology. The latter is thought to be manifested in the widespread introduction of new forms of urban habitation - the so-called *nouveaux ensembles urbains* - characterised by high rising blocks and car-dependent locations. Such ensembles serve the cause of the ruling classes by minimising the revolutionary aspects of urban social coexistence at the same time as they ensure the basic reproduction of the labour force/consumers. However according to Lefebvre, they also generate, paradoxically, the precondition needed for an urban revolution. By breeding ennui and alienation, urban planning is thought to produce a revolutionary subject.

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[20] In the German Ideology, Marx and Engels argue that ideology must be understood as a set of ideas which represents the interest of the ruling class. 'The class which has the means of material production at its disposal', they write, 'has control at the same time over the means of mental production, so that thereby, generally speaking, the ideas of those who lack the means of mental production are subject to it' (Marx and Engels, GI: 61). The purpose of ideology, in other words, is to make a frictionless kind of domination possible by hiding the true effects of class exploitation.

Lefebvre's urban revolution is therefore an ideology- and praxis driven revolt; one predicated on the rejection of existing urban structures and on the desire to develop new utopian forms of urban co-existence. The latter revolve around a resurgence of the carnivalesque, of experimental spatial practices ('utopianism'); elements of urban life which according to Lefebvre had been suppressed by the bourgeoisie. In Lefebvre's words the urban revolution therefore must be an attempt 'to open a path to the possible, to explore and delineate a landscape that is not merely part of the 'real', the accomplished, occupied by existing social, political and economic forces. It is a utopian critique because it steps back from the real without, however, losing sight of it' (Lefebvre, 2003: 6-7).

The wording and the vision of this urban revolution made Lefebvre's analysis popular during the late 1960s. There furthermore was an obvious overlap between his theories of urban utopianism and those of the *Situationist International* - although the relationship would soon sour - something that no doubt contributed to his popularity. However the reception of Lefebvre's urban theory was not universally positive. Some argued that his utopian urbanism contradicted the basic principles of dialectical materialism and that it itself represented a form of bourgeois or fetishistic thinking (this for instance was Castells critique, as we shall soon see). Marx and Engels, the argument went, had discussed the industrial town as one of the main manifestations of the new industrial mode of production without at the same time exalting it to the position of 'motive force' in the historical development of society.

But is this what Lefebvre does? I am not convinced that that is the case. Certainly there is ambiguity in Lefebvre's discussion of urban social evolution. And while some elements of his analysis may be taken to indicate that space is a motive force in history, others - such as his description of space as a 'secretion' of society - would seem to indicate the opposite, namely that he perceives it, ultimately, as a manifestation of underlying social forces. What is however true, is that Lefebvre explicitly criticised Marx's analysis of urban space, claiming that

dialectical materialism, insofar as it ignores space, is not suitably equipped to take on the hegemonic structures of the 20th century. 'Socialism', he writes,

> provides us merely with an improved form of labor (salaries and material conditions on the job). But to offer nothing more would be shortsighted. For socialism soon finds itself confronted by the urban problematic, armed with nothing but childish concepts and ideologies (Lefebvre, 2003: 110).

This made Lefebvre a *pariah* in some circles - indeed, Castells' *Urban Question,* is, to a certain extent at least, a critical response to Lefebvre's '*urban problematic'* - even if his reputation has since largely been restored. However, Lefebvre's legacy is more complicated than that. While many in the 1970s criticised the urban utopianism proposed by Lefebvre, two of the central concepts of *The Urban Revolution -* the redirection in the 20th century of investments or surplus value towards a secondary circuit of capital; and the hegemonic reconfiguration of patterns of social reproduction, or consumption, such as habitation – in fact form the foundations on which Harvey and Castells would construct their proper arguments. In this sense, *The Urban Revolution* engenders a new understanding of the city, a new image, even if the relationship to the later theories – Castells' in particular – is sometimes contradictory.

1.2.2. *Castells: Monopolville and the structural distribution of collective consumption*

Castells arguably is the Marxist geographer that is the most closely associated with Lefebvre (who was the supervisor of his thesis). However he also is one of the theoreticians that criticise Lefebvre in the strongest, most direct terms, calling the theory of urban utopianism 'excessively crude' (Castells, 1977: 90). Castells' definition of what he terms 'the urban question' in fact may be seen as an attempt to transcend Lefebvre's theory of urban utopianism, exploring theoretical pathways more closely related to Structural Marxism than to Lefebvre. His book, *The Urban Question,* constitutes one of the mythical texts of human geography. It is a text which, in spite of its abstruse style and dense presentation, was among

the first works of the new school of French urbanists to make a real impact in the anglophone world[21], and for this reason alone it constitutes an important work.

The Urban Question has since been renounced by many (including Castells himself) on account of its excessively formalistic logic. In the 'afterword' to the English translation, produced five years after the original French publication, Castells thus acknowledges the ' too rapid […] leap from a theoretical critique to an extremely formalised theoretical system' (Castells, 1977: 438), thereby distancing himself from central aspects of the book's analysis[22]. The publication of the English translation allowed Castells to save from the ruins of *The Urban Question* a few theoretical principles, thereby forming a bridge from the formalistic structuralist theory of the original French version of the book to the more community-based investigations that he would later pursue in books such as *City, Class and Power* (Castells, 1978), and *The City and its Grassroots* (Castells, 1983).

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[21] As Harloe writes: 'It would be an exaggeration to say that Castells's approach monopolised the development of the 'new' urban sociology in Britain in the mid-1970s', Harloe writes, 'Nevertheless, the citations to his work, as well as the attention paid to a critical examination of it, indicate that Castells's writings were of central importance' (Harloe, 1981: 4). The influence of Castells' work came before that of Lefebvre, and so for many years, Lefebvre's work was predominantly known through Castells' critique of it. As Saunders writes: ' The centrality of Castells's work during this period was partly a reflection of the fact that his key papers, and his key book, were translated into English quite early on while foreign-language works by other writers remained relatively inaccessible. For much of this period, many of us in Britain remained largely ignorant of the political and intellectual context which had spawned Castells's theories and had little knowledge of the alternatives being proposed by other European Marxists, nor of the debates to which Castells's work was addressed' (Saunders, 1986: 142-43).

[22]Already in *Monopolville* - written with Francis Godard and published in 1974 (i.e. two years after the original French publication of *The Urban Question* - the validity of the formalistic approach is questioned: ''To fix a certain mode of theoretical analysis', the authors write, 'and to hold on to its internal logic and to the validity of the social laws already established by the general theoretical framework from which this mode of analysis derives is a considerable risk, or if you like, a gamble on its applicability' (Castells and Godard 1974: 14). This, then, was not a new critique that Castells mounted in 1977, but one that had been materialising pretty much since the publication of *La Question Urbaine.*

Some have suggested that the perspective of Louis Althusser (prevalent in the original edition) is replaced with the theories of Nicos Poulantzas in this theoretical shift (see for instance Merrifield, 2002). This is based on the observation that Castells increases the emphasis on the discussion of 'urban social movements' - or 'classes'; the focus of Poulantzas' theoretical framework - at the expense of 'structural instances'. There might be an element of truth in this analysis. However, I find it to be too reductive a description of the matter, among other things because it implies a clear distinction between the positions of Poulantzas and Althusser that I do not think exists (this mirrors the opinion of Saunders, 1986).

That is not to say that the two theories are identical. Rather they should be thought as complementary - the one foregrounding a purely structural perspective of the State; the other a structuralist class perspective - and in some respects Castells' work is adding a third (geographical or 'spatial') voice to this choir. The connection between the three scholars therefore is crucial, and it is my argument that if one wants to understand the mechanics of Castells' urban question, one also must understand the way it has been informed by Althusser's theory of the State and by Poulantzas discussion of classes. For this reason, I provide a quick review of these theories before returning to Castells' theory of urban space.

The focus of Althusser's so-called 'Structural Marxist' analysis is with the 'structures' of society and with the emergent (and self-organising) logic that these are conjectured to express. As a doctrine, Structuralist Marxism is predicated on the *rejection* of the idea of the State as the preserve of a ruling class (the so-called 'instrumentalist perspective'), and the *affirmation* of the State as a complex whole whose different structures (or 'instances') relate to each other in a complex, emergent and essentially homeostatic way.

That the State is not the preserve of a ruling class does not mean that there is no hegemonic domination. It rather means that this domination is expressed in a

complex - as opposed to simple or direct - way. A given State will thus, according to Althusser, involve a series of so-called 'Repressive State Apparatuses' (RSAs), e.g. the police, the military, the judiciary system. These suppress popular insurrections on behalf of a hegemonic class or series of classes, but also involve their own logics which may contradict each other on certain counts. A State also will involve a series of so-called 'Ideological State Apparatuses' (ISAs), such as for instance schools, religious institutions, the family, etc. The role of these is to prevent popular insurrections in the first place. But again, they may involve a certain degree of autonomy. It is in effect the internal logic and relation of these different apparatuses that Structuralism tries to understand.

Due to the complex nature of the State, Althusser is critical of Marxists who analyse a historical situation simply with respect to its economic base. A given historical situation must therefore be conceived, not just in terms of its 'mode of production', but rather in terms of its 'complex structural whole'. To be sure, this 'whole' includes instances related to the economic base (i.e. the production and circulation of Capital). But it also involves instances related to the political, juridical and ideological spheres (the RSA and ISA; the 'superstructure'). Each of these instances - including those in the superstructure - will involve their own logic and may in theory precipitate important historical events. For this reason, Althusser speaks of the 'relative autonomy of the superstructure with respect to the base' (Althusser, quoted in Lapsley and Westlake, 1988: 5).

If this autonomy can only be 'relative' it is because Althusser's particular brand of historical materialism – the so-called 'aleatory materialism' - still grants the economic base an important, if not absolutely determinative, role. Each historical 'whole' (or 'conjuncture') will therefore be expressed in a particular matrix of structural and superstructural instances which to a certain extent stabilise themselves with respect to each other (although contradictions subsist within and between structures). The order of this matrix will be structured by a so-called 'structure in dominance' which in turn is 'determined' by the economic base. The base therefore does not specify the *particular logic* of the historical conjuncture

as a whole or of the individual structural instances. It rather determines the propensity of a particular structure to become or remain dominant (but not the particular way this structure 'dominates'). As Saunders writes:

> The question of which of the three levels [economic, juridico-political or ideological] is to perform the dominant function in any particular mode of production is determined by the nature of the economic relations pertaining in that mode (feudal economic relations, for example, necessitated a dominant role for religion in maintaining the unity of the system; capitalist economic relations necessitate a dominant role for the economy itself; and so on). In other words, although the economic is not always *dominant*, it is always *determinate* in the sense that it determines the nature of the relations between the three levels and hence which is to perform the dominant role. This is what Althusser means by economic determinancy 'in the last instance (Saunders, 1986: 129).

Like Althusser, Poulantzas tries to develop a more adequate understanding of the State. What sets him apart from Althusser is his focus on the different classes in society and the complex network of alliances that these are conjectured to create and maintain. The relationship between the State and the classes arguably is more dynamic in Poulantzas than in Althusser, with classes granted a more prevalent role. This yields a more nuanced perspective on the structures of society. Historical conjunctures are not just structured, from 'above', by the structure in dominance, but also - from 'below' - by the class activities of social movements. As Clarke writes:

> The originality of Poulantzas's work lies in his attempt to transcend the integrationist perspective of functionalist sociology. He does this by trying to graft the Marxist proposition that the class struggle is the motor of history onto Althusser's structural-functionalist conception of society. The theory of class is inserted between the structure and the state, so that the state is subject to a double determination. In the first place, it is determined directly by the structure as a specific functional level of that structure. Secondly, its functioning in practice, within limits determined by its place in the structure, is subject to the conditions of the class struggle, which are in turn determined, at least partially, by the structure (Clarke 1977, 11.).

In Poulantzas, classes therefore both *inform* the evolution of the structural whole and are *produced* by this structural whole. In order to understand this double determination, one must understand a) the relationship between the structure in dominance and the classes, and b) the way these classes are themselves

productive and relatively autonomous. The structural production of classes is theorised in a similar way to the structural production of historical conjunctures in Althusser, i.e. as a relatively autonomous self-organising phenomenon constituted in the vicinity of a structure in dominance. However where, for Althusser, the structure in dominance selects and distributes *structures* within a given conjuncture, for Poulantzas it selects what he calls '*class positions*'.

A 'class position' designates an abstract type of worker that fits into and has a role to carry out in the relations of production particular to a given conjuncture. Thus an industrial society will involve and depend on the production of the following class positions: factory workers (one class position), engineers (another class position) and managers (a third class position). Similar lists of class positions can be drawn up for other modes of production. Indeed the relationship to the mode of production is key. Ultimately the existence and distribution of class positions are determined by processes originating in the economic base. In this sense, a 'class position' is economically defined, that is: defined with respect to the economic base.

Whilst the notion of the 'class position' is of great importance to Poulantzas' analysis of classes, it is however not the only relevant element. Classes are also thought to be defined with respect to processes unfolding in society's superstructure, for instance in relation to political, religious or judicial problems. Sometimes a class agent will therefore act in accordance with his/her position in the economic base. However at other times, s/he may choose to act in an 'ideological' fashion, for instance by making a strategic alliance with another class on a certain issue. This makes the field of classes dynamic and so the adequate analysis of class production must therefore take into account both structure and superstructure. As Poulantzas writes,

> The economic place of the social agents has a principal role in determining social classes. But from that we cannot conclude that this economic place is sufficient to determine social classes. Marxism states that the economic does indeed have the determinant role in a mode of production or a social formation; but the political and the ideological (the superstructure) also have an important role. […]

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We can thus say that *a social class is defined by its place in the ensemble of social practices, i.e. by its place in the ensemble of the division of labour which includes political and ideological relations* (Poulantzas,1973: 27-28; emphasis added).

Each class will thus be enfolded in a so-called 'ensemble' of social relations. This ensemble, in turn, will involve several 'blocs' each of which will contain sets of classes, of which one will be 'hegemonic' whilst others will be 'powerful' (but not hegemonic) and others still: 'dominated'. The 'hegemonic class' is that class for whom the particular structure of the State is the most beneficial. This does not necessarily mean that this class is identical to the administrative class or the political elite. In fact, according to Poulantzas, it rarely is the case that the members of the hegemonic class occupy the most senior positions in the State administration.

That this is so is significant because it means that the different institutions of the State - organised as they are to favour the hegemonic class on the whole - enjoy a relative independence from this class and so might contradict it on specific issues. The hegemonic class also cannot enforce its will at all times lest it risks provoking backlash from other powerful (but non-hegemonic) classes, or indeed: popular insurrection from the dominated classes. There thus may be situations where the State will have to acquiesce to the pressure exerted by the dominated classes thereby ceding ground on certain political issues - such as health care, social housing, and welfare programmes - even if the overall tendency remains to favour the hegemonic class. Writes Poulantzas:

[I]in working for class hegemony, the State acts within an unstable equilibrium of compromises between the dominant classes and the dominated. The State therefore continually adopts material measures which are of positive significance for the popular masses, even though these measures represent so many concessions imposed by the struggle of subordinate classes. This essential material aspect cannot be explained if the relationship between State and popular masses is reduced to the couplet repression-Ideology [...] the field of [State] activity goes far beyond repression and ideology (Poulantzas, 1980: 31).

By exploring the dynamics of the State through the classes, Poulantzas thus introduces a more fluid (and concrete) understanding of the State than the one

found in Althusser. But ultimately, it still is a theory that operates according to a decidedly functionalist logic where the State produces what it 'needs' - for instance 'class positions' - to sustain itself over time[23]. Class struggle therefore may be an engine of social change and reform but it always must be conceptualised as an element operating within the complex social whole of the historical conjuncture and, more specifically, with respect to the State and its apparatuses. Poulantzas therefore does not overturn Althusserianism. He merely modifies it.

Althusser and Poulantzas' theories resonate deeply with Castells' conceptualisation of the structure of the city and its urban social movements. Indeed, as I will now show, the particular logic of Althusser's aleatory materialism in many ways is reproduced in Castells' conceptualisation of urban form and formation, with the material structures of urban space thought to express the structural logic of the historical conjuncture. Similarly, Poulantzas' at once fluid and strategic definition of class struggle may be shown to lurk beneath Castells' discussion of so-called 'urban social movements', and so both urban artefact and urban social fact are imbued with a structuralist determination.

Like Althusser, Castells subscribes to an aleatory materialism meaning that individual structures or instances retain a certain degree of autonomy even if they are determined into a relation by a structure in dominance. Applied to the structure of urban space, this creates a paradoxical situation in which space has a certain autonomy (or 'specificity') at the same time as it is an expression of the historical conjuncture, that is: of a structural 'ensemble' that includes economic structures and politico-juridical superstructures. This provides a more complex understanding of the relationship between society and space than the one found

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[23] The relations between the different branches of the state also are said to present 'a specific internal unity and obe[y], to a large extent, [their] own logic' (Poulantzas, 1972: 248). This led Miliband to criticise Poulantzas for functionalistic reasoning in a now famous polemic in *The New Left Review* (Poulantzas, 1972).

in Lefebvre where the city more directly is a representation of economic base. Urban space, for Castells, therefore is not

> a mere occasion for the deployment of the social structure, but a concrete expression of each historical ensemble in which a society is specified. It is a question, then, of establishing, in the same way as for any other real object, the structural and conjunctural laws that govern its existence and transformation, and the specificity of its articulation with the other elements of a historical reality. […] Something fundamental for my analysis emerges from this: *the social signification of the different forms and types of space, the significative segmentation of space, the spatial units, do not have meaning outside the segmentation of the social structure in scientific terms,* therefore in terms of the mode of production and of social formations. That is to say, each mode of production and, at most, each stage in the mode of production implies another segmentation of space, not only in theoretical terms, but also in terms of the real relations established between the different spaces (Castells, 1977: 115 & 443; emphasis added).

The essentially structural nature of urban space means that its analysis also must be structural. To be more specific, the complex organisation of urban space must be analysed by disaggregating the different elements that it involves (economic, political, ideological) and by revealing how these are related, in the first place, to the historical ensemble and, in the final analysis, to the economic base that 'determines' the configuration of this ensemble. To analyse space as an expression of social structure, Castells asserts, thus 'amounts […] to studying its shaping by elements of the economic system, the political system and the ideological system, and by their combinations and the social practices that derive from them' (Castells, 1977: 126.).

This also means that cities from different historical periods must be qualitatively different from each other. An ancient city therefore will be the expression of a conjuncture whose particular structure is dominated by the *ideological instance*, whereas a 19th century western city will express a logic dominated by the *economic instance*. It therefore is possible to carry out, a bit like Lefebvre, an archaeological investigation of different urban types, although this analysis must be 'conjunctural' (as opposed to 'economistic'). Castells' concern, however, is not historical as much as it is political or revolutionary. In *The Urban Question,* he therefore is less interested in comparing different historical social formations than

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with exploring the domination taking place in the 20th century city and its expression in forms of urban coexistence and consumption[24].

This is a city that, elsewhere, he refers to as 'monopoly city' (or *Monopolville';* cf. Castells and Godard 1974); a term which makes apparent the link that Castells sees between the 20th century city and so-called 'State monopoly capitalism'. The notion of State monopoly capitalism hypothesises the merging of the interests of the State with those of 'Big Capital'. It is thought to find its concrete expression in situations where the State takes on the responsibilities of social reproduction by providing health care, free schools, public housing schemes and benefits systems - services which otherwise would have to be purchased by the labour force with their salary - thus ensuring the availability of the industrial reserve army whilst socialising the cost of it, all to the benefit of Big Capital[25].

This form of social reproduction constitutes what Castells refers to as 'collective consumption' (Castells, 1977: 460); a term that is crucial to his analysis. The Monopoly State thus is thought to produce schemes of collective consumption in order to sustain itself and its specific structural conjuncture, something which makes the comprehension of these forms of consumption significant to the comprehension of the historical conjuncture. This logic applies to the State in general but also to urban space insofar as various forms of collective consumption – such as those associated with health, education and housing – occur there. 'The state apparatus', he writes, thus

> intervenes in a massive, systematic, permanent and structurally necessary way in the process of consumption, and in different forms: a) Direct aid, to the capitalist monopolies, in order to facilitate their takeover of certain sectors (example: a tax system that favours the distribution chains against the small tradesmen). b) *'Filling in the gaps' left by big capital in certain sectors of consumption. Thus we*

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[24] A historical account of urban social movements (but not of 'space' as such) is however found in *The city and its grassroots (*Castells, 1983).

[25] Boccara's *Études sur le capitalisme monopoliste d'État, sa crise et son issue* (Boccara, 1973), remains the paradigmatic text on this matter. See Theret and Wievorka (1978) and Fairley (1980) for instructive critiques.

shall witness a takeover by the state of vast sectors of the production of means essential to the reproduction of labour power: health, education, housing, collective amenities, etc. It is here that the 'urban problematic' sends down its roots. c) Since the state is taking charge of a considerable, and objectively socialized, part of the process of consumption, since it intervenes in direct aid to the large economic groups that dominate that process, since consumption is becoming a central cog in the economic, political and ideological levels, whereas no centralised regulation of the process is being set up in the economic, *the state becomes the veritable arranger of the processes of consumption as a whole: this is the root of so-called 'urban politics'* (Castells, 1977: 459; emphasis added).

It is Castells argument that specific instances of collective consumption can be mapped onto the material city. There thus is, according to Castells, a correspondence of *units of consumption* and actual *spatial units* and so the morphology of the city may be said to be informed by strategies of consumption as these pertain to different classes and different sets of goods distributed in urban space. (It is, as Castells writes, 'here that the urban problematic sets down its roots').

The Monopoly city is thought to express its 'specificity' - i.e. that which makes it specific within the historical ensemble - through its capacity to reproduce various aspects of the working class. 'An urban unit', Castells writes, thus 'possesses a certain specificity in terms of residence, in terms of 'everydayness'. It is, in short, the everyday space of a delimited fraction of the labour force' (Castells, 1977: 445). Different 'urban units' - these may be parks or schools or other facilities that reproduce social relations - therefore will be distributed in urban space in accordance with a principle that reflects the structural logic of the Monopoly state. It is for this reason that Castells can state that the urban units 'seem to be to the process of reproduction what the companies are to the production process' (Castells 1977: 236–7).

In the discussion of urban units, the Lefebvrian notion of 'everydayness' thus returns but in a different form. In Castells' Monopoly city everydayness is not defined as a psychological or existential phenomenon – one where ennui can estrange the urban inhabitant from his or her own nature - but as a hegemonic expression of State power which is informed by a logic of social reproduction (or

collective consumption). This rephrasing of the problem of everydayness also means that urban social existence, *qua* expression of collective consumption, becomes a political cause around which the various classes inhabiting the city may mobilise thus forming so-called 'urban social movements'.

An urban social movement is a political fraction involved in a struggle related to collective consumption in general and the geographical distribution of urban units in particular. As in Poulantzas, such movements may include alliances between classes that occupy different (and sometimes contradictory) class positions but which nevertheless may unite around a common cause. Society, Castells writes, in effect is 'but a more or less contradictory articulation of interests and therefore of social agents, which never present themselves simply as themselves but always, at the same time, in relation to something else' (Castells, 1977: 110-11).

A unit of consumption is therefore not just a unit of domination. It also is a unit around which nascent forms of political resistance may be engendered. Whether an urban social movement is formed around the exigency of having a school refurbished or a hospital constructed close-by, otherwise entrenched class differences may momentarily disappear or be alleviated and the outline of a revolutionary subject be formed[26]. Understood as such, the material city becomes a laboratory for revolutionary action. This is the other side – the revolutionary side - of the urban question.

Castells divides urban social movements into two ideal types. Those for whom resistance takes on a reformist type of opposition (an expression of what Castells calls, with some disdain, the 'petty-bourgeois revolt'; Castells, 1977: 464). And those for whom opposition takes on a revolutionary expression ('acting as a challenge to class power'; Castells, 1977: 464). The former, according to Castells, 'mak[es] claims and modif[ies] the relations of distribution and administration without changing the relations of production' (Castells, 1977: 464).

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[26] This is a phenomenon that Castells is later to explore in his 1983, *The city and its grassroots.*

Urban social movements of this kind are thus 'releas[ed] from their historical interests' and therefore 'do not directly challenge the relations of production or political domination' (Castells, 1977: 464). The latter, on the other hand is characterised by its inherently revolutionary intent. As such, it 'aim[s] at the destruction of the bourgeois state apparatus and the creation of political conditions that will allow the beginning of a transition to socialism' (Castells, 1977: 464).

Like Poulantzas before him, Castells acknowledges the relative good that may come from the actions of reformist social movements. Modest socio-economic advances can in fact be made through reform. However, the reach of such reformist advances always must be limited insofar as they fail to challenge the underlying roots of the problem, that is: the hegemonic relations of production as these structure society and are reproduced spatially. Paradoxically, reform therefore comes to constitute a counterrevolutionary activity which - instead of challenging and overthrowing the hegemonic structures - merely modulates them, thereby deferring the 'transition to socialism'.

According to Castells, only a revolutionary subject - led by the proletariat and intent on overthrowing the Monopoly State - can identify and change the underlying problems of the city and its inhabitants. The issue is therefore to ensure that the dissatisfaction emanating from a particular urban struggle is translated into a revolutionary rather than a reformist social movement. As he argues: 'The key of the problem is to unite the broader masses around an anti-monopoly political programme, that is to say, to construct the historical bloc of the dominated classes under the hegemony of the proletariat' (Castells, 1977: 464). As a book, *The Urban Question* in effect is conceived to facilitate the construction of this revolutionary bloc.

It is difficult not to notice the overlaps between Castells' account and that of Lefebvre. At its heart, the urban question, as both Castells and Lefebvre frame it, is a question of understanding the role of the city in either fomenting or

preventing revolution and then of bringing this process as quickly as possible to its revolutionary climax. There are of course also differences - mainly to do with Castells' rejection of Lefebvre's supposed spatial fetishism (i.e. the fact that he ascribes some sociogenetic agency to space) - but perhaps these are not quite as stark as Castells makes them out to be. After all, the spatial efficacy that Lefebvre theorises is itself the product of a prior socio-economic principle and so so the accusation of fetichism is no clear cut case.

What is clear is that urban space is informed, for Castells, by the metastable structure of the historical conjuncture. The city and its spatial structure therefore must be seen as a representation of a complex, shifting social 'before' and therefore as a subject of political contention. The comprehension of the role of spatialised consumption is crucial to understanding the nature of this essentially political problem at least as far as the so-called Monopoly city is concerned. Indeed, only by understanding the relationship between consumption and space is revolution possible, and these three elements - consumption, space, revolution - thus go hand-in-hand in Castells' analysis of the Monopoly city.

1.2.3. Harvey: The productivity of urban space, or: urban space as a 'racket'

Harvey's theory of urban space centres on the *productive* aspect of space rather than its ability to reproduce the working class through *consumption*. This does not mean that consumption does not feature in his analysis (it does). But it does not constitute the most central aspect of his enquiry. In Harvey's definition, the productive aspect of urban space relates to its capacity to either realise value *directly* (through the imposition of rents), or facilitate its realisation *indirectly* by reducing turnover time either in production (i.e. reducing the time needed to get raw materials to the locale of production), or exchange (i.e. reducing the time needed to get the finished commodity to the relevant market). Urban space therefore is not just something that represents or reproduces a social structure through patterns of consumption (although it also is that). It is in fact an integral part of the creation and realisation of surplus value; 'an 'active moment' within the

overall temporal dynamic of accumulation and social reproduction' (Harvey, 1982: 374).

There is a difference of focus between Castells and Harvey, but also of theoretical grounding. Where Castells incorporates the theoretical frameworks of Poulantzas and Althusser, Harvey elaborates his theoretical position through a close reading of Marx' *Capital*. In some respects, Harvey is perhaps the Marxist geographer that bases his system the most closely on Marx (although this might be contested by Lefebvre scholars). However, his research constitutes more than just a rehash of Marx' theories. In his analysis of the role of urban space, Harvey thus tries to move beyond what he perceives as Marx' one-eyed focus on temporality; teasing out from within Marxism a spatial aspect of historical development and dialectical contradiction.

For Harvey, the development of the Capitalist city is informed by the mode of production that it develops within. As we have seen, this largely corroborates what Castells and Lefebvre have argued before him. However Harvey specifies that the spatial order of a particular city will depend on how the mode of production informs and cascades through a series of instances (instances of production as well as reproduction), each of which imparts to the process of urban formation its own dialectical logic. (In this regard, Harvey is closer to Castells in his conceptualisation of the urban problem than to Lefebvre).

There are, according to Harvey, certain immutable principles of urban morphogenesis or formation which, ultimately, refer back to the mode of production. But these always must be contextualised within a wider framework of socio-economic structure particular to the specific urban culture. '[T]he processes', Harvey writes, therefore 'are general but […] the manifestations are particular because the institutional, geographical, cultural and historical situations vary a great deal from place to place. In other words, the processes are general, but the circumstances are unique to each case and so, consequently, are the results' (Harvey, 1974: 250).

Perhaps for this reason Harvey tends to favour analyses of major urban transformations. Such transformations constitute moments where the urban system readjusts itself to the economic contradictions that have cropped up within it thereby causing a radical morphological reorganisation of urban space to suddenly occur. In this way, contradictory developments in the economy may spill over and lead to a reconfiguration of the city. As examples of this phenomenon he points to the radical transformations of 1860s Paris (presided over by Baron von Haussman), or the morphological transformations New York (overseen by Robert Moses), both of which were driven by a sudden influx of money which had been 'overaccumulated' in the economic sphere (Harvey, 2008).

Major urban transformations thus constitute resolutions to contradictions (or problems) arising within the economic realm. At the same time, however, they also generate a whole new series of problems, spatial and social, which in turn may be resolved in either a peaceful or catastrophic manner. Such problems will concern the way particular spatial configurations facilitate or hinder the production and circulation of value in space and thereby the functionality of the capitalist system. But they also will affect the distribution of wealth between individual actors, potentially exacerbating already entrenched structures of economic inequality. Space thus becomes an important factor in the historical and economic development of societies as well and in the welfare of the individual agent. This explains why, for Harvey, a true Marxist analysis must be geographical as well as temporal.

'Rent' plays an important if complex role in this process. Strategically advantageous locations are rented out at a premium, something which in a sense levels the playing field in production (those in more well-connected locations pay a higher rent and *vice versa*) . At the same time rent represents another way for the dominant classes to exploit the proletariat, selling them access to a resource that they control. This has important consequences for production as well as

habitation. I shall deal with the latter aspect - which is relatively speaking 'simpler' to explain - first, before subsequently returning to the former.

In discussing the issue of rent and habitation, Harvey explores the transition - already suggested by Lefebvre - from a mode of production where surplus value is predominantly extracted from industrial production, to one where it also is extracted from landownership through rent (what Lefebvre calls 'the second circuit of capital'). This is a transition that affects not only the nature of domination but also the roles of the exploited and the exploiter, thus 'blurring' the distinction between capitalist and landlord and that between ground rent and capital[27].

As exploitation becomes part of habitation, the working class therefore is exploited on two levels: first at the place of production (i.e. the shop floor), then at the place of consumption (i.e. in their homes). If this affects the working class negatively, but simply, it benefits the rentier class in at least two ways: i) by providing them with another source of surplus value; and ii) by increasing the spectrum of strategic options available. The increasing viability of rent-seeking schemes makes it possible to extract and realise surplus value in multiple circuits, that is: in areas of production as well as consumption. This in turn makes it possible for the individual capitalist to spread his or her capital in several circuits and thus to hedge his or her bets. Writes Harvey:

> The distinction between a mere transfer payment— rent — and profit on productive capital investment is difficult to keep in mind. The individual investor does not particularly care about the distinction; the overall rate of return on financial outlays is what matters. Money is put, therefore, where the rate of return is highest irrespective of whether productive activity is involved or not. If rates or return are high in the real estate and property markets, then investment will shift from the primary productive circuit of capital to this secondary circuit in a manner that would be consistent with Lefebvre's thesis. From the investor's point of view there is nothing to prevent such a shift. What has to be explained, however, is how returns can be higher on the secondary circuit over any length of time (Harvey, 1974: 240-41)

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[27] '[I]n an urbanized world', writes Harvey, 'the distinction between capitalist and landlord has blurred concomitantly with the blurring of the distinctions between land and capital and rent and profit' (Harvey, 1974: 241).

One way to maintain artificially high returns in the secondary circuit of capital - in any circuit of capital - is if a group comes to dominate the market like a cartel. Harvey refers to this phenomenon - which also is discussed by Marx[28] - as a 'class-monopoly rent'. According to Harvey, 'The concept of 'class-monopoly rent' describes any situation in which the rate of return to a class of providers of an urban resource (such as housing) is set by the outcome of conflict with a class of consumers of that resource' (Harvey, 1974: 239). In other words, it constitutes a type of rent levied by a class who controls and manipulates certain sectors (or 'submarkets') of the rental market thereby disrupting the latter's inherent tendency towards price equilibration.

Rent, as Harvey points out, is a question of scarcity[29]. In this, the control of an architectural or infrastructural asset does not differentiate itself much from other assets. But unlike other forms of scarcity - e.g. the scarcity of raw materials or natural resources – the scarcity that pertains to the built environment can be artificially created. One way of achieving a higher rent is through the more or less coordinated withdrawal of units of habitation from the sphere of consumption. A rent-seeking capitalist may for instance let a centrally located rental property be run down before having it razed and (eventually) redeveloped. During the period where this property is not inhabited, the demand for rental homes will, all other things being equal, increase for the remaining urban system and so rents will

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[28] Marx, Cap I, cf. Harvey, 1974: 241-43.

[29] He writes: 'There is little 'natural wealth' that has not been prepared prior to production - the field has to be cleared and the mineshaft has to be dug. Relatively permanent improvements - such as the terracing of hillsides, the building up of soil fertility and the draining of marshlands, may with time come to be regarded as 'natural' resources for human use. In an urbanized world this problem becomes even more serious. Urbanization creates relatively permanent, man-made resource systems. Human effort is, as it were, incorporated into the land as fixed and immobile capital assets that may last hundreds of years. Consequently, the high rent for a piece of land in the centre of London may be due to its higher productivity, but that productivity has been created by the construction of the vast man-made resource system that is London. Because these relatively permanent fixed capital assets are highly localized in their distribution, the urbanization process has created scarcity where there was none before' (Harvey, 1974: 240).

tend to go up. This may impair earnings in the short run (although not for the class as a whole) but may open up the possibility for lucrative redevelopment in the longer run.

Two elements are required if a class-monopoly on urban space is to be actualised. Firstly, it is necessary that a landowning class collectively unites around the control and manipulation of the market, releasing and withdrawing units at moments when this is opportune for the class as a whole. However, if the scheme is to work in practice, it also is necessary that the individual class-monopolist be able (and ready) to forego the realisation of rent at strategically important moments. 'The key concept', writes Harvey, 'is class power. If landlords could not or would not behave in accordance with a well-defined class interest, then class-monopoly rents would not be realized. Landlords gain their class power in part from the fact that individually they can survive quite well without releasing all of the resource units under their command' (Harvey, 1974: 241)[30].

According to Harvey, 'class power' is predicated on the existence of two kinds of 'support': i) a legal framework that may stabilise the volatility of urban markets through zoning laws thereby making accurate predictions about market evolution possible; and ii) the existence of advantageous tax schemes for those with money to invest. 'The first support', he writes, 'permits speculator-developers to form reasonable expectations about the future, while the second ensures that only people with sufficient resources undertake the task of coordinating and stabilizing land-use change' (Harvey, 1974: 243).

Zoning laws play a particularly important role in this, making it possible to establish and differentiate between 'submarkets' where different rent and/or insurance fees may be imposed. In one study, Harvey thus shows how certain submarkets of the 1960s Baltimore housing market were charged extortionate rates for mortgages or home insurance simply because of the zone that they lived in (Harvey, 1974). This type of economic exploitation sometimes will reflect and

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[30] Cf. Harvey, 1982: 349-58.

further exacerbate other conflicts in society, for instance racial conflicts. This, for instance, was the case for the predominantly black residents of 1960s West Baltimore who, based in a particular zone, were driven into the hands of 'speculator-landlords' with whom they had to rent and insure their homes at inordinately high rates (this was referred to as 'the black tax' by the residents).

Harvey shows how this in fact was merely one of several submarkets - he counts thirteen in total - that were carved out of Baltimore's urban fabric by a type of zone-based exploitation rooted in a particular mix of state regulations and financial institutions. ('These institutions', Harvey writes, thus 'become a fundamental force in shaping the residential structure of the city'; Harvey, 1974: 249). Harvey claims that his study of Baltimore demonstrates empirically the hypothesis - put forward by Lefebvre - that a new, rent-based mode of production, or rather exploitation, is manifesting itself in 20th century Western cities.

This mode of production not only creates new opportunities for class exploitation. It also makes the city amenable to the whims of capital speculation, with sudden splurges (as well as sudden moments of capital evacuation) becoming a transformative force involved in the restructuring of urban space. '[W]e find', Harvey writes, 'that the geographic structure of the city is continuously being transformed by conflicts and struggles generated by the ebb and flow of market forces, the operations of speculators, landlords and developers, the changing policies of governmental and financial institutions, changing tastes, and the like' (Harvey, 1974: 249).

The logic of these forces - the ebb and flow of the market - and the way they influence the evolution of urban space is the subject of *Limits to Capital;* Harvey's *magnum opus.* With this book, Harvey takes a step from an empirically driven investigation of rent and urban space to the construction of an elaborate theoretical system in the style of *Capital.* Shifting the focus from individual rent (and thus *consumption*) to the role of rent in processes of *production* and

distribution, the book arguably offers the most complete view of what Harvey thinks is Capital's progressive invasion and restructuring of urban space.

Harvey proceeds from a highly abstract proposition - concerning the internal contradiction in commodity value - to the increasingly specified expressions of this principle, including its manifestations in spatial configurations. This manner of advancing, he claims, is consistent with the method used by Marx in *Capital;* something which emphasises the close link between these two texts*.* The value of commodities in the capitalist mode of production is, according to both Marx and Harvey, a phenomenon which involves a fundamental contradiction. As 'goods' become 'commodities' (i.e. objects of trade), the nature of their value is thought to undergo a transformation which - sustaining an internal split - becomes identifiable both as 'use value' and 'exchange value'.

According to Marx, these two kinds of value constitute two very different concepts. The former relates to the materiality of the particular good and includes in its definition the work that has gone into its production and the network of people involved in this. It therefore constitutes a *concrete* understanding of value as well as of the production process. The latter on the other hand represents value as an *abstract* phenomenon; one that is related to other things for which it may be exchanged rather than to the immediate use it might have or the work that has gone into producing it. As such, it designates a relationship between 'things' rather than 'people' thereby expressing the hallmark of what Marxists call 'fetishism'[31].

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[31] Marx writes the following regarding fetishism: 'As against this, the commodity-form, and the value-relation of the products of labour within which it appears, have absolutely no connection with the physical nature of the commodity and the material relations arising out of this. It is nothing but the definite social relation between men themselves which assumes here, for them, the fantastic form of a relation between things. In order, therefore, to find an analogy we must take flight into the misty realm of religion. There the products of the human brain appear as autonomous figures endowed with a life of their own, which enter into relations both with each other and with the human race. So it is in the world of commodities with the products of men's hands. I *call this the fetishism which attaches itself to the products of labour as soon as they are produced as*

Marx sees the two forms of value as fundamentally irreconcilable. Insofar as they are contained within the same thing (the commodity) their contradictory relationship comes to constitute an inner dialectic operating *within* - and radiating *outwards from* - this commodity. A series of dialectical transformations then occur. The contradiction of the notion of commodity value calls out for a reconciliation which in this case arrives in the form of money. The creation of money in turn makes possible i) the inception and solidification of a capitalist market (where different forms of accumulated value can be easily exchanged); and ii) the grounding of a capitalist mode of production (which relies on the availability of a disenfranchised labour force that does not own the means of production and therefore rely on the capitalist classes for work). As Harvey writes:

> Marx opens Capital with the idea that the material commodity is simultaneously a use value and an exchange value, and that the two forms of value necessarily oppose each other This opposition (which is internal to the commodity) achieves its external expression in the separation between commodities in general (use values) and money (the pure representation of exchange value). But money then internalizes contradictory functions within itself which can in turn be resolved only if money circulates in a certain way, as capital. And so the argument proceeds to encompass the class antagonism between capital and labour, the contradictory dynamics of technological change, and ultimately evolves into an elaborate and lengthy disquisition upon those seemingly irreconcilable contradictions that lead capitalism into the cataclysms of crises (Harvey, 1982: xvi).

Harvey follows Marx in progressing from the simple but inherently contradictory phenomenon of commodity value to the increasingly elaborate manifestations that it takes on as it cascades through the social system, eventually building up so many contradictions that the onset of a crisis becomes inevitable. (The theory of value, in this sense, is a theory of crisis; for Marx as for Harvey). But he also pushes the notion further than Marx, incorporating into value's expanding dialectical logic sectors of capitalist society - the housing market, infrastructure investments - which Marx only treats parenthetically.

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commodities, and is therefore inseparable from the production of commodities' (Marx, Cap I: 165; emphasis added).

Central to the understanding of the creation of crises is what Marx calls 'the law of the Tendency of the Rate of Profit to Fall' (commonly abbreviated as 'TRPF'; Cf. Marx, *Cap.* III, 13 & 14). According to Marx, TRPF shows how the individual capitalist's drive to increase productivity will lead him or her to invest a growing ratio of the surplus value extracted from the production process into so-called '*constant capital*' (i.e. raw materials, machinery, plants[32]). This occurs at the expense of what Marx calls '*variable capital*' (essentially: labour power), and so wages fall with respect to total capital expenditure.

This form of behaviour will be rational for the individual capitalist insofar as investments in constant capital are likely to enhance productivity. New machines for instance will allow the labour force to produce more commodity units per unit of capital and new means of transport may speed up turnover time, increasing from the market-end the number of units shifted per unit of capital. But whilst the machinisation of the production process might be rational and advantageous to the individual capitalist it is, according to Marx, detrimental to the dominant classes as a whole. In order to understand why that is, one first must understand the source of value as Marxism understands it.

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[32] As Harvey points out, 'constant capital' is distinguished from 'fixed capital' insofar as fixed capital 'cannot be defined independently of the use to which material objects are put' (Harvey, 1982: 205). Unlike constant capital, fixed capital therefore designates a relational value. In distinguishing between 'constant capital-variable capital' and 'fixed capital-circulating capital', Marx was stipulating two different perspectives. More specifically, he was providing the vocabulary to understand two different aspects of capital. Harvey elaborates: 'The categories of constant and variable capital reflect the class relation between capital and labour within 'the hidden abode of production'. They thereby help us to understand the production of surplus value, the origin of profit and the nature of exploitation; they allow us to see 'not only how capital produces, but how capital is produced' (Capital, vol. 1, p. 176). But the movement or motion of capital through production also encounters certain barriers which can check and on occasion disrupt the overall circulation of capital. The fixed-circulating dichotomy is designed to help us understand these problems (Harvey, 1982: 207-08).

For Marx, value only is produced by labour. Land, for instance, only is valuable to the extent that it has been worked on by workers; materials, only to the extent that they have been excavated from the natural environment and transformed into goods, *etcetera*. This means that the reconfiguration of the composition of capital in favour of constant capital inevitably will have the effect of diminishing the profit rate unless other countervailing factors interfere[33]. What is more, the intensive investment in certain kinds of technologies - what Harvey calls a 'technological mix' - means that a significant amount of capital becomes 'locked' in a specific mix thus preventing its circulation into other assets. Writes Harvey:

> What Marx in effect shows us is that individual capitalists - coerced by competition, trapped by the necessities of class struggle and responding to the hidden dictates of the law of value - make technological adjustments which drive the economy as a whole away from 'a 'sound'', 'normal' development of the process of capitalist production' (Capital, vol. 3, p. 255). Put another way, individual capitalists, acting in their own self-interest under the social relations of capitalist production and exchange, generate a technological mix that threatens further accumulation, destroys the potentiality for balanced growth and puts the reproduction of the capitalist class as a whole in jeopardy. Individual capitalists, in short, necessarily act in such a way as to de-stabilize capitalism (Harvey, 1982: 188).

Marx regarded the TRPF as central to his overall system, describing it as 'the most important law of modern political economy' (Marx, Gr: 748). According to him, it provided the theoretical proof of the inherently contradictory nature of the capitalist mode of production and a key to understanding the inevitability with which it must produce crises. Harvey endorses this view to a certain extent but also finds it to be insufficient in itself. More specifically, he argues that Marx overlooks the importance of the credit system and the real estate market as means to defer, if not diffuse, such crises.

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[33] According to Marx, such countervailing factors could be constituted by i) a more intense exploitation of the labour force; the reduction of wages; the reduction in the cost of constant capital; the expansion of the so-called reserve army of labour; the introduction and capitalisation of foreign trade; the introduction of the use of so-called 'share capital'. Cf Marx, Cap III, 339; and Harvey, 1982: 176-190).

Capitalism is not forced to invest in constant capital in the same industry. It also may direct funds into other companies or industries or into land. According to Harvey, this means that Marx' analysis of the TRPF, whilst important, is insufficient in itself and that other aspects of capital investment (and the internal dynamics of these as well as the knock-on effects that they create) must be analysed and so in this sense *Limits to Capital* is not just a search for the limits of the capitalist mode of production; it also is a search for the limits of Marx' analysis of it.

The central notion in Harvey's critique of *Capital* is that of 'overaccumulation'. But what is overaccumulation, and how does it differentiate itself as a concept from the simple accumulation of surplus value by way of exploitation? In order to understand this, one must return to the TRPF and the example of the rationally behaving capitalist. With the profit rate falling, it becomes increasingly difficult for the capitalist to reinvest accumulated surplus value in a meaningful way. Investment in more labour-power does not manifest itself in increased productivity whereas the investment in fixed capital may lead to increased productivity in the short run but also to the retardation of capital in a particular technological mix. Failure to reinvest on the other hand leads to the overaccumulation of capital - for instance in an inflated inventory of goods, fixed capital (unused machines, plants), or variable capital (idle workers) - and so on the whole, TRPF will tend to produce overaccumulation. Quoting Marx, Harvey (1982: 190) writes that

> The tendency of the profit rate to fall 'breeds overproduction, speculation, crises and surplus capital alongside surplus population.' Furthermore, it reveals 'that capitalist production meets in the development of the productive forces a barrier which has nothing to do with the production of wealth as such; and this peculiar barrier testifies to the limitations and merely historical transitory character of the capitalist mode of production ... (Marx; quoted in Harvey, 1982: 190).

Overaccumulated capital is capital that cannot be immediately realised. It is capital congealed in a commodity which does not have an immediate taker, a tool that does not have a use or an employee that does not have a job to do. According to Harvey, such retardation undermines the value of capital - devalues

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it as it were - insofar as the latter is predicated on its ability to circulate as quickly as possible between production and consumption. Circulation here is key. Capital, according to Harvey, is 'value in motion' (Harvey, 1982: 194), and any capital that 'slows down' necessarily must undergo a devaluation, all other things being equal.

> Since capital is value in motion, value can remain value only by keeping in motion. […] An inventory of commodities not yet being used or not yet sold, a reserve of money, etc., can all be lumped together under the heading of 'devalued capital' because the value is not in motion. This necessary devaluation, inherent in the circulation of capital itself, is automatically suspended once value resumes its motion by undergoing the 'metamorphosis' of moving from one state to another' (Harvey, 1982: 194).

A devaluating product is that product which seeks out some kind of realisation of its value through a strategy of price-reduction. One may therefore think of *devaluation* as a means whereby production may come into touch with demand. In this sense, a crisis - where the value of an entire market suddenly collapses - is a logical consequence of overaccumulated capital; its sudden eruption the manifestation of a realignment of the market through devaluation. To a certain extent, crises can be thought of as cathartic for the system as a whole, bringing it into alignment with itself. But it is a tough cure - and a temporary cure at that - for a problem that is systemically generated as a biproduct of a particular mode of production.

Letting the crisis erupt, however, is not the only resolution to the problem of overaccumulation. Overaccumulation also may be momentarily overcome by shifting accumulated surplus value into other 'circuits' of capital. This may for instance be done by i) providing credit monies to other capitalists from which an interest may be extracted instead of reinvesting in one's own constant capital ('Sufficient power', Harvey writes, 'resides within the credit system to counteract the tendency towards disequilibrium in production'; Harvey, 1982: 325); or ii) by acquiring plots of land on which a land rent may be levied or a competitive advantage exploited.

According to Harvey, such crisis-management strategies creates two new horizons against which the crisis can exhaust itself. A *temporal horizon* (the credit market) where different production processes - each involving it own turnover time - are brought together and synchronised by the credit system. And a *geographical horizon* (the real estate market) where investments in the built environment are explored and exploited; as well providing an outlet for accumulated surplus value. For Harvey, the existence of the temporal and spatial horizons demonstrates the need for a more complex theory of crisis than the one found in Marx. There therefore must be what he terms as 'three cuts' at the theory of the crisis.

A first cut at the theory of the crisis deals with the collapse of industrial production as a function of overproduction/lack of demand. This in effect corresponds to Marx's analysis of the TRPF and therefore does not constitute a transgression of the limits of Capital in itself. *A second cut* at a theory of the crisis incorporates the financial circuit and thus the creation and distribution of credit monies along a temporal gradient. *Lastly, a third cut* at the theory of the crisis integrates the spatial expression of the crisis as this manifests itself in artificially created urban and regional landscapes.

According to Harvey, the creation of the credit system makes it possible to shift capital between sectors of the economy in a swift and relatively cost-free way. This is conjectured to diminish the detrimental effects of the actions of the individual capitalist by making possible the coordination of the activities of the capitalist class as a whole. The credit system is argued to coordinate flows of capital by way of price signalling processes (thereby making the credit system, in Harvey's words, a kind of 'central nervous system for coordinating the divergent activities of individual capitalists', Harvey, 1982: 270). As such,

> the credit system brings capital together as the common capital of the class, with the potentiality to counteract those errant behaviours of individual capitalists that are a primary source of disequilibrium in production. To this we can then add all of those vital powers that permit the co-ordination of production with realization and consumption and distribution. Sufficient power apparently resides within the

credit system to counteract the tendency towards disequilibrium in production. This power cannot be applied directly but must be transmitted via price and other signals in the sphere of exchange (Harvey, 1982: 325).

The credit system in a certain sense *resolves* the crisis in production. However in resolving the production crisis it *engenders* its own kind of crisis. This crisis manifests itself in speculative bouts where the chasing of future rents drives the market into a frenzy. When this occurs, the valuation of rents falls out of line with the actual value of the commodities that they are supposed to represent, and so the credit system creates its own form of misalignment (or 'bubble') between the exchange value of a certain commodity and its real value. These two forms of crisis (that of the production, and that of speculation) are qualitatively different. However according to Harvey, they nevertheless collude in the formation of real economic crises, as the onset of a crisis in one circuit easily spills over into the other. Writes Harvey:

> [T]he 'second-cut' theory of crises must always allow for relatively autonomous speculative booms in fixed capital and consumption fund formation, in land sales, in commodity prices and commodity futures (including those of money commodities like gold and silver) and in paper assets of all kinds. Such speculative fevers are not necessarily to be interpreted as direct manifestations of disequilibrium in production: they can and do occur on their own account. But Marx demonstrates that they are surface froth upon much deeper currents making for disequilibrium. He also shows us that overaccumulation creates conditions ripe for such speculative fevers so that a concatenation of the latter almost invariably signals the existence of the former. The difficulty here is to disentangle the pure surface froth of perpetual speculation from the deeper rhythms of crisis formation in production (Harvey, 1982: 325).

As the speculative froth of the credit system adds itself to the deeper currents of the production crisis, the inevitable collapse of the financial market edges ever closer; something which, according to Harvey, leads to a second transformation of the crisis. This transformation is predicated on a shift along the spatial rather than the temporal axis. More particularly, it involves the strategic acquisition and production of spatial locations in the form of: i) private investments in land and housing stock; and ii) grand-scale infrastructure investments typically implemented by the state both as an investment for the future and as a means of Keynesian crisis management.

It is a crucial point for Harvey that the two levels of spatial integration - that of the state and that of the capitalists - whilst fundamentally different, are symbiotically related. The value of a plot, he argues, will therefore depend on its location in a network of spatial relations (a spatial configuration) which, in addition to other plots of land in its vicinity, involves the '*physical infrastructure*' (transport, communication, etc.) that connects these and the '*social infrastructure*' that services them (i.e. schools, parks, hospitals, etc). The geographic integration of capital therefore is a problem of spatial configuration but one that unfolds through the simultaneous, if qualitatively different, efforts of individual capitalists and the state.

The value of these investments is measured with respect to their capacity for increasing the circulation of capital (in all its guises). From the perspective of the individual capitalist, a favourable location will be a location that enables him or her to reduce turnover time either at the production-end or the market-end of his/her business. However, in order to achieve this benefit, the capitalist will need to freeze a portion of his/her total capital in either land or building stock. One must, writes Harvey, 'make a certain portion of capital immobile in order to give the remainder freedom to move' (Harvey, 1982: 420). (It is worth recalling, here, that 'real estate' is referred to, in French, as 'l'immobilier', calling attention to the fact that it represents an immobile asset). The price to be paid to acquire a high speed of circulation is therefore - paradoxically - that of taking out of circulation a quantum of one's capital.

A similar paradox faces the circulation-maximising (and crisis-circumventing) state. Society as a whole must thus freeze a quantum of what is known as its 'total social capital'[34] in order to enable the circulation of the remainder (including the circulation of the labour force via public infrastructure). As Harvey writes: 'The

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[34] The political scientist, Geoff Pilling, defines total social capital as consisting 'of the contradictory ensemble of all individual capitals in their dynamic interrelations' (Piling, 1980, chap 3).

general principle at work is this: both capital and labour can become more geographically mobile at the price of freezing a portion of the total social capital in place' (Harvey, 1982: 395).

The freezing of capital in space is, in turn, thought to create the preconditions for the spatial manifestation of the crisis. According to Harvey, capital invested in the built environment is highly sensitive to changes in the overall spatial structure - e.g. in the availability of infrastructure - something which may significantly transform the value of a particular lot of land. This bears an important resemblance with the logic of the crisis in the sphere of production. The same contradiction that faced the capitalist class with respect to reinvestment in fixed capital in fact faces the rent-seeking bourgeoisie and the state with respect to reinvestments in space. Writes Harvey:

> [W]e see that capitalism seeks to overcome spatial barriers through the creation of physical infrastructures that are immobile in space and highly vulnerable to place-specific devaluation. Roads, railways, canals, airports, etc., cannot be moved without the value embodied in them being lost. Value has to be immobilized in the land to an increasing degree, therefore, in order to achieve spatial integration and to eliminate spatial barriers to the circulation of capital. At some point or other, the value embodied in the produced space of the transport system becomes the barrier to be overcome. The preservation of particular values within the transport network means constraints to the further expansion of value in general. Strong devaluations and re-structurings within the transport system, with all that this implies for the shaping of spatial configurations and levels of spatial integration, then become inevitable. This is the central contradiction which modifies and circumscribes the mobility of capital in commodity form (Harvey, 1982: 379-80).

The investment (and immobilisation) of capital in the built environment therefore may offer a temporary resolution to the crises in the first and secondary circuit of capital. But in reality it merely delays the onset of a bigger crisis; one that has been given more time to aggravate the misalignment between capital and market. This is the root of what might be termed the 'urban manifestation of the crisis'. Elsewhere, Harvey discusses the historical redevelopment of Paris as an example of such an urban crisis. He shows how the massive investment into the reconfiguration of Paris in the 1850s were a means for putting to use (and thereby mobilise) overaccumulated capital.

This profoundly changed the structure of the city, bringing prosperity (and new cultural proclivities) in the short run. The Paris of the department stores (les grands magasin), and of the cafés were a pleasant bi-product of this process. However a more catastrophic bi-product also is produced in the dialectical contradictions emerging between economy and space. A spatial manifestation of the crisis. Insofar as the underlying economic problems were not resolved, the investments into spatial structures was a strategy which allowed the crisis to grow bigger and infiltrate more sections of the human lifeworld before finally erupting. In the wake of this eruption, many destructive forces were unleashed, including forces that would lead to social upheaval and even war. As Harvey writes:

> [The French State took on a] vast programme of infrastructural investment both at home and abroad. In the latter case, this meant the construction of railroads throughout Europe and into the Orient, as well as support for grand works such as the Suez Canal. At home, it meant consolidating the railway network, building ports and harbours, and draining marshes. Above all, it entailed the reconfiguration of the urban infrastructure of Paris. Bonaparte brought in Georges-Eugène Haussmann to take charge of the city's public works in 1853 [...] The system worked very well for some fifteen years, and it involved not only a transformation of urban infrastructures but also the construction of a new way of life and urban persona. Paris became 'the city of light', the great centre of consumption, tourism and pleasure; the cafés, department stores, fashion industry and grand expositions all changed urban living so that it could absorb vast surpluses through consumerism. But then the overextended and speculative financial system and credit structures crashed in 1868. Haussmann was dismissed; Napoleon III in desperation went to war against Bismarck's Germany and lost. In the ensuing vacuum arose the Paris Commune, one of the greatest revolutionary episodes in capitalist urban history, wrought in part out of a nostalgia for the world that Haussmann had destroyed and the desire to take back the city on the part of those dispossessed by his works (Harvey, 2008: 25 & 26).

As this paragraph shows, the impact of the expanding economic crisis is real even if Capitalism's ability to actually abort the crisis is rather inexistent. The sheer force of the impact of the expanding crisis owes to the multiplier effect that plays out between its different 'cuts'. As overaccumulated capital circulates through its many circuits, Capitalism fails to fix the underlying cause of its problem. What it does manage to do, however, is export its own inherent

contradiction to other areas of human social existence, thereby wreaking havoc on multiple levels and multiple agents.

This in a sense is the true significance of the notion of the 'expansion of value'. It is a contradiction arising within the system of production which fails to resolve itself but which succeeds in generating spill-over effects in the financial system and in the investment in structures in urban space. As such, it constitutes a dialectical problem in the true sense of the word, that is: a problem which expands from an inherent contradiction that, by negating itself, constitutes new contradiction, new problems, each of which simultaneously embodies, perverts and perpetuates the initial impulse.

Capital thus transforms the *structure* of the city to the advantage of some and the disadvantage of others. However according to Harvey, it also imparts to urban space a certain *frequency*. The arbitrary manner whereby capital flows into and out of the city thus creates a 'pulsating rhythm' within the urban artefact (Harvey, 1982: 410), sometimes propelling it towards the creation of new spatial structures and configurations, other times towards their sudden collapse. The logic of this rhythm is imbued with the logic of class relations and class exploitation. The ruling class therefore is said to build 'a physical landscape appropriate to its own condition at a particular moment in time, only to have to destroy it, usually in the course of a crisis, at a subsequent point in time. The temporal and geographical ebb and flow of investment in the built environment can be understood only in terms of such a process' (Harvey quoted in Merrifield, 2002: 142).

Harvey's inherently economical theory of urban space thus demonstrates how the ever-expanding crisis engenders, mobilises and integrates new spheres of existence – including urban space - as an important aspect of its own (attempted) resolution. Yet the Capitalist crisis is never actually resolved, always only postponed. The contradictions that lie at its root merely are reified, projected outward towards ever more elaborate catastrophes, and thus towards an ever more complete reorganisation of the human life-world.

1.3. The tropes involved in the Marxist image of the city

Having discussed the different theories involved in the Marxist image of the city, it now is possible to proceed with a more general analysis of it. While I will argue that such an analysis is possible, it is however important to note that the theories by no means must be taken to be isomorphic. As the preceding sections show, important differences in fact exist between the three theoreticians and their respective theorisation of the urban question. A simple conflation of the theoretical positions therefore must be avoided.

For one, the theoreticians focus on different *subject matters.* Lefebvre thus analyses different historical periods (largely concomitant with the historical periods analysed by Marx, i.e. the Ancient mode of production, the Feudal mode of production, the Industrial mode of production), whereas Harvey and Castells focus their investigations around the Capitalist and Monopoly capitalist city, respectively. Certain *theoretical differences* also pertain. Both Harvey and Castells for instance reject Lefebvre's assertion that the revolutionary subject of the 20th century must be the direct outcome of urbanisation, although the conviction with which they do so differs.

Castells robustly rejects the idea that urban ennui and alienation may be the sources of the revolution and not just an expression of class relations manifested in urban space[35]. Harvey, for his part, offers a more measured response. Yet he

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[35] Castells specifically rejects Lefebvre's utopian and humanist form of critical urbanism, arguing that in replacing spontaneous individual acts of spatial practice for class struggle, it becomes inadvertently counterrevolutionary. '[Lefebvre's] critique', he writes, 'is experienced as the problematic of alienation, as opposition on the part of urban spontaneity to the order of urbanism, as a struggle of the everyday against the state, independent of (or above) the class content and specific conjuncture of social relations. That 'everydayness', that is to say, social life, governed above all by the rhythms of the ideological, may be the expression of new forms of contradiction in social practice, there can be no doubt. But that it should be the source, rather than the expression, of complex class relations determined, in the last resort, by economic relations, is a reversal of the

nevertheless rejects as 'unrealistic' the idea that urban society (and the patterns of organisation that is thought to pertain to it) has somehow supplanted industrial society[36].

The fact that certain differences exist between the theories however does not mean that these are absolutely heterogeneous or contradictory. As I shall try and show in the next two sections of the thesis, the three geographers in fact share some important assumptions about the form and formation of urban space (urban morphology and morphogenesis), and about urban space's relation to society (urban sociogenesis and efficacy). It is insofar as they agree on these matters that it is appropriate to speak of an image of the city particular to Marxist geography even if the individual theoretical frameworks contain concepts that differ.

1.3.1. Urban form and formation in Marxist geography: the spectre of hylomorphism

Let us start by examining some of the claims brought forward by the three theoreticians regarding the nature and formation of urban space. A review shows a clear tendency to portray the form of the urban artefact as something that in an

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materialist problematic and sets out from 'men' rather than from their social and technological relations of production and domination' (Castells, 1977: 93).

[36] As he writes in the concluding chapter of *Social Justice and the City*: 'Almost everything that has been stated so far is reasonably consistent with Lefebvre's thesis. So wherein lie the differences? Lefebvre asserts that urbanism now dominates industrial society. He arrives at this position through construction by negation. The use of such a dialectical device provides a hypothesis. It does not constitute a proof. And I do not believe the hypothesis can at this point in history be substantiated. Urbanism possesses a separate structure—it can be conceived as a separate entity—with a dynamic of its own. But this dynamic is moderated through interaction and contradiction with other structures. To say that urbanism now dominates industrial society is to say that contradictions between urbanism as a structure in the process of transformation and the internal dynamic of the older industrial society are usually resolved in favour of the former. I do not believe this claim is realistic. In certain important and crucial respects industrial society and the structures which comprise it continue to dominate urbanism' (Lefebvre, 1973: 311).

important sense depends on the dialectical transformations occurring within historical societies. This, in a sense, is the hallmark of Marxist geography's dialectical urban materialism. It is true that each of the theoreticians conceive of this 'materialism' in their own way. Lefebvre by affirming a relation between mode of production and spatial form; Castells by conceiving cities as entities involving specific configurations of 'urban units' organised by a dominant structure; and Harvey by hypothesising that the form (and rhythm) of space be produced by a crisis originating in the economic realm. However, it also is clear that they all submit the form and formation of the city to historical processes radiating – in the final analysis - from the relations of production, thereby making urban space a manifestation of a prior social force.

It is revealing that Lefebvre defines space as a 'secretion' of society. 'The spatial practice of a society' he writes, '*secretes* that society's space; it propounds and presupposes it, in a dialectical interaction; it produces it slowly and surely as it masters and appropriates it' (Lefebvre: 1991: 33; emphasis added)[37]. Urban space is theorised as some kind of architectural husk that the social group concurrently sheds and inhabits through its spatial practices, as in some sort of socio-spatial symbiosis. It is true that this symbiosis is dialectical, and that space, to Lefebvre, is something more than just an empty (Kantian) container. Urban

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[37] Discussing Navarrenx, his home town, Lefebvre repeats this description: 'I know every stone of Navarrenx. In these stones I can read the centuries, rather as botanist can tell the age of a tree by the number of rings in its trunk. But for Navarrenx - as for many other places, villages and towns - a different analogy springs to mind: the image of the seashell. *A living creature has slowly secreted a structure*; take this living creature in isolation, separate it from the form it has given itself according to the laws of the species, and you are left with something soft, slimy and shapeless […] it is precisely this link, between the animal and its shell, that one must try to understand. It summarizes the immense life of an entire species, and the immense effort this life has made to stay alive and to maintain its own characteristics' (Lefebvre, 1995: 116; emphasis added). The notion of the shell is – it must be noted - complex, something which owes to the nature of Lefebvre's spatial dialectics. Spatial structures may be secreted from ideologically-rooted spatial practices (as such society may be said to be, in the final analysis, analytically anterior to space). Yet they are not mere empty containers, expressions of an a priori category. Rather they must be thought of as being in a dialectical relationship with social forces, a relationship that is mediated by spatial practices.

space is not something static, or inanimate. It moves, it is under formation. Yet the force that moves it and that bestows upon it its form is essentially social. Space is thought to represent the mode of production particular to a given society, with each transition of mode of production yielding a new urban type. '[E]ach epoch', Lefebvre writes, 'produces its own space' (Lefebvre, quoted in Katznelson, 1993: 96).

Such is the correspondence between mode of production and the form of the material urban artefact, that the ancient political city is described as actively 'excluding' from the urban structure aspects of commercial city-life (e.g. places for trade) found not to be directly compatible with the ancient mode of production[38]. Similarly, the commercial city is said to 'defend itself' against tendencies towards industrial reorganisation[39], again indicating that urban type or form must necessarily correspond to an underlying social principle that it actively

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[38] He writes: 'Those places given over to exchange and trade are initially strongly marked by the signs of heterotopy. Like the people who are responsible for and inhabit them, *these places are at the outset excluded from the political city: caravansaries, fairgrounds, suburbs.* This process of integrating markets and merchandise (people and things) in the city can last for centuries. Exchange and trade, which are essential to the survival of life, bring wealth and movement. *The political city resists this with all the power at its disposal, all its cohesiveness; it feels, knows, that it is threatened by markets, merchandise, and traders, by their form of ownership (money, a form of personal property, being movable by definition). There is ample evidence that Athens, a political city, coexisted with Piraeus, a commercial city, and that attempts to ban the presence of merchandise in the agora, a free space and political meeting place, were unsuccessful.* When Christ chased the merchants from the temple, the ban was similar, had the same meaning. In China and Japan, merchants were for years an urban underclass, relegated to a 'special' (heterotopic) part of the city. In truth, it is only in the European West, at the end of the Middle Ages, that merchandise, the market, and merchants were able to successfully penetrate the city' (Lefebvre, 2003: 9; emphasis added).

[39] Writes Lefebvre: 'Just as the political city resisted the conquest-half-pacific, half-violent-of the merchants, exchange, and money, similarly the political and mercantile city defended itself from being taken over by a nascent industry, industrial capital, and capital itself. But how did it do this? Through corporatism, by establishing relationships. Historical continuity and evolution mask the effects and ruptures associated with such transitions' (Lefebvre, 2003: 13).

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attempts to approximate and maintain. Inevitably, this gives Lefebvre's theory of urban space a functionalist ring, with space rejecting tendencies that do not comply with the evolution of the social whole and affirming and perpetuating those that do.

In Castells, the structure of the material city is conceived as a *'projection'* of the historical conjuncture. The city thus is argued to '*projec[t] on the terrain a whole society*, with its superstructures, its economic base and its social relations' (Castells, 1977: 92; emphasis added)[40]. Urban space is therefore a thing whose integrity and order is imposed from without; something which affirms the general concomitance between Castells' theory of urban form and that of Lefebvre. What Castells adds to Lefebvre's definition of urban structure is an awareness of the different instances involved in a particular historical conjuncture and, more importantly, of the complex structural logic that presides over their arrangement.

According to Castells, the analysis of urban form must be approached at two levels. First, the spatial analyst must identify the particular set of spatial units (economic, ideological, political) involved in the settlement. And secondly, he or she must identify the structural logic responsible for the ordering of these units in space. (It is according to Castells 'not enough to think in terms of urban structure; we must define the elements of the urban structure and their relations before analysing the composition and differentiation of the spatial forms'; Castells, 1977: 124). Castells therefore propounds an analysis

> whose central theme is the contradictory action of social agents (social classes), but whose foundation is the *structural web that creates the problematic of any*

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[40] Confusingly, Castells also asserts that space is not just a projection. 'To consider the city as the projection of society on space', he writes, 'is both an indispensable starting point and too elementary an approach. For, although one must go beyond the empiricism of geographical description, one runs the very great risk of imagining space as a white page on which the actions of groups and institutions are inscribed, without encountering any other obstacle than the trace of past generations' (Castells, 1977: 115). Presumably what he means to say is that each particular social formation involves its own conflicts - meaning, therefore, that the projection itself must be fissiparous - yet the exact meaning of his assertion remains unclear.

society - that is to say, the way in which a social formation fashions nature, and the mode of distribution and administration, and therefore of contradiction, that stems from it (Castells, 1977: 122; emphasis added).

This means that the form of urban space must correspond 'essentially' to the dominant structure that orders and distributes its constitutive units and that any change in the structural logic must manifest itself in morphological transformations. As Castells writes: 'each mode of production implies another segmentation of space not only in theoretical terms, but also in terms of the real relations established between the different spaces. Let us say, in a very general way, that the specificity of these types of space will correspond, *essentially*, to the instance not only determining, but dominating, a mode of production - in the case of capitalism, the economic' (Castells, 1977: 442-43; emphasis added). Ultimately, the urban question therefore is a question

> of establishing, in the same way as for any other real object, the structural and conjunctural laws that govern the existence and transformation [of urban space], and the specificity of its articulation with the other elements of a historical reality. This means that there is no theory of space that is not an integral part of a general social theory, even an implicit one (Castells, 1977: 115).

Harvey's conceptualisation of urban morphology and morphogenesis follows along the lines established by Lefebvre and Castells. He thus argues that 'it seems reasonable to suppose that a dominant mode of production will be characterised by a dominant form of urbanism and, perhaps, by a certain homogeneity in the built form of the city' (Harvey, 1973: 204). He also asserts, in a comment on the capitalist mode of production, that the form of the capitalist city should be thought of as 'carved out according to the dictates of capitalism' (Harvey, 1982: 373; emphasis added), and, elsewhere, that the mode of production 'operate as invariant shaping forces in historical-geographical development' (Harvey, 1989: 121).

What unites these three accounts is therefore their tendency to theorise urban space as some sort of projection or representation of either the mode of production or the historical conjuncture and, ultimately, of the social relations of

production. The ancient city thus represents, in Lefebvre, the social relations particular to the *latifundia.* The capitalist city, according to Harvey, reflects those relations of production that include a rent-seeking bourgeoisie. And the Monopoly city, according to Castells, projects the reproductive-hegemonic schemes of Monopoly capitalism.

Such a definition of morphological essence and morphogenesis rules out the possibility that the organisation of urban space might be informed by processes that are not socio-economic. Space, conceived as a thing in itself – i.e. as a phenomenon involving a set of endogenous laws: laws that are not imposed from without, that proceed from its own nature - therefore is programmatically excluded from the conceptualisation of urban morphogenesis. Isolating in such a way 'space' from wider socio-economic processes amounts to a fetishisation of the urban artefact. As Lefebvre writes:

> Instead of uncovering the social relationships (including class relationships) that are latent in spaces, instead of concentrating our attention on the production of space and the social relationships inherent to it—relationships which introduce specific contradictions into production, so echoing the contradiction between private ownership of the means of production and the social character of the productive forces—we fall into the trap of treating space "in itself," as space as such. We come to think in terms of spatiality, and so fetishize space in a way reminiscent of the old fetishism of commodities, where the trap lay in exchange, and the error was to consider "things" in isolation, as 'things in themselves'. (Lefebvre, 1991: 90)

Urban space therefore should not be thought of as a thing in itself, in isolation, but as a thing suffused with 'social relationships (including class relationships)'. Treating it otherwise – as something that involves its own laws – leads to fetishisation. At most, already existing spatial structures will offer some form of resistance to the ongoing structuration of the city as this radiates from the relations of production towards the urban artefact. But this is a passive kind of influence which is to do with material redundancy rather than actual agency. When Castells asserts that 'urban space is not simply a white page in which the ideological practices are inscribed. It has a certain consistency […]', he therefore

also specifies that this consistency 'must be able to be broken down socially if it is to be something other than a metaphysical entity' (Castells, 1977: 219)[41].

Again, this rules out the idea that space may involve its own essence or morphogenetic logic. As Peet writes: 'Once it is recognized that space is socially organized there can no longer be a question of its being a separate structure with independent rules of transformation' (Peet, 1996: 869). Lefebvre thus can assert that 'The differences that are established in space *do not come from space as such but from that which settles there* [i.e. 'society']' (Lefebvre, 2003: 125). Castells, for his part, argues that 'there is no specific theory of space, but quite simply a deployment and specification of the theory of social structure, in order to account for the characteristics of the particular social form, space, and of its articulation with other, historically given, forms and processes' (Castells, 1977: 124).

It is true that the existence of so-called spatial practices (or '*praxis*') adds some nuance to this image. The latter are characterised as the causal element mediating between society and space in processes of urban morphogenesis. As such, they constitute the concrete link between the abstract social structure of society and the physical spatial structure of the city. However spatial practices are themselves considered to be essentially informed by 'ideologies', and thus: by a schema that pertains to and reinforces the relations of production. It is in fact because praxis is ideological that space may be imbued with social structure in the first place and so the problem of urban form and formation again is referred back to a prior social logic. As Harvey writes:

> The problem of the proper conceptualization of space is resolved through human practice with respect to it. In other words, *there are no philosophical answers to philosophical questions that arise over the nature of space – the answers lie in human practice*. The question 'what is space' is therefore replaced by the question 'how is it that different human practices create and make use of distinctive conceptualizations of space (Harvey, 1973: 13-14; emphasis added)?

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[41]I have slightly rearranged this sentence to better suit the copy. The meaning, however, remains unchanged.

This splitting of the morphogenetic process into an active force (society) and a passive material substrate (the city; built form; 'space') evokes the hylomorphic principle discussed in the thesis introduction. As I argued then, the hylomorphic principle is a principle of formation which breaks down into an active or *dynamic form* and an amorphous *material substrate*. Differentiation, essence and discreteness thus solely are attributes of the *form*, whereas *matter* is something inherently undistinguished, docile and inessential. The same seems to be the case in Marxist geography, as can be seen from the wholesale rejection of an endogenous spatial logic and from the absolute ascription of morphogenetic capacity to society.

It is insofar as space is perceived as docile and inessential that it can be held that there is 'no theory of space that is not an integral part of a general social theory', and that 'the differences that are established in space do not come from space as such but from that which settles there'. Space as a thing in itself must in other words be excluded from analysis, lest this risks becoming 'metaphysical', 'philosophical', or 'fetishistic'. The hylomorphic principle suffusing the Marxist image of the city reaffirms one of the central elements of historical or dialectical materialism - that the relations of production must ultimately be the source of social transformations, an active principle in a reactive world - but transfers it to the problem of urban morphology and morphogenesis. This makes it an important aspect of the Marxist image of the city, even if - as Hillier points out - it is not particular to Marxist geography.

It here is relevant to reflect on the meaning of the notion of 'materialism'. For what does this term signify? There are in fact two kinds of materialism. The historical or dialectical materialism that Marxism explores, and a philosophical or ontological materialism. The former is a kind of materialism that tends to foreground the human lifeworld. The phenomena that Marxists analyse therefore refer back to dialectical contradictions proceeding from the relations between different classes in production or consumption. This makes Marxism a powerful

theory for theorising aspects of economic domination and political oppression. But it also makes it a relatively weak tool with which to approach other aspects of the material world.

The latter is a kind of materialism that foregrounds material vibrations and the spontaneous formation of material patterns. Such spontaneous and autopoietic processes of formation are explored by a swathe of philosophers and philosophical schools, stretching back at the very least to the early atomists. It is an important point that these two types of materialism do not always align, that they in fact express essentially different logics. Marx, it is true, wrote his doctoral thesis on the difference between the Democritean and Epicurean philosophies (both atomists). Yet the historical materialism that he later developed with Engels – mainly in response to Hegel and the young Hegelians – is an altogether different theory.

This creates a conceptual tension that is only now beginning to be acknowledged. As theoreticians such as Bennett (2010) and Braun (2006) have noted, Marxism has a paradoxical tendency to exclude from analysis (or at the very least: blackbox) aspects of material reality that are not directly related to the production, consumption, and/or circulation of Capital. Only structures and social classes have agency. Opting for another kind of materialism - what I call an ontological materialism - theoreticians such as Bennett and Braun instead explore emergent processes of formation as these may be found in the greater material world. As such, they ascribe agency not just to classes or social structures, but to all material beings whether human, biological or artefactual. (Marxism, as Braun writes programmatically, 'may not yet be materialist enough'; Braun, 2006: 193).

If one were to transpose this type of materialism to the analysis of built form, one would have to reject certain aspects of Marxist geography, in particular the hypothesis that space represents a prior social logic and the summary negation of spatial laws. Such a rejection would open up another enquiry into the

spontaneous and emergent kinds of urban formation that proceed, not from a socio-economic 'before', but from the materiality of the urban artefact itself. However, as I have shown in this section of the thesis, overcoming this barrier means not just overcoming a particular way of thinking about social relations (Marxism), it means overcoming a particular way of thinking about form and formation (hylomorphism).

1.3 2. Urban form and spatial efficacy: ideology, 'fetishism' and anti-positivism

In the previous section I showed how the form and structure of the urban artefact is conjectured, in the Marxist image of the city, to be determined by society in accordance with a representational or hylomorphic logic. I also showed how this form is argued to be implemented by spatial practices informed by particular ideologies. The social relations of production are thus deposited - or 'condensed' (Castells, 1977: 432) - in a set of ideologies which bear down on space through the medium of spatial practices; something which makes the notion of urban ideology particularly important to the Marxist geographical project[42].

However, the concept of ideology is not just crucial to Marxism's understanding of what space *is* and how space-making practices operate. It also informs its understanding of what space *does*, i.e. its sociogenetic efficacy. It is in fact not only the idea that urban space may contain its own ontogenetic principles (or 'laws') that is thought to be ideological. It also is the idea that urban space may be involved as a motive force in processes of urban sociogenesis, i.e. in the creation of certain sociological traits and cultural proclivities within a particular social group. This at least is the case for Harvey and Castells. For Lefebvre, however, ideology represents a more complex problem.

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[42] Such is the significance of the notion of 'ideology' that Castells argues that his analysis of the urban question is informed 'above all' (Castells, 1977: 437) by a desire to expose and circumvent it. In the conclusion to *The Urban Revolution,* Lefebvre makes a similar statement, writing: 'In this book I have criticized urbanism as ideology and institution, representation and will, pressure and repression, because it establishes a repressive space that is represented as objective, scientific, and neutral' (Lefebvre, 2003: 181).

Unlike Castells and Harvey, Lefebvre does ascribe a certain sociogenetic capacity to space. It is thus from the spatial formations of the modern city that a revolutionary principle is thought to first appear and spread. This makes the problem of urban ideology a somewhat thorny issue in Marxist geography; one that almost splits the Marxist image in two. But it also is an issue that provokes dialectical negotiations between the conceptual positions within the paradigm; something which animates it from within. Lefebvre's definition of ideology thus may be said to be sublated or surpassed (*Aufhebung*) by Castells - and to a lesser extent, by Harvey - and so a dialectical theoretical triad is established. It also must be emphasised that the sociogenetic capacity that Lefebvre ascribes to space is not simple, or direct, but rather operates dialectically.

For Lefebvre, the term 'urban ideology' characterises a rationalistic or 'scientistic' way of relating to urban form. More particularly, he argues that modern urban ideology is informed by a principle of optimisation which seeks to maximise the movement of people and goods within urban space and to minimise eruptions of unpredictable and anarchic behaviour whether that be in the form of spontaneous festivals or revolutionary class insurrection. The urban ideology thus is an ideology concerned with rationalising space and what happens in it, and curtailing the eruption of what he calls 'maximum difference'. It aspires, to put it differently, to make the unpredictable predictable and the unruly manageable.

These are tendencies that according to Lefebvre come to a head in the 20th century western city, for instance in the establishment of the maligned '*nouveaux ensembles*', with their 'superblocs' and intermittent 'superhighways' (cf. Lefebvre, 2003: 18). But the scientistic and rationalistic urban ideology is conjectured to have a much deeper history, going back to ideological changes occurring with the establishment of the ancient political city and manifesting itself, later on, in the medieval merchant city, and in the city of industrial society. As such, the modern urban ideology is nothing but the latest manifestation of a complex dialectical process that stretches back to the *latifundia*.

According to Lefebvre, the political city - 'inconceivable without writing: documents, laws, inventories, tax collection' (Lefebvre, 2003: 8) – thus presides over the development of various representational techniques which make the creation of an efficient bureaucracy possible. These techniques are conjectured to be retained and dialectically surpassed in the mercantile city where various forms of geometrical representation begin to proliferate, reaching an apex in the 'geometrical thinking' found in Rationalist philosophy (and more particularly: in Descartes). Representation therefore comes to take on a spatial characteristic, as manifested in the emergence of what Lefebvre calls 'the science of planometry'[43].

The true potential of this dialectically developing ideology is realised only in the 20th century city - in the modern-day spatial practices of architecture and urban planning - and is expressed in what Lefebvre calls 'the dictatorship of the right angle' (Lefebvre, 2003: 98). What characterises this 'dictatorship' is both an aesthetic and a theoretical disposition. The former refers to a tendency towards the creation of geometrical rather than organic forms. ('If we look at the various urbanist proposals', Lefebvre, writes, 'we find that they don't go very far. They are limited to cutting space into grids and squares'; Lefebvre, 2003: 157). The latter, to the scientific isolation of the city as a unit independent from the developments in the wider social whole - and thus from dialectical analysis - as reflected in the emergence of positivist spatial sciences.

According to Lefebvre, the urban ideology concurrently *promotes* positivist ideas regarding the nature and efficacy of the city; and *obscures* the dialectics of social contradictions operating within it. This, he argues, creates a kind of obliviousness, or 'blindness'[44], to the constantly developing logics of urban spatial

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[43] 'After a certain point in time', he writes, 'the city developed its own form of writing: the map or plan, the science of planometry', Lefebvre, 2003: 12.

[44] Ideology, according to Lefebvre, is that 'which illuminates other fields or brings fictional fields into view'). 'There are 'blind fields'', he writes, 'whenever language fails us,

formations in favour of static and simply causal positivist models. Ideological blindness, he elaborates, 'consists in the fact that we cannot see the shape of the urban, the vectors and tensions inherent in this field, its logic and dialectic movement, its immanent demands. We see only things, operations, objects (functional and/or signifying in a fully accomplished way)' (Lefebvre, 2003: 14).

The ideologues therefore are those who try 'to eliminate dialectical thought and the analysis of contradictions in favor of logical thought - that is, the identification of coherence and nothing but coherence' (Lefebvre, 2003: 40). This identification of coherence supposedly counteracts all attempts at exploring new spatial practices in favour of a sterile, predictable and controlled conceptualisation of urban space. And it is this concept of space that, ultimately, supports a particular political hegemony. Urban ideology (or simply 'urbanism') thus

> […] masks a situation. It conceals operations. It blocks a view of the horizon, a path to urban knowledge and practice. It accompanies the decline of the spontaneous city and the historical urban core. It implies the intervention of power more than that of understanding, [it] prevents thought from becoming a consideration of the possible, a reflection of the future. It encloses thought in a situation where three terms - critical thought, reformist ideology, leftist opposition - clash, a situation from which thought must escape, a situation from which urbanism and the urbanist prevent it from escaping (Lefebvre, 2003: 157 & 160-61)

It is, Lefebvre argues, only by exploring new forms of urban practice - his so-called 'u-topias' - that the ideological domination of space may be overcome. Such u-topias must be anchored in dialectical thought lest they risk approximating the 'positivist pseudoscientificity' (Lefebvre, 2003: 186) of the technocratic spatial practices that they seek to replace. This in turn necessitates an opening up of the spatial enquiry towards the social whole, and the recognition

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whenever there is surfeit or redundancy in a metalanguage (discourse about discourse, signifiers floating far from their signifieds). This brings us back to the contrast between the blinding and the blinded. The blinding is the luminous source (knowledge or ideology) that projects a beam of light, that) illuminates elsewhere. The blinded is our dazed stare, as well as the region left in shadow. On the one hand a path is opened) to exploration; on the other there is an enclosure to break out of, a consecration to transgress (Lefebvre, 2003: 31).

of this whole's inherent contradictions and constantly evolving nature. '[T]he urban phenomenon', Lefebvre therefore writes in a comment with Hegelian undertones, 'can only be comprehended as a totality, but its totality cannot be grasped. It escapes us. It is always elsewhere' (Lefebvre, 2003: 186).

Castells echoes Lefebvre's critique of urban ideology as involving a particular positivist, or 'technocratic', way of thinking[45]. But he also radicalises this critique, turning it against Lefebvre and his humanist-utopian urbanism. It thus is Castells' argument that the defining characteristic of urban ideology is the ascription of an active sociogenetic efficacy to urban space. It therefore is insofar as it defines space as 'causal' that the urban ideology must be known. Space, according to Castells, does not cause social effects. Holding this to be the case obscures the real dynamics of history which are class-related. The capacity that space has therefore is not so much productive as reproductive. It *reproduces* the social relations of production through structured patterns of consumption, something which Castells takes to be an entirely different proposition.

Castells shows how both the Chicago School and Lefebvre attributes to urban space certain socio-genetic characteristics. These are to do with the dimension, density and heterogeneity of the city; factors which in turn are conjectured to breed a certain set of sociological and psychological dispositions, e.g. alienation, individualisation, the breaking down of social mores, the eruption of crime and suicide, etc. Transformations in forms of social behaviour are thus explained with respect to the evolution in types of spatial settlements - for instance in the juxtaposition between rural and urban lifestyles - something that obscures the much more important question of class relations and hegemony. Writes Castells:

> The urban ideology is that specific ideology that sees the modes and forms of social organization as characteristic of a phase of the evolution of society, closely linked to the technico-natural conditions of human existence and, ultimately, to its environment. It is this ideology that, in the final analysis, has very largely made

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[45] 'In the parlance of the technocrats', he writes', the 'city' takes the place of explanation, through evidence, of the cultural transformations that one fails to (or cannot) grasp and control', Castells, 1977: 73.

possible a 'science of the urban', understood as a theoretical space, defined by the specificity of its object. Indeed, as soon as one thinks one is in the presence of a specific form of social organization - *urban society* - the study of its characteristics and of its laws becomes a major task for the social sciences and its analysis may even govern a study of particular spheres of reality within this specific form (Castells, 1977: 73-74; original emphasis).

What makes the urban ideology such a powerful narrative is that it portrays social evolution in a teleological and non-contradictory way. Urban society thus 'grows out' of rural society; a simple stage of socio-cultural advancement spurred on by spatial differentiation rather than by the contradictions emerging from socio-economic domination and class struggle (aspects of urban social life which in this way are glossed over). This conceals the dialectical nature of real societal transformations - the multiplicity of conflicts and alliances negotiated between classes and the structures that they express and inform - at the same time as it reduces the evolution of society to an organically defined phenomenon.

Society is thus unified and develops in an organic way, producing universal types, formally opposed by way of being unsynchronized but never, within any given social structure, opposed by way of contradiction. This, of course, in no way prevents one from commiserating with the alienation of this 'unified Man', at grips with the natural and technological constraints that impede the full development of his creativity. The city - regarded both as the complex expression of its social organization and as the milieu determined by fairly rigid technological constraints - thus becomes, in turn, a focus of creation and the locus of oppression by the technico-natural forces brought into being. The social efficacity of this ideology derives from the fact that it describes the everyday problems experienced by people, while offering an interpretation of them in terms of natural evolution, from which the division into antagonistic classes is absent. This has a certain concrete force and gives the reassuring impression of an integrated society, united in facing up to its 'common problems' (Castells, 1977: 84-85).

It is Castells' argument that a critical conceptualisation of urban space - including an understanding of the structuralist or 'aleatory' way that it is ordered - is counteracted by urban ideology. The first step towards an adequate conceptualisation of the urban problem - on this he agrees with Lefebvre - therefore must pass through a critique of urban ideologies. Such a critique contains several discrete elements. According to Castells, it thus is necessary:

1. To treat space and the urban separately, that is to say, to treat the process of collective consumption at its different levels. 2. To proceed to the analysis of the

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social determination of these processes, in particular explaining the new forms of intervention of the state apparatuses in this domain. 3. To study the organization of space as a chapter of social morphology as Lefebvre proposes, while establishing the specificity of such a form, but without treating it as a new motive force of history. 4. Lastly, and above all, to explain the social bases of the ideological link between the problematic of space and that of the reproduction of labour power ('everydayness', to use Lefebvre's term)' (Castells, 1977: 93-94).

Harvey does not go to as great lengths in his discussion of urban ideology as Lefebvre and Castells do. Ideology seemingly is not as crucial to his account of the urban problem as it is to theirs. However, this does not mean that ideology is missing from Harvey's analysis, nor does it indicate a positivist or non-dialectical tendency in his thinking. Harvey in fact is highly critical of those 'counter-revolutionary' urban scholars (his early scholarly self included) that fail to explore the dialectical roots of urban social problems. He thus distinguishes between between '*revolutionary theories* which are productive of change, *status quo theories* which are derived out of and help to preserve an existing situation, and *counterrevolutionary theories* which produce only confusion, obfuscation and frustration' (Harvey, 1973: 298), choosing to develop his arguments within the first kind of theory.

Harvey is of the belief that the ruling class 'produces the ruling ideas in society '(Harvey, 1973: 146), and that these are translated into certain spatial practices and, consequently, spatial formations. Like Lefebvre, his concern in a sense is with developing utopias, new forms of urban social coexistence and economic redistribution essentially dissociated from positivist or technocratic reasoning. 'Our thoughts', he writes, 'cannot rest merely on existing reality. It has to embrace alternative realities creatively. We cannot afford to plan for the future on the basis of positivist theory, for to do so would merely reinforce the status quo' (Harvey, 1973: 145). As was the case for Castells and Lefebvre, the affirmation of a spatial dialectics thus necessitates a rejection of positivism. Instead, a dialectical conceptualisation of space must be elaborated and deployed with respect to spatial formations. Writes Harvey:

> [P]ositivism draws its categories and concepts from an existing reality with all of its defects while Marxist categories and concepts are formulated through the

application of the dialectical method to history as it unfolds, here and now, through events and actions. The positivist method involves, for example, the application of traditional bi-valued Aristotelian logic to test hypotheses (the null hypothesis of statistical inference is a purely Aristotelian device): hypotheses are either true or false and once categorized remain ever so. The dialectic, on the other hand, proposes a process of understanding which allows the interpenetration of opposites, incorporates contradictions and paradoxes, and points to the processes of resolution. Insofar as it is relevant to talk of truth and falsity, truth lies in the dialectical process rather than in the statements derived from the process (Harvey, 1973: 130).

On the question of spatial efficacy, Harvey acknowledges that urban form may be socially significant - for instance in the creation and distribution of surplus value - but he denies that this significance can be theorised in and for itself. At most, urban form may solidify certain social relations radiating from the economic kernel of society, not engender new ones. The city and urbanism, he writes, 'therefore function to stabilize a particular mode of production (they both help create the conditions for the self-perpetuation of that mode)' (Harvey, 1973: 203). This evidently resonates more clearly with Castells' position than with Lefebvre's.

Some important differences thus exist between the way the three Marxist geographers conceptualise urban ideology. As we have seen, these relate to the kind of sociogenesis that is ascribed to space (productive or reproductive) and ultimately: to whether space can be conceived as a motive force in history or not. Yet similarities also pertain. Shared is a suspicion of 'technocrats' and 'positivist science' and a rejection of theories seen to obscure the social question supposedly at the heart of the urban problematic. Positivism - with its verificationist affirmation of empirical laws, and its analytical isolation of the investigated phenomenon – therefore is identified by all three scholars as a false response to the urban question; one that isolates and compartmentalises what is by nature relational and, ultimately, social.

'Compartmentalisation', 'isolation'. This is the charge sheet of fetishism. The fetishist is that theoretician that attributes value and efficacy to a certain physical thing (urban space in this case) when in fact s/he should be analysing the social relations of production that, ultimately, are responsible for it. Even for Lefebvre,

the efficacy of urban space therefore cannot be conceptualised in isolation but must be contextualised by an understanding of a dialectically evolving social whole. Space thus may specify and entrench the social relations of production particular to a given historical conjuncture. But it does not cause them in a simply causal way as this would short-circuit the basic principles of dialectical materialism.

The question of spatial efficacy creates some significant problems for Marxist geographers. How much spatial efficacy may be theorised before a theory becomes ideological? And conversely, how little efficacy may be theorised before the enquiry into space becomes meaningless; a pure meditation on architectural aesthetics? This is something of a paradox for Marxist geographers, one that as we have seen creates divisions within the paradigm. Is this paradox ever resolved? I am not convinced that it is, something which makes Marxist geography's stance on spatial efficacy fundamentally schizophrenic.

1.4. Conclusion

In this first part of the thesis I have explored the so-called 'Marxist image of the city'; a notion that I take from Portugali and Hillier but explore in more detail. Part of this exploration involved discussing the way Lefebvre, Castells and Harvey, respectively, frame and explicate the urban question. Having discussed the individual theories, I then discussed two tropes (hylomorphism) and (anti-positivism) that I argued subtend the Marxist image of the city. Why did I progress in this manner? Sequence here is important. Only once the particularities of the different theories had been explicated was it possible to advance to the discussion of the tropes of the Marxist image of the city and the way these manifested themselves across the individual contributions.

As I showed, a deep image of the city in fact may be demonstrated to exist; one that is found in all three theoreticians and which revolves around a negation of the material urban artefact as a thing in itself. This negation is double. First, it is

expressed in a *hylomorphic trope* which posits that urban space must essentially be an expression of socio-economic forces; this, at the same time, rules out the possibility that the structure of urban space could derive from an endogenous spatial logic. Second, it is expressed in an *anti-positivist* or *anti-physicalist trope* which dictates that the material urban artefact cannot directly cause the creation of social relationships (at least not in a simple, non-dialectical way).

The thesis thus is in agreement with the general conclusion of Hillier and Portugali, namely that a deep Marxist image of the city exists and that this image involves a propensity to approach the urban question, so to speak, society-first. But in arriving at this conclusion it has added more detail to the understanding of how this image is expressed in the largely corresponding but nevertheless discrete theories of Lefebvre, Castells and Harvey. Such detail is important. Partly because it provides a truer picture of Marxist geography. But also because it shows the different forms that the Marxist image of the city takes on; its ability to infiltrate and suffuse otherwise discrete enquiries.

How, then, should we come to grips with the Marxist image of the city? How may it be theorised? On the evidence of the above analysis, one may compare it with Deleuze's notion of an 'image of thought'; a deep paradigmatic tendency that guides philosophical enquiry. In *Difference and Repetition,* Deleuze argues that the same image of thought ('representation') prevents a series of different philosophers - Plato, Leibniz, Kant and Freud - from conceptualising difference *in itself*. This despite the fact that all of them had developed philosophies in which such a conceptualisation had been, in Deleuze's analysis, attainable. How does the image of though work? By way of convention. Protevi summarises the *modus operandi* thus: 'a historical figure […] does not grasp, or backs away from, the radical implications of what he has written in a 'furtive and explosive moment'' (Protevi, 2010: 38). It is in this way that the affirmation of 'difference', crucial to Deleuze's project, is excluded by the representational image of thought.

A similar logic seems to be at play as regards the Marxist theorisation of urban space. Here too, a series of historical figures either do not grasp or back away from the radical implications of engaging with urban space as a thing in itself. Each in their own way get close. In Lefebvre, a spatial dialectic thus is affirmed and explored. This manifests itself in an understanding of space as animated, rather than empty, even if this animation is ultimately social. A kind of spatial efficacy also is affirmed. But this is argued to operate dialectically in the totality of social relations rather than directly from space to society. Ultimately, Lefebvre's attempt at thinking space therefore falls back on the idea that the spatial dialectic must be predicated on processes unfolding in the social realm. One therefore ends up with a theory of space that is really about society.

Castells, for his part, attempts to transpose the aleatory materialism of Althusser to the problem of space. But his attempt at thinking space in itself founders on the same ground as Lefebvre. Space must represent society; it must not involve an organising principle or essence proper to itself lest it risks becoming metaphysical. Harvey may be the Marxist who gets the closest to affirming a theory of space in itself. His configurational approach to the distribution of land use in the urban structure certainly involves the elements of a theory about space in itself. But, ultimately, he insists that a theory of space must understand the city to be 'carved out' by the economic forces of society, and so he too fails to think urban space as a thing in and for itself.

According to Deleuze, it only by studying existing images of thought that new ones can be formed. As he states in an interview: 'noology [i.e. the study of images of thought] is the prolegomena of thought' (Deleuze, 1995: 147)[46]. The

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[46] As Murphy (1992) and Protevi (2010) show, *Difference and Repetition* in fact is ordered according to a noological order. The introduction and first two chapters review and critique the deployment of the concepts of 'difference' and 'repetition' in the history of philosophy. The last two chapters and the conclusion on the other hand unfolds a positive definition of 'difference' and 'repetition' in and for themselves, rooting these in the metamathematics of Albert Lautman (2011). What is significant, here, is that the third chapter ('The Image of Thought'), situated between these two series of chapters, in

same may be true for the development of a new, materialist image of the city. Such an image would have to understand but also negate the hylomorphism of the Marxist image of the city at the same time as it would have to affirm the material causality of urban space. It is an obvious choice to look to Hillier and Portugali in developing such an image. Both develop theories that define urban space as a thing in and for itself, integrating aspects of materiality into urban morphogenesis as well as urban sociogenesis. This makes them an ideal starting point for the development of a new urban materialism; a task I shall return to this task in the thesis' part III.

However, as I discuss in the thesis' introduction, neither SIRN or space syntax have a strong philosophical conceptualisation of these factors. They theorise spatial-material causality, but in ways that are theoretically unsatisfactory (although for different reasons). It is true that SIRN explores ways of theorising the urban artefact as a thing capable of sustaining autopoietic and efficacious processes. This involves deploying the scientific notion of synergetics with respect to artefacts of different kinds such as chairs, paintings and cities. Whilst this is no doubt interesting, this theory nevertheless cannot be said to be anchored in or constitutive of a deep image of thought, if by this we understand a philosophical principle that transcends science. As such, it falls short of the mark.

An image of the city does on the other hand appear in Hillier, but this image is problematic due to its theoretical anchoring. As I discuss in the thesis introduction, Hillier's attempt to move beyond what he calls the 'Aristotelian' paradigm (identical to what I call the 'hylomorphic principle of formation') goes by way of Newton's principle of inertia. This creates some problems insofar as this principle cannot really be conceived as involving a theory of form and formation. I therefore find this particular epistemological link to be problematic. I can however subscribe to the general sentiment of what Hillier asserts, namely that if one

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effect facilitates the transition from the one series to the next. In this sense, the 'image of thought' becomes the conceptual centre around which the treatise turns.

wants to move beyond hylomorphism, one must affirm a formal capacity for material self-organisation.

In order to do that, the idea of colliding and creative bodies - which seems to be what Hillier extracts from the principle of inertia - may be a good place to start. These are however ideas that are just as closely related to 'materialist' philosophy as they are to Newtonian physics. One may for instance look to the ancient atomism of Epicurus or Lucretius - developed more than a 1,500 years prior to Newton - where the random collisions between atoms falling through a cosmic void are thought to give rise to material formations or assemblages. Or one may look to the modern-day atomism of Hobbes and Gassendi (who Fisher argues, 'lands on atomism as a central component of a broader Epicurean alternative system to the robust range of received Aristotelian views'; Fisher, 2014: 6).

The trouble with the atomist account, however, is that while it may speak of self-organisation between randomly colliding bodies, it has no principles that may explain the force by which an agglomeration of bodies sustains itself over time, or indeed the capacity that this agglomeration will have for engendering new agglomerations. There is, in other words, no conceptual framework for explaining the persistence of a corporeal assemblage from a moment t_0 to another t_1, nor for understanding how two (or more) bodies become involved in an assemblage in the first place (why do some bodies recoil off each other whilst others intermesh?).

Such a conceptual framework may however be found in the philosophy of Baruch Spinoza which, as I will show in the next part of the thesis, affirms the random collisions of matter at the same time as it invests in the individual body a power to sustain itself over time and to engage in a creative manner with other bodies. This makes Spinozism a highly original conceptualisation of the problem of form and formation, one to which the thesis now turns.

2. A Spinozist principle of formation

2.1 Introduction

What must the characteristics of a new image of the city be? If it is to subvert the Marxist image of the city it first of all must involve a non-hylomorphic understanding of form and formation. However, it also must ascribe some sort of efficacy to the material city, lest it risks perpetuating the anti-physicalist trope that also forms part of this image. Put in philosophical terms, 'matter' must be granted the capacity to involve itself in open-ended morphogenetic processes (i.e. to be more than an amorphous substrate). But the individual body also must be allowed to influence other material bodies (in the case of artefacts: to have actual, sociogenetic efficacy).

These are ideas that may be explored through Spinoza's materialist ontology, in particular in his understanding of 'modality'. To subvert the Marxist image of the city one must therefore think modally. However, before I commence the explication of this concept, a brief introduction to Spinozism is in order. 'Spinozism' is a name commonly used to designate Spinoza's materialist philosophy. The latter is renowned for its conceptual richness but also for its impenetrability. It revolves around three major notions: 'Substance', 'the attributes' and 'the modes'. The detailed nature of these, and their complex interrelation, will be discussed in more detail in what follows. But the main principles of the argument must be anticipated here to give the reader a theoretical foothold.

'*Substance*' is perhaps the most important concept of Spinozism. It is equated with 'God' or 'Nature' (Spinoza tends to use these designations interchangeably to suit the context; I shall refer to it as either 'Substance' or 'God', or 'God or Substance', depending on the context) and is defined as self-conceived and self-caused (*causa sui*). Unlike Cartesian philosophy where there are two substances - 'the extended thing' [*res extensa*], and 'the thinking thing' [*res cogitans*]) - as

well as a God who manipulates them, Spinoza's Substance is an absolutely singular and univocal entity. It therefore is conceived as infinite - there is nothing outside of Substance - and as something which cannot be caused by anything else.

'*The attributes'* are what explicate or express Substance, but also what constitute it like so many parts. They are not external to Substance but explicate different aspects of it, in a sense providing different perspectives on the same thing. There is for instance an attribute of Extension which expresses Substance in a corporeal or extensive manner (i.e. as 'bodies'), and an attribute of Thought which expresses God or Substance in a noetic or intensive manner (as 'minds' or 'essences', which in Spinozism effectively is the same thing). These two attributes are the only ones known to Man but there is in fact an infinity of other attributes whose existence and properties escape human understanding and experience (holding otherwise would limit the expanse and power of God, something which according to Spinoza constitutes a contradiction in terms).

There then are the modifications of Substance. These express clearly a particular part of God or Substance, but fail to express in a clear manner the remainder of his infinite being. Man for instance is involved in God's infinite being but only expresses a particular and determinate aspect of him. The modification in turn is expressed in different *modes* which are involved in the respective attributes. A particular modification of Substance, such as for instance a human being, will therefore be expressed through an infinity of modes including an *existing mode* (corresponding to the human body) and an *essential mode* (corresponding to the human essence or nature). Like the attributes, the modes therefore express parallel realities, that is: the same thing (the modification) as seen from different perspectives. This also is known as modal 'parallelism'.

The Ethics brings these different concepts together in a coherent if complex statement. This statement is 'ethical' to the extent that it provides the reader with an understanding of the order and mechanics of Nature and with a way for the

reader (a human 'modification') to navigate this. One aspect of this is to understand the *necessity* - as opposed to benevolence - with which God or substance *is* and *acts*. Unlike the universe of the Schoolmen (or indeed of Leibniz), Spinoza's universe therefore is not a universe ordered by a calculating deity in accordance with a benevolent principle. It rather is a universe that orders itself through the more or less random collisions of material bodies and the emergent ontogenetic situations these give rise to.

Insofar as it is not ordered by a benevolent God, the universe must be essentially amoral (there can be no distinction between a 'good' or a 'bad' event or mode as all modes partake in God). In such a universe, 'virtue' - the main subject for any ethics - becomes a question of understanding and accepting the stream of passionate affections which are part of existence and of learning to live with them in equanimity. The virtuous subject is therefore that subject which manages to comprehend and accept the necessity with which the processes of this world unfold. However, that subject also is virtuous that manages to order the world - if only momentarily - so that it does not harm him/her. This in a sense is what it means to live in accordance with one's essence. For Spinoza - as for the Stoics, which are his most important philosophical forebears in this regard - self-control, wisdom and the dedicated pursuit of one's own essence thus constitute the key to virtue and blessedness (or 'beatitude').

The Ethics is divided into five parts each of which has been divided into Definitions, Axioms, Propositions, and Scholia; this is known as the geometrical order[47]. Of the five parts making up the treatise, each specifies a particular aspect of the ethical question. A first part treats of God; a second of the Soul; a third of the Affections; a fourth of Human Bondage; and a fifth of Human Freedom (or 'Beatitude'). These parts refer back to each other in complex networks of philosophical reasoning, lending the treatise an elliptical character. Reading the

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[47] I follow Macherey (2011) in calling the sections of the treatise 'parts' rather than 'books' on the grounds that one of the most important characteristic of Spinoza's *Ethics* is that it concerns the integration of parts into a whole, whether these be attributes in Substance or thoughts in the divine intellect.

Ethics therefore can be a complex challenge - by Spinoza's own admission the geometrical order makes the comprehension of the treatise 'cumbersome' (EIVp18schol.) – insofar as one cannot understand a particular definition, axiom or proposition in isolation from the remainder of the treatise.

The complicated nature of the treatise has seen a series of studies discuss and explicate its internal logic (or 'order of reasons'; Gueroult, 1968-1974). Of these, the analyses of Macherey (1994-98) and Gueroult (1968-74) stand out for their attempts to explicate and map the complex logics of the entire philosophical system. These are studies of considerable wealth and expanse, each totalling well over 1,500 pages (in the case of Gueroult, this just covers the first two of the treatise's five parts). As such, they offer a detailed comprehension of Spinoza's treatment of such varied subjects as the being of God, the reasons for the establishment of human commonwealths (or 'societies'), and the problem of suicide.

This thesis will not go into such detail. Instead, I shall focus only on the parts of the treatise that are absolutely central to this thesis' enquiry namely those concerning modal individuation and modal efficacy. These predominantly are discussed in part II and III of the treatise and it therefore is here that I focus my analysis. However, I will to a certain degree have to pay heed to the other parts of the treatise insofar as the issue of modality cannot be understood in absolute isolation from these (modes for instance cannot be comprehended in isolation from God or Substance). I therefore follow Moreau's 'microanalytical' method (Moureau, 1994: xi.)*,* which explores one aspect of the treatise (in his case: the phenomenological aspect of 'experience') whilst ensuring that the propositions and definitions needed for an adequate treatment of this aspect are highlighted and considered.

According to Moureau, microanalysis does not set out to 'summarize the system (the text is not the system in miniature), but to indicate the torsion points of it' (Moureau, 1994: vi; my translation), *viz.* those definitions, axioms and

propositions where the seeds for the comprehension of a particular aspect of ethical life are sown. This makes it a powerful method for the specific analysis of concepts or ideas but also one that must be deployed with care. In exploring the notion of modality, I devote particular attention to parts I and II of the treatise insofar as these constitute Spinoza's *Metaphysics* (part I) and his *Physics* (part II). However, it also will be necessary to introduce some propositions from part III which touch on modal affectivity. Parts IV and V of the treatise on the other hand hardly will be discussed.

Following Ramond (1995) I divide up Spinozism according to the coordinates of '*being*' and '*action*'. This means that Spinoza's *metaphysics* (which discusses his conception of God), and his *physics* (which discusses the genesis and nature of the modes) are divided up according to what the phenomena *are* and how they *act*. This resonates with Deleuze's reading of Spinozism as a philosophy whose central components revolve around what a thing '*is*' and what a thing '*does*' (Deleuze, 1992)*. (This way of dividing up being - namely as something which *is* and *acts* - has obvious advantages to a reading of Spinozism that aspires to approximate a theory of matter that does not negate material essentiality or efficacy).

The structure of this second part of the thesis follows from this. I first explore the logic and significance of Spinoza's geometrical method (section 2.2.). Having shown how this method provides a key to understanding Spinozism, I then proceed to the discussion of Spinoza's God, i.e. what his being *is* (sections 2.3.1. and 2.3.2.) and how he *acts* (sections 2.3.3. - 2.3.5.). I then discuss the genesis and properties of the individual modes, including the power whereby they perpetuate themselves (sections 2.4.1. - 2.4.4.) and the power whereby they engage in open-ended processes of creation or individuation (section 2.4.5.).

2.2 Reason, Metaphysics and Geometry: the *more geometrico, or* the absolute rationalism of Spinoza

A rationalist philosopher, Spinoza champions a belief in the clear and distinct understanding of all aspects of Nature - both physical (bodies) and metaphysical ('minds', or essences) – and of the mechanisms that order it. There thus are no areas of being that are inaccessible to the human mind. (In this he differentiates himself from Descartes to whom the will of God is essentially impenetrable; enigmatic). However the adequate understanding of the things of this world must be predicated on a comprehension of their essence or internal nature rather than an understanding of their empirical qualities. An empiricist he is not.

Spinoza defines the essential as something genetic. An essence (or mind) therefore is identical to the process responsible for the actualisation of a particular phenomenon (or body) in nature. That thing therefore is essential that defines the ontogenetic process pertaining to a particular mode. The access to the essential nature of things however can only be achieved by abiding to a strict method. The mind must dedicate itself to the reasoned explication of essences, shunning unfounded speculation and 'opinion'. Only through 'reason' [*ratio*] is the confused and inadequate comprehension of the imagination circumvented and the essences of things approximated. In this way, the essential, the genetic and the rational are fundamentally related. Spinozism thus is said to be a pure form of rationalism; perhaps the most strict rationalist programme of all[48].

In the *Ethics*, this rationalist commitment is translated into a particular form of exposition: the so-called geometrical method (or *more geometrico*). All things must therefore be able to be explained and understood 'geometrically' - which is the same as to say essentially or genetically - even the truth particular to a philosophical treatise such as the *Ethics*. It is for this reason that the treatise is presented in the complex doctrinal network of definitions, axioms, propositions

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[48] Gueroult thus refers to Spinozism as an instance of 'absolute rationalism'(Gueroult, 1968:11; *my translation*). Lærke makes a similar point, referring to Spinoza as the 'most rationalist of rationalists' (Lærke, 2008: 775; *my translation*).

and scholia, its structure mimicking that of Euclid's treatise on geometry, the *Elements*[49].

To the modern reader, this will appear as a strange strategy and its outcome abstruse. However at the beginning of the 17th century, the deployment of mathematical reasoning in the resolution of philosophical problems was by no means an uncommon procedure[50]. There were specific historical reasons for this. Most importantly, the language of mathematics was perceived as being free from the pitfalls of Scholasticism; a school of thought increasingly deemed unscientific in the philosophical community. Geometry offered a new way of speaking of 'essences' - whether mathematical or logical - without referring to scholastic forms. This salvaged the notion of essentiality from oblivion - thereby preserving the possibility of metaphysics - and represented a new way of conducting philosophical research which was taken up by a series of philosophers including René Descartes, John Wallis and Thomas Hobbes[51].

Spinoza's deployment of the geometrical method is not particular to the *Ethics.* In fact one of his first philosophical works is a geometrical reordering of Descartes' *Principles of Philosophy* (which claimed 'geometricality' without adhering to Euclid's terminology and principles to a great extent; cf. Spinoza, PPC[52])*.* But the

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[49] As Spinoza writes in his notes to the Theological-Political Treatise: 'Anyone can comprehend Euclid's propositions before they are proved' (TTP, VII n8).

[50] Galileo thus famously suggests, in *The Assayer*, that 'philosophy [...] is written in the language of mathematics, and its characters are triangles, circles, and other geometrical figures, without which it is humanly impossible to understand a single word of it'.
[51] Cf. Descartes' *La Géometrie* (Descartes, 1637), and Hobbes' *De Corpore:* a geometrical explication of body and the source of an ill-tempered dispute between Hobbes and Wallis.

[52] As Meyer - a friend of Spinoza - writes in his preface to Spinoza's *The Principles of Philosophy demonstrated in the geometrical manner*: 'Although the philosophical writings of this most noble and incomparable man [i.e. Descartes] exhibit the mathematical manner and order of demonstration, yet they are not composed in the style commonly used in Euclid's *Elements* and other geometrical works, the style wherein Definitions, Postulates, and Axioms are first enunciated, followed by Propositions and their

deployment of the geometrical method arguably is much more strict in *the Ethics* than it is in the *Cartesian Principles of Philosophy* - a treatise which furthermore is unfinished - and it is an uncontroversial fact that a significant amount of thought has gone into the ordering of the former.

The geometrical ordering of the *Ethics* constitutes more than a stylistic trait (although it also is that). As Gueroult has convincingly shown (Gueroult, 1968), the fact that the structure of the treatise is informed by a geometrical method is a way of both exemplifying and amplifying the arguments advanced in it. The deployment of the *more geometrico* therefore allows for the progressive structuring of a particular philosophical argument in the mind of the reader just as geometrical definitions do (here, too, the connection established between genesis, geometry and reason thus is emphasised). Conceived thusly, the *more geometrico* is a form of construction that replicates the way that the things of this world - whether logical or physical - are constructed.

The adequate understanding of a given body's essence is the one that manages to conceive this body genetically. It therefore is the morphogenesis of the body that is essential, not its morphology. However, the genetic-geometrical approach is symptomatic for Spinoza's definition not just of body but also of mind. That mind which corresponds to a particular body will therefore involve (or 'implicate') a particular set of minds, each of which will correspond, for its part, to a minor constitutive body involved in the constitution of the complex body. Everything has either a cause (body) or a reason (mind, essence). But these causes and reasons themselves are genetic and complex, and so being as well as reason will

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demonstrations. They are arranged in a very different way, which he calls the true and best way of teaching, the Analytic way. For at the end of his 'Reply to Second Objections,'he acknowledges two modes of conclusive proof. One is by analysis, 'which shows the true way by which a thing is discovered methodically and, as it were, a priori'; the other is by synthesis, 'which employs a long series of definitions, postulates, axioms, theorems and problems, so that if any of the conclusions be denied, it can be shown immediately that this is involved in what has preceded, and thus the reader, however reluctant and obstinate, is forced to agree (Meyer in Spinoza, PPC, preface).'

involve a complex network of causative and implicative processes. Taken in this sense, understanding and being may be conceptualised as two genetic series unfolding in parallel alongside each other. 'Thought and Being', as Parmenides writes, 'are the same' (Parmenides, DK fragment B6.

Spinoza does not invent this genetic approach to geometry but merely introduces it into a philosophical context. One thus finds in geometry a school that concerns itself exclusively with the formation of shape; and a school that concerns itself exclusively with that shape's static characteristics or properties. The former is spoken of in terms of 'problems' (the genetic approach therefore is known as the 'problematic' approach), whereas the latter is spoken of in terms of theorems, thus making it a 'theorematic' approach. As Clavius, a 17th century Jesuit mathematician, writes:

> All demonstrations of mathematicians are divided by ancient writers into *problems* and *theorems*. A demonstration that demands that something be constructed and teaches how to construct it they call a *problem* [...] But they call that demonstration that examines only some aspect [*passio*] or property of one or several quantities at once a *theorem* (Clavius, 1612: 1.9.; emphasis added)[53].

Broadly put, geometrical 'problems' refer to the process whereby a figure - such as a circle or a sphere - is *generated*. They thus define the way in which the geometrician may construct, in the most simple and accurate way, a given figure. Geometrical 'theorems' on the other hand are descriptions of static characteristics. Their concern is with the *properties* that so to speak 'flow' from a figure once it has been constructed, e.g. the way that the property of having angles that total 180 degrees flows from the triangle. The terms 'problematic' and 'theorematic' are not deployed by Spinoza. But they clearly are part of his way of reasoning (and we known that Spinoza was aware of Clavius' work[54]).

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[53] See Jesseph (1999: 19-22) for a further discussion of the distinction between problems and theorems.
[54] Spinoza thus discusses Clavius in an exchange of letters with de Vries (*Ep. VIII*)

One may take as proof of this Spinoza's discussion of a particular geometrical form, the circle, for which he provides both what might be termed a theorematic and a problematic definition. In the *Treatise for the Emendation of the Intellect*, Spinoza thus discusses the *properties* that flow from the essence of the circle, including the property that each point on the circle's circumference is equidistant to its centre (TIE 96). Elsewhere, in his correspondence with Tschirnhaus, Spinoza defines another property of the circle, namely that an infinite number of infinitesimal rectangles exhaust themselves against the internal side of its circumference (Ep. LIX & Ep. LX.).

Such characteristics evidently are of a *theorematic* nature, describing the static characteristics or properties that pertain to an already constructed circle. However, a problematic definition of the circle also is provided by Spinoza, one that defines the genetic process involved in its construction. In order to arrive at this definition, Spinoza conducts a thought experiment. Instead of defining the circle with respect to its static properties, he provides the constitutive elements needed for a dynamic definition, evoking a line of which one end is movable and the other end fixed. He then imagines a 'proximate cause' which - if applied to the initial setup - may animate the line thus giving rise to a circle. In this way, an essential definition of the latter is provided. He writes:

> If the thing be a created thing, the definition, as we have said, must include its proximate cause. For example, according to this rule a circle would have to be defined as follows: a figure described by any line of which one end is fixed and the other movable. This definition clearly includes the proximate cause (TIE § 96)[55].

If this definition is 'essential', it is because it allows the geometrician to define a minimal system (the line with one end fixed and the other moveable; a nondescript proximate cause) from which a dynamic and 'adequate' description of the genesis of the figure may be constructed. There is, as Spinoza points out,

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[55] In a similar manner, a 'sphere' is defined, essentially, as a semicircle rotating around its own axis in an earlier section of that treatise (TIE § 72.). Once animated, the rotating semicircle must necessarily produce a sphere, and so the essence of that sphere is affirmed.

nothing in the line itself which compels it to pivot around its centre. Indeed, movement does not pertain to the essence of the line and so the line relies on a so-called 'proximate cause' for its animation. But what is this cause and how does it fit into the geometrical system that Spinoza is constructing?

In order to understand this, one needs a comprehension of the relationship between essence and existence. In Spinozism an essence may either exist or not. That essence exists which is actualised (or 'endures) in the physical world, whereas that essence which is not actualised does not exist. The existence of an essence may, in turn, be either *necessary*, *impossible* or *possible* (EIp11dem.2); not all essences therefore necessarily exist. The essence of God, for instance, necessarily involves his existence. Given that God is *essentially* a perfect creature, it would be contradictory for him not to exist and his existence therefore is *necessary*. Unlike the existence of God, the essence of a contradictory being like, say, a square circle does not involve existence inasmuch as its essence stipulates a form that is impossible to realise in existence. The essence of a contradictory thing therefore *excludes* existence thereby making its existence *impossible*.

Outside of these two extremes, one finds a third and last category of existence. This category concerns beings whose existence is neither necessary or impossible (this effectively encompasses all existing beings that are not God). For such sublunary beings, essence does not involve existence and so existence is a *possibility* rather than a necessity. What this means is that, unlike God, they cannot bring about (or 'actualise') their proper existence simply by their own perfection but must rely on an efficient or 'proximate' cause for their essence to be actualised. This corresponds to the way that the line with one end fixed and one end moveable relies on the impulse from another agent in order that it may transcend its own being and bring into existence a new form, the circle.

Once a proximate cause is affirmed, so too is the actualisation of the essence (or 'mind') corresponding to a given body. As ever, the genetic processes pertaining

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to corporeal being go hand in hand with those pertaining to the understanding; cause and reason representing two sides of the same process. This is described the most clearly in the *Treatise on the Emendation of the Intellect*, where - using the example of the sphere to illustrate his argument - Spinoza writes:

> To form a sphere, I invent a cause at will, namely, that a semicircle rotates about its centre, and a sphere, as it were, is produced by this rotation. Now this is, of course, a true idea, and although we know that in Nature no sphere has ever been produced in this way, this is nevertheless a true perception and a very convenient way of forming the concept of a sphere. *Now, we should observe that this perception affirms that a semicircle rotates, an affirmation that would be false were it not conjoined with the concept of a sphere, or else with a cause determining such motion; that is, in short, if this were a completely isolated affirmation. For in that case the mind would not be extending its affirmation to anything beyond the motion of the semicircle, and neither is this contained in the concept of a semicircle nor does it originate from the conception of a cause determining the motion.* Therefore the falsity consists solely in this, that something is affirmed of a thing when it is not contained in the conception we have formed of the thing, as in this case motion or rest is affirmed of the semicircle […] *the motion of the semicircle is false when taken in isolation, but true if it is conjoined with the concept of a sphere, or the concept of some cause determining such motion* (TIE, §72 & 73; emphases added).

The correlation that Spinoza establishes between proximate *cause* and adequate *concept* is crucial. It is in many ways a precursor for what he is later to write in *the Ethics*, namely that 'for each thing there must be assigned a cause, *or* reason [*causa sive ratio*], both for its existence and for its nonexistence' (EIp11dem.). In the context of the present example, the motion of the semicircle remains abstract, false even, until it is animated by a proximate cause. When animation occurs, a being or a series of beings become involved in a state of affairs that actualise a body in existence at the same time as a corresponding idea is affirmed. Such an idea is not animated from without - like bodies are - but arises spontaneously at the same time as those bodies coalesce. Conceptual 'affirmation' in this sense constitutes the other side of corporeal animation but it arises in the realm of essences rather than in that of existence.

It is this particular kind of essentialism - a genetic or problematic essentialism - that subtends and informs the structure of *the Ethics*. If Spinoza introduces and defines a series of concepts in a particular order - the 'order of reasons' - it

therefore is not a gimmick as much as a strategy for mobilising in the mind of the reader a particular truth that corresponds to the very essence of the treatise. The latter thus, in a sense, becomes the proximate cause for the construction of the ethical truth in the mind of the reader. As Gueroult was the first to point out, this makes the *more geometrico* an integral part of the treatise; a 'Rosetta stone' without which the adequate conceptualisation of Spinoza's complex philosophy is impossible.

Geometrical reasoning in fact is so ingrained in Spinozism that all its major concepts must be understood geometrically. The geometrical considerations outlined in this section therefore provide the preconditions for understanding the structure of the treatise. But they also are significant to the understanding of Spinoza's definition of 'God or substance' and 'the modes', both of which are constructed according to the problematic geometrical logic. In this way, Spinozism takes on a fractal characteristic, referring God or substance, the modes - even the structure of the treatise itself - back to the same genetic principle.

2.3. Spinoza's God: *causa sui* and *causa omnium rerum*

2.3.1. Constructing Spinoza's God (EIp9-11): From *Ens Simplicissimum* to *Ens Realissimum*

In this section and the next, I discuss the genesis of Spinoza's God. More particularly, I show that Spinoza's God constitutes a complex and composite entity and that the composition of this entity necessarily must be explained before it can be adequately understood. There are good reasons for proceeding in this way. These are to do with the geometrical considerations outlined in the preceding section, but also with the historical reception of *the Ethics*. It is in fact a common misconception that *the Ethics* sets out from a simple and certain truth - the infinite perfection of God - in order that a series of properties may be derived

from this (For an example hereof, see Tschirnhaus' communication with Leibniz; A VI-3, 384-85).

This reading implies that God is a simple being' - indeed the simplest of beings (*Ens simplicissimum)* - and that his simplicity correlates *with* or derives *from* his perfection. However this does not stack up to the idea of God or substance presented in *the Ethics,* and the affirmation of an *Ens Simplicissimum* therefore represents a misreading. Such misreadings are not difficult to explain. Whilst it is inaccurate and indeed wrong to hold that the God of *the Ethics* is simple*,* it is in fact in line with the definition of God provided by Spinoza in his earlier work, the *Cogita Metaphysica*. 'God', writes Spinoza in this earlier treatise,

> is not a composite thing, from which we can conclude that he is a most simple being [*Ens simplicissimum*]; and this we shall easily accomplish. Because it is self-evident that component parts are prior at least by nature to the composite whole, then of necessity those substances from whose coalescence and union God is composed will be prior to God by nature, and each can be conceived through itself without being attributed to God. Again, because they are necessarily distinct from one another in reality, then necessarily each of them can also exist through itself without the help of the others. And thus, as we have just said, there could be as many Gods as there are substances from which it was supposed that God is composed. For because each can exist through itself, it must exist of itself, and therefore it will also have the force to give itself all the perfections that we have shown to be in God, as we have already explained fully in Prop. 7 Part I, where we demonstrated the existence of God. Now because nothing more absurd than this can be said, we conclude that God is not composed of a coalescence and union of substances (CM, chap 5, §3).

If the characterisation of God as *Ens simplicissimum* is true for the early Spinoza, it is, however, an inaccurate characterisation as regards the God of *the Ethics*[56]. When examining the order of reasons it thus is clear that *the Ethics* does not set out from a simple truth identical with God but rather builds towards the moment when God is introduced. God in fact only is defined in the 11th proposition, and so a series of propositions precede his definition.

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[56] 'The idea that Spinoza in the Ethics 'installs' himself in God and 'begins' with God', writes Deleuze, 'is only an approximation of the truth and is, strictly speaking, inaccurate (Deleuze, 1990: 74).

What is the purpose of these propositions? Some commentators take them to be either insignificant or accidental, but they are anything but. As both Gueroult (1968) and Deleuze (2004) point out, they reveal in Spinoza a new way of thinking about God, one that is in keeping with the genetic-geometrical reading discussed in the previous section. Spinoza therefore does not set out from the simple essence of God at the start of *the Ethics* but rather begins by constructing his essence the way that, elsewhere, he constructs the essence of the circle or that of the sphere, namely by defining the parts of the composite being in question and the transcendence of these through the affirmation of an essence. One may thus speak (as Deleuze does[57]) of an 'evolution' in Spinoza's philosophy: from an early phase where God's essence is simple and the perfection of his essence equated with simplicity, to a later phase where his perfection is characterised not by simplicity but by its opposite, *viz.* complexity.

Before the nature of God can be adequately explained, the definition and interrelation of the parts involved in his being therefore first must be given. This is the task undertaken in the first pages of *the Ethics*; arguably some of the hardest to penetrate in the entire treatise. Employing a Cartesian terminology, Spinoza thus speaks of 'attributes', of 'substances' (*plural*) and of 'modes'; the latter following like 'affections[58]' of a given substance through which they are conceived (EId5). Substances are defined as self-conceived (EId3), something which sets them apart from modes. They also are defined as prior to the modes (EIp1) and the relationship between the two categories therefore is a clear and hierarchical one.

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[57] Deleuze, 2004: 148.

[58] In Spinozism, the terms 'affection' and 'mode' may, in certain circumstances, designate the same phenomenon. As EID5 states, 'By mode I understand the affections of substance, *or* that which is in another through which it is also conceived.' The correlation between modality and affection predominantly is emphasised when the world is understood 'substantially', i.e. from the perspective of substance. When the world is understood 'modally' - i.e. from the perspective of the modes - an affection rather is something that the mode must suffer in its encounter with other modes; a passion.

Things are a bit more complicated as regards the relationship between substances and attributes. An 'attribute' is qualified as that which *constitutes* a given 'substance's' essence (EId4), yet no proof is offered as to exactly how this essential constitution takes place. This is later to change, but at this point in the treatise the explication of this problem is deferred and the distinction between the two categories therefore remains vague and abstruse. In the early propositions of *de Deo*, a substance is defined as a phenomenon constituted by a *single attribute* which explicates it in a particular way; something that makes Spinoza's definition of the concept practically indistinguishable from the concept as it is found in Descartes. One thus may conceive a substance constituted by the attribute of *Thought* (this would be a 'substance' *involving* all thoughts) and a substance constituted by the attribute of *Extension* (i.e. a 'substance' *involving* all extensive beings).

These 'substances with a single attribute' are characterised i) by being distinct (EIp2 & EIp3), and ii) unique (EIp5); something that means that iii) they cannot produce affects in one another (EIp6). They also are said iv) to *exist necessarily* and be *cause of themselves* (EIp7), and v) to be *infinite in their own kind* (EIp8). As such, it is impossible for a substance with a single attribute to cause or affirm anything in another substance. A substance constituted by the attribute of Thought therefore is not able to produce a cause in a substance constituted by another attribute, for example the attribute of Extension[59]. It furthermore is impossible to imagine a substance as not existing, just as it is impossible to imagine that such a substance could be in any way limited. These are the characteristics or *properties* of such substances.

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[59] Here, Spinoza contradicts one of the central Cartesian propositions, that God and Man are capable of having thought command the behaviour of body. Man, for instance, is thought to have a centre in the brain - the infamous 'penal gland' - which could be acted on by the spirit and thereby convey the desires of the mind to the appropriate areas of the body. In this way, the attribute of thought and that of extension could influence each other, even if this was not the case for other beings, such as animals, the behaviour of which was seen as entirely mechanical. The issue of the complication of attributes - which to the mind of Spinoza is impossible - is taken up again in EIVpreface.

With substances preliminarily defined as infinite in their own kind, self-conceived and absolutely distinct, the picture at this early stage of the treatise is thus of a multitude of substances with nothing in common and no interaction whatsoever. They coexist but do not interact with each other in any way; one substance being unable to provoke or cause an affect in another. This changes with the 11th proposition which reads:

> God, *or* [*sive]* a substance consisting of infinite attributes, each of which expresses eternal and infinite essence, necessarily exists (EIp11).

This is a highly complex proposition, involving both the notions of substance and attributes and furthermore introducing the notion of God. At first sight, it seems to merely state with respect to God what already has been stated with respect to the substances of a single attribute: that he exists 'necessarily'. But more is going on here than just that. First of all, it is important to note that the proposition in fact *identifies* God with substance through the Latin word '*sive'* which signifies an identity in terms rather than a difference; a crucial aspect lost when translated into the English 'or'[60]. For the first time of the treatise, Spinoza therefore does not treat of 'substances with a single attribute' (plural), but of 'God or [*sive*] substance' (now, crucially, in the *singular* form).

It transpires that this is no substance like the ones discussed in the early propositions. Defined as consisting of 'infinite attributes', the substance evoked in EIp11 distinguishes itself radically from such substances (which involved just one attribute) and indeed from the other kinds of 'substances' found in the philosophical tradition whether in Scholasticism or Cartesianism. Substantiality, in Spinozism, therefore is monistic, not plural; at the same time, God is taken to be complex, not simple. Having introduced and defined the *substances consisting of one attribute* in the first 10 propositions of the treatise, Spinoza brings these together like so many parts in the constitution of his complex or composite God.

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[60] When '*or'* is given in *italics* it translates the Latin *sive* or *seu* which - as Curley notes - 'normally indicates an equivalence rather than an alternative' (Curley, in Spinoza, 1996: xix).This thesis follows Curley in making apparent this specification.

The proof for this proposition proceeds in the same way as the proof of the circle from the line with one end fixed and one end moveable or that of the sphere from the rotating semicircle, viz. by showing the *ecstatic* genesis of a complex being from the spontaneous integration of constitutive or 'simple' elements and the concurrent affirmation of a concept (here: the concept of God).

But unlike the circle and the sphere which constitute possible beings - and which therefore depend on a proximate cause for their actualisation - the spontaneous genesis of God or substance follows necessarily from the absolute perfection of his essence. There therefore is no proximate cause responsible for the animation of God because God himself, *qua* infinitely perfect, is *cause sui.* And there can be no thing outside of God lest the essence and power of God be limited which in turn means that he must involve and integrate all of the things of this world which in this case mean the substances with a single attribute. Without the concept of God, the substances with a single attribute therefore remain separate in the manner described in the earlier propositions. But once the idea of God is affirmed, they are spontaneously united in the affirmation of his infinitely perfect being.

Significantly, this does not change the characteristics of the substances with one attribute - for instance they cannot cause affects in each other - but it now is clear that they are subsidiaries to God or substance; simple parts enveloped in his complex being. A 'substance with one attribute' in fact is what Spinoza calls an 'attribute' (Note: for this reason they are designated henceforth by this thesis merely as 'attributes'). These attributes retain all of the characteristics as originally defined (EIp5 & EIp6), but they now are mobilised in an idea that supersedes them (EIp11). The essence of God is thus the reason or 'power' that corresponds to the spontaneous integration of the attributes in Substance. The power of this reason derives from its perfection; only an absolutely perfect being would have the perfection to unite the attributes .

However this perfection is not explicitly discussed in EIp11, but in the propositions that precede it: EIp9 & EIp10. (If I have postponed their explication till now it is because the affirmation of God as a substance uniting the attributes makes it easier to understand the meaning of propositions 9 and 10). In EIp9 it thus is asserted that 'The more reality or being a thing has, the more attributes belong to it'. This introduces the possibility that a thing may have more than one attribute and that a substance's capacity for *possessing* attributes is in some way a function of its level of *reality* or perfection. The correlation between the *reality* of a given being and its *possession of attributes* is further emphasised in EIp10schol which holds that '[…] it is far from absurd to attribute many attributes to one substance. Indeed, nothing in Nature is clearer than that each being must be conceived under some attribute, and the more reality, or being it has, the more it has attributes which express necessity, *or* eternity, and infinity'.

One here sees the invisible geometrical hand of Spinoza; the patient construction of an idea in the mind of the reader. The Cartesian affirmation of substances with a single attribute (the extended thing and the thinking thing) is thus rejected or at the very least modified; at the same time the idea is introduced that a being with infinite power and infinite attributes may exist. Together, EIp9, EIp10 and EIp11 thus may be said to preside over the genetic construction of God's essence or being - what he *is:* an infinitely complex being, spontaneously involving all of the attributes - in the mind of the reader.

But in actual fact, the full definition implies all of the first 11 propositions. For God to be able to affirm his essence, it is necessary that the elements that are involved in this essence (the attributes) first are defined. It is therefore only through the concerted explication of the first 11 propositions that the possibility of an absolutely infinite substance - i.e. a substance whose perfection exceeds that of its attributes - is suggested and ultimately affirmed. Insofar as *perfection* is said to correspond to *reality*, these propositions come together in defining God or substance as not only the most *perfect* being but also the most *real* being, what we might call the *Ens realissimum*.

There is one last thing to affirm as regards the relationship between substance and the attributes. This is to do with the 'explicative' nature of the attributes. As just demonstrated, the attributes *constitute* substance as elements or parts coming together in a whole. They thus are spontaneously united in and through substance like so many tributaries flowing into a river. But according to EIp11 the attributes also are the elements *through which* the essence of this substance is explicated or 'expressed'. This gives them a double role, as both constituting God or substance and expressing his essence. In order to understand how this can be one must differentiate between what God's being is and what his essence is. God in effect is the union of all of the attributes. But his essence is the infinite power that unites them. It is this power that, once affirmed, flows from his essence or nature towards the things of this world by way of the attributes.

2.3.2. From the *causa sui* to the *causa omnium rerum* (EIp15-18): the order of reasons pivots

The discussion of the essential nature of God or substance is completed by propositions EI12-14 in which his properties are provided; like the attributes, he is indivisible (EIp12-13), infinite and unique (EIp14). But unlike the attributes he is said to be 'absolutely infinite' (his 'infinity' being of an infinitely higher order than the infinity of attributes that he implicates[61]). With this, the definition of God or substance is complete. Spinoza now turns to the explication of God's power - the way he *acts,* rather than what he *is* - which in this context is taken to mean the way he produces the modes. The treatise thus moves from the explication of God as a cause that produces itself (*causa sui*), to the explication of God as a cause that produces 'all the things' (*causa omnium rerum*).

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[61] As Gueroult notes, the infinity of God is different from that of the attributes insofar as it is 'absolute' (Gueroult, 1968: 168-69 & 177-78). The attributes are 'infinite in their own kind', whereas God or substance is absolutely infinite. The differences is to do with orders of magnitude. If there are an infinity of attributes - each of which is infinite - then the infinity of God must be absolute insofar as it integrates an infinity of infinities.

There are in fact many layers to this transition. In pivoting from the *causa sui* to the *causa omnium rerum,* the treatise also pivots i) from what might be termed a *substantial perspective* on the world (in which everything is one, univocal, beyond division) to a *modal perspective* where the things of this world are discrete, distinguished and infinitely subdivided; and ii) from a *logical* perspective (where the things are mere 'properties' of God's essence) towards a *causal* perspective (where the things are verily caused by God or substance). The perspective that begins to manifests itself is thus of a modal, fractured, and causal world rather than substantial, whole, and logical one. These, Spinoza explains, are complimentary perspectives. They express the same thing, even if the substantial perspective is the more adequate one of the two[62]. It therefore is not contradictory for him to affirm both the substantial and the modal perspectives.

Spinoza advances cautiously, systematically, in this shift of emphasis from substantial to monadic perspective. The pivot of the treatise therefore by no means is an instant one. It is initiated in EIp15 which reads: 'Whatever *is*, is in God, and nothing can be or be conceived without God'. Evidently, those beings that are 'in God' and whose existence and 'conception' depend on him must be the *modes* (that this is so is confirmed in EIp15dem[63]). The proposition thus

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[62] Discussing the matter of God or substance's indivisibility, Spinoza for instance writes: […] we conceive quantity in two ways: abstractly, *or [sive]* superficially as we imagine it, or as substance, which is done by the intellect alone. So *if we attend to quantity as it is in the imagination, which we do often and more easily, it will be found to be finite, divisible, and composed of parts [that is: modal]; but if we attend to it as it is in the intellect, and conceive it insofar as it is substance, which happens with great difficulty, then (as we have already sufficiently demonstrated) it will be found to be infinite, unique and indivisible […]* matter is everywhere the same and […] parts are distinguished in it only insofar as we conceive matter to be affected in different ways, so that its parts are distinguished modally, but not really (EIp15schol.)

[63] Spinoza writes: 'Except for God, there neither is, nor can be conceived, any substance (by P14), that is (by D3), thing that is in itself and is conceived through itself. But modes (by D5) can neither be nor be conceived without substance. So they can be in the divine nature alone, and can be conceived through it alone. But except for substance and modes there is nothing (by A1). Therefore. [NS: everything is in God and] nothing can be or be conceived without God, q.e.d. (EIp15dem.)'

reintroduces into the order of reasons the notion of modality; an aspect of the ethical world which largely has been ignored in the initial discussion of God's being. The demonstration also stipulates that the relationship between the modes and substance is an immanent one, the former existing as it were *within* the latter.

This is reaffirmed in the scholium which states that 'All things, I say, are in God, and all things that happen, happen only through the laws of God's infinite nature and follow (as I shall show) from the necessity of his essence' (EIp15schol.). The fact that Spinoza writes that the modes 'follow' from God's essence is taken by Gueroult to indicate that this is still a formal rather than a causal perspective (Cf. Gueroult, 1968: 243-45). The modes thus are perceived as properties that follow or 'flow' from an essence (the way the properties of the circle follow from its essence), rather than things produced by a cause in a causal or mechanical system.

A causal perspective begins to manifest itself in proposition EIp16 and in its corollaries (there are three). The proposition - considered one of the defining moments in the treatise[64] - states: 'From the necessity of the divine nature there must *follow* infinitely many things in infinitely many modes, i.e., everything which can fall under an infinite intellect' (EIp16). It thus introduces the idea that an infinitely infinite reality exists (i.e. a reality in which an infinity of modes are expressed by an infinity of attributes which are involved, in turn, in substance; this is what Spinoza calls 'absolutely infinite'). But it also preserves the formal or logical perspective where things follow from the nature of God rather than being caused by him.

This changes with the corollaries the first of which states that 'God is *the efficient cause* of all things which can fall under an infinite intellect' (EIp16corol.1, emphasis added). In the philosophical tradition, 'efficacy' designates the ability to

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[64] Tschirnhauss - in his correspondence with Spinoza - refers to EIp16 as 'almost the most important proposition of the first book of the treatise' (Ep, LXXXIII).

cause something in something else, the way for instance a billiards ball in motion may cause movement in another. In deploying the notion of 'efficient cause' Spinoza thus indicates that God now is treated as cause rather than essence, and the production of the modes therefore becomes a matter of *causation* rather than a *logical* exigency[65]. This is reaffirmed in EIp16corol.3 which asserts that God 'is absolutely *the first cause* [*prima causa*] ' (EIp16corol.3; emphasis added), which here means that he is the cause that suffuses all the causal relationships of this world such as these unfold between the modes.

By introducing a causal perspective at the expense of a purely logical one, EIp16 (with its corollaries) thus separates God or substance from the modes. In doing so, the nature of the immanent relationship that otherwise existed between the two also changes. The modes, therefore, are not 'contained' in God in the same way as they were before (that is: logically). They are *caused* by him rather than *flow* from in him. This does not mean that the relationship between substance and modes is no longer immanent. But it does introduce a different kind of immanence; one that corresponds to a causal reading rather than a logical or substantialist one.

In the substantialist perspective, the things are *in God* the way the properties of a triangle may be said to be 'in' the triangle (e.g. that it has three sides, that its interior angles must total 180 degrees, etc.). As Gueroult rightly observes (Gueroult, 1968: 223), this is immanence as 'containment' or '*panentheism'*, meaning that everything [*pan*] is in [*en*] the divine being [*theism*]. Immanence according to the causal perspective in a way reverses this relationship.

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[65] Viljanen agrees with the assertion that the treatise pivots from a general concern with God's essence and the things that can be derived from it in EIp15, towards a general concern with power from EIp16 onwards. As he writes: 'There is nothing outside God (1P15), and because no thing can exist without its necessary properties, we arrive at 1P16 which asserts that God necessarily brings about all the properties inferable from his definition (which, in fact, means that God realizes all genuine possibilities). Now, precisely at this point - and no earlier - the notion of power steps in: the realization of this necessary system of entities requires power [...] real beings require power even at the most fundamental level, just as the Eleatic Stranger would have it' (Viljanen, 2011: 62).

Immanence, here, does not signify that things are in God, but rather that God (or God's power) is in the things. Gueroult classifies this tendency as '*pantheism'*, the omnipresence in nature [*pan*] of God's being or power [*theism*].

The pantheist form of immanence that pertains to the modal perspective adds an important aspect to the understanding of the modes: that they are imbued or suffused with God's power. As the reader laters learns, each mode carries within itself a finite part of God's infinite power, this power being identical both to its essence and to its ability to persist in duration (the so-called *conatus*). If a mode can exist, if it has an essence, it therefore is because it involves God's power in accordance with a pantheist principle of immanence. One now sees the profound shift that occurs in these seemingly drab propositions. Causality replaces pure logics, the substance-mode relationship now is viewed from the point of view of the modes, and the notion of immanence - so crucial to Spinozism - becomes pantheist rather than panentheist.

With this, Nature itself breaks off into two modes or perspectives. One that is causal but cannot itself be caused (God or substance; the attributes). And one that is caused but itself also causative (the modes). The two sides of this split corresponds to what Spinoza will later call 'naturing nature' (Lat: *natura naturans*) and 'natured nature' (*natura naturata*)[66], thus introducing yet another set of categories. Lærke lists the characteristics of these two 'natures' as they are found on either side of proposition EIp16 (the arrow [→] signifies the transition from cause to effect):[67]

Deus = Ens = substantia = causa sui = potentia agendi
→
Deus quatenus = res = modus = causa = conatus

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[66] Cf. EIp29schol.

[67] Lærke, 2008: 657.

This, then, is a transition from Being [*ens*] to things [*res; modus*]; from the cause of itself [*causa sui*] to causality *tout court* [*causa*]. It furthermore is a transition from an enquiry concerned exclusively with the constitution of God [*Deus*] to an enquiry that concerns itself with God insofar as he is explicated in the attributes [*Deus quatanus* meaning literally 'God insofar as…'][68]. Perhaps most importantly of all, it involves the transition from the infinite power of God [*potentia agendi*] to the limited and finite power for action that pertains to the individual mode [*conatus*].

One here sees the contrast between the two perspectives explored by Spinoza in the two first sections of *de Deo.* Where the perspective of the first part of *de Deo* constitutes an enclosed, almost solipsistic, reference to the definition and nature of God's essence - a necessary excursus that Spinoza has to make in order to define the complex God (*Ens realissimum*) that is particular to *the Ethics* - the perspective of this latter part provides a definition of how God, once constituted, turns his hand at the production of the things in this world.

2.3.3. The infinite modes or the problem of causation (EIp19-23): From *God or the attributes* to the *finite modes*

Spinoza spends the next propositions discussing the nature and qualities of the attributes, establishing once more that they are in God (EIp18), that they are eternal (EIp19) and that they both *explain* and *express* his essence (EIp20). It is not uncommon for him to sum up or rehearse the findings already made before launching into the explication of a new problem, and that seems to be what he does here. Significantly, however, the proposition EIp19 includes the expression 'Deus, *sive* attributa' (God *or* attributes; as opposed to God *or* Substance). This indicates that the focus of the the treatise now has turned towards the attributal

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[68] The expression is found several places in the Ethics, for instance in EIp29schol. which in the original Latin rendition reads: 'Deus, quatenus, ut causa libera, confideratur'. Curley translates this as: ' God *insofar as* he is considered a free cause' (emphasis added).

expression of modes, i.e. the way that the attributes produce the modes (as opposed to the way that they constitute God). As Gueroult writes:

> The equation *Deus, sive attributa*, announced for the first time in proposition 19, signifies that it increasingly is a question of understanding God in regards to the face that he turns towards the things of which he is the cause, that is to say, less in his substance than in the attributes of which this substance is constituted, insofar as one may consider them as causes and seats [*les assises*] of natured nature (Gueroult, 1968: 343.).

What might be termed the 'problem' of modal production is thus introduced in EIp19, but it only really is broached with EIp21-EIp23. The problem that Spinoza needs to resolve, here, involves a certain degree of complexity. Having explained that God is infinite and infinitely perfect, he now must explain how this perfect being can come to express itself in the modes (imperfect and finite) without contradicting its own nature. This is a logical or mathematical problem which concerns the issue of squaring different orders of magnitude. More specifically, how does one move from that which is infinite (God or substance; the attributes) to that which is finite (the modes)? Spinoza overcomes this problems by introducing another category of being: the so-called 'infinite modes'.

The purpose of the infinite modes is to facilitate a passage from the infinite to the finite. As such, they occupy a place somewhere in-between the categories of substance and attributes (self-caused, perfect, infinite; 'naturing nature') and that of the finite modes (caused, imperfect, finite; 'natured nature'). The clue in fact is in the name. Infinite modes are 'infinite' in the sense that there are no bounds to them; in this they are like substances/attributes. But they also are something expressed or caused rather than something expressive or autopoietic, and so in this they are 'modal' rather than substantial. Because of the infinite modes, God can express himself all at once in another infinite medium thereby avoiding the contradiction of expressing his infinite perfection in something finite. Each attribute thus expresses itself in infinite modes which means that there are infinite modes for both the attribute of Thought and the attribute of Extension.

A further qualification applies. Spinoza distinguishes between the infinite *immediate mode* and the infinite *mediate* mode[69]. The former refers to what is caused 'immediately' by God *qua* attribute, that is: to that infinite mode which is produced *without* the intervention of an intermediary cause. The latter refers to what is produced 'mediately', that is: to that infinite mode which is *produced by way of* another cause or series of causes. Each attribute expresses itself in these two categories of infinite modes. There thus is an infinite immediate mode and an infinite mediate mode that pertain to the attribute of Thought. And an infinite immediate mode and infinite mediate mode that pertain to the attribute of Expression (and presumably the same applies for all the other attributes of which Man has no knowledge or experience). These are complex propositions which have caused scholars much concern[70]. But as I hope to show, they are crucial to the understanding of modal production and so are worth unpacking in detail.

As regards the attribute of Thought, *the infinite immediate mode* is given as the 'absolutely infinite intellect' (Ep. LVIV). The conventional reading of this rather obscure definition is that it refers to 'the mind of God' as a mind containing or involving all minds (or essences; recall that the two are identical). This relies on the premise that a particular mind or essence may contain or imply other essences. The essence of a hand for instance may be said to be implied in the essence of an arm, and the essence of the arm in that of the body, and so on. If one were to continue this movement infinitely upwards - hand, arm, body, species, etc. - the assertion is that one would end with an essence or mind which contains all essences or minds, this mind being that of God.

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[69] By EIp23dem '[…] the mode, which exists necessarily and is infinite, has had to follow from the absolute nature of some attribute of God - either immediately (by P21) or by some mediating modification, which follows from its absolute nature, that is (by P22), which exists necessarily and is infinite, q.e.d.'.

[70] Schuller, for instance, asks Spinoza to clarify the matter by providing 'examples of those things immediately produced by God, and of those things produced by the mediation of some infinite modification' (Ep. LXIII).

Note that the *attribute of Thought* is not identical to *God's infinite intellect*: the former being an inherently productive force (and thus part of 'naturing nature'), the latter an entity produced (and thus part of 'natured nature'). This is an important difference to note insofar as it dissociates God's mind from the production of this world, thus making it impossible for God to 'choose' the best of all worlds, as he does, for instance, in Leibniz. It also foregrounds God's productive nature, indicating that God *produces* before he *understands* (production in this sense comes before essence; formation before form).

The definition of the *infinite immediate mode* pertaining to the attribute of Extension is somewhat clearer with Spinoza defining it simply as 'motion and rest'; a term also known from Descartes where it designates the most primitive state of materiality (cf. Descartes Pr II 37-39). What the attribute of Extension imparts to the infinite immediate mode therefore is the capacity for affection or modification by way of motion and rest, with different corporeal constellations potentially arising from this primitive state. As Spinoza will go on to define in his 'Small Physics' - a part of the treatise that I return to shortly - corporeal modes therefore may differentiate themselves from one another by embodying and presiding over different relationships of corporeal movement and rest. A billiards ball, for instance, will preside over a series of acrylic bodies whose patterns of movement and rest it dominates and orders in a spherical form that corresponds to its essential nature.

Problematically, Spinoza never provides the definition for the *infinite mediate mode* pertaining to the attribute of Thought; quite possibly because such a mode cannot be imagined (I discuss why that may be in the next section of the thesis). However the *infinite mediate mode* pertaining to Extension is given as: 'the face of the whole universe [*facies totium universi*], which, although varying in infinite ways, yet remains always the same'[71]. This effectively designates the constant

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[71] All quotes in this paragraph are taken from Spinoza's letter to Schuller, Ep. LXIV.

fluctuations of the material world occurring as a function of bodies having the capacity for involving and inducing patterns of corporeal movement and rest.

Obscure as they might seem, what Spinoza outlines with these propositions are the frameworks of modal production and interaction as these apply to the different attributes. Sequence, as always in Spinoza, is important here. First, an infinite mode is produced *immediately* by the attributes: this is 'the intellect of God' as regards the attribute of Thought, and the capacity for 'motion and rest' as regards the attribute of Extension. Next, a second infinite mode is produced *mediately* - that is: *by way of the immediate mode* - as in the infinite modulations of the material universe that arise from states of movement and rest in Extension.

Why divide this process into two? The answer is to do with abstraction and the movement towards the finite - towards 'number' - from that which is infinite, or so to speak 'beyond number'. Spinoza inserts a layer of reality between the infinitely perfect nature of God or substance and the imperfect nature of the modes in order to make this transition more palatable. He cannot proceed directly from infinity to finitude, from naturing nature to natured nature. God *qua* attribute thus expresses himself firstly (and directly, immediately) in something that is abstract like the quality of movement and rest or the notion of an absolutely infinite intellect, and secondly (and indirectly, mediately) in something that is more concrete (but also more imperfect) such as the ever-changing face of the universe.

2.3.4. Producing the finite modes (EIp24-28): the infinite series of Spinozism

Why does Spinoza not define the infinite mediate mode for the attribute of Thought when he provides it for Extension? The reason for this omission is never given - Schuller, who presses him on related matters, is not given an answer(Ep. LXIII & LXIV.) - but the most probable explanation is that it is to do with a difference in the way Spinoza conceives the production of the different kinds of

finite modes, i.e. *the extended modes* and *the essential modes,* or: the bodies and the minds.

These distinct and fundamentally different production processes are the subject of propositions EIp24-29. In these propositions, the reader learns that finite extended modes - or 'bodies' - are produced in *duration* and their existence therefore involves endurance and, more abstractly, temporality. It is because bodies exist that they must endure, and, conversely: it is because they endure that they must at one point cease existing (this happens when another body causes the body's extinction).

'Minds' or essential modes, on the other hand, are not theorised as temporal. Essences rather are posited directly - or immediately - in the mind of God, and may therefore not be extinguished or annihilated the way bodies may. This also means that they do not endure like bodies do. They rather are eternal or sempiternal phenomena residing in the infinite intellect of God which means that neither temporality[72] nor causality pertains to them (although the latter is a somewhat contentious issue[73]). Insofar as essences are posited directly in the

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[72] This for instance may be seen from EIp24dem. which states that '[…] whether the things exist or not, so long as we attend to their essence, we shall find that it involves neither existence nor duration'.

[73] The question of *essential causality* is a problematic issue in Spinozism. As I write elsewhere:' Spinoza in fact seems to contradict himself on the matter. From EIp21-23 it is clear that essences cannot stand in a causal relationship to each other. The same is affirmed in Spinoza's letter to Schuller (Ep. LXIV). However, in EIIp9dem Spinoza states that '[…] the cause of one singular idea is another idea, or God, insofar as he is considered to be affected by another idea; and of this also [God is the cause], insofar as he is affected by another, and so on, to infinity, q.e.d.' The demonstration underscores the parallelism between essential and corporeal reality but squares awkwardly with the characteristics of essential reality and represents something of an unresolved – even paradoxical – issue in Spinozism '(Weissenborn, 2015: 41). I subscribe to the reading that essence do not 'cause' each other even if they might 'imply' each other. This also is the position of Deleuze who asserts that 'if all essences agree, this is just because *they are not causes one of another*, but all have God as their cause' (Deleuze, 1968, 194; emphasis added). Gueroult makes a similar statement, distinguishing between physical causes (between bodies) and metaphysical causes (between essences). He writes: 'It is

mind of God - and insofar as causality does not pertain to them - there therefore is no need for an infinite mediate mode for Thought which would explain why Spinoza does not discuss it.

These propositions prepare the ground for Spinoza's discussion of corporeal production by pointing to the phenomenon of modal causation as this pertains to the bodies. The production of bodies necessarily involves a causal element - the 'proximate cause' discussed earlier - insofar as they are only potential beings. One body (or series of bodies) thus causes the actualisation in existence of another body which again - at least potentially - may cause the existence (or demise) of another body and so on to infinity. As EIp28 states.

> Every singular thing, *or* any thing which is finite and has a determinate existence, can neither exist nor be determined to produce an effect unless it is determined to exist and produce an effect by another cause, which is also finite and has a determinate existence; and again, this cause also can neither exist nor be determined to produce an effect unless it is determined to exist and produce an effect by another, which is also finite and has a determinate existence, and so on, to infinity (EIp28).

This infinite causal chain later is referred to as 'the common order of Nature' (EIIp29dem. and EIIp30dem.); a term which designates the state of affairs in the mediate infinite mode of Extension at the same time as it highlights the latter's distinction from the infinite intellect of God (the Royal order of Nature?). Unlike the infinite Intellect of God, the common order of Nature is characterised by its randomness but also its necessity. Bodies thus are determined to be produced and annihilated in an infinite chain by way of 'fortuitous encounters with things'

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not that the essences are not in a certain sense causes, because they involve in themselves the content by which, from all eternity, is expressed the divine force that produces them and that lives in them, that by which existence is promoted and what makes it persevere, to the extent that the external order of things permits it. But to the extent that they [the essences] are forces of a pure interiority [*des forces purement intérieures*] that do not act on one another, *because no essence acts on another,* these kinds of causes must be *metaphysical*. Conversely, the singular existences [i.e. the corporeal modes], which act on one another and depend for each mode on the action of others, are not metaphysical causes, but *physical* causes'(Gueroult, 1968: 335-6; my translation, emphasis added)'.

(EIIp29schol.); encounters which in turn are characterised by causality and exteriority. [W]e are dealing,' writes Deleuze, 'with an extrinsic order, that of the inadequate: the order of encounters, the 'common order of Nature', which is said to be 'fortuitous' since it does not follow the rational order of relations that enter into composition, but which is necessary nonetheless since it obeys the laws of an external determinism operating proximately' (Deleuze, 1988: 93).

The distinction in the manner whereby bodies and essences are produced is now apparent. The nature of the essential does not allow it to be produced causally (the relationship between essences is implicative rather than causal). Essences also do not stand in an extrinsic relation to each other the way bodies do and they necessarily must be adequate (there is no such thing as an inadequate essence). A process of mediate-causal production - such as the one imagined in the common order of Nature - also does not apply to essences insofar they are posited *directly* or immediately in the mind of God. Bodies therefore are produced mediately, randomly; essences on the other hand are produced immediately, reasonably. If they express the same thing - God's essence - they thus express it by way of different *modi operandi*.

These propositions are a testament to the strict rigour with which Spinoza approaches the task of moving from substance to modes (with all the problems that this entails). This makes them important in themselves. But they also are significant inasmuch as they describe the exact way that God produces bodies and essences differently. God or substance therefore does not act immediately in the infinite mediate mode of extension, only mediately, which is to say that he imparts to this mode a vital impulse which - translated into relations of movement and rest - is played out in an infinite series of causal activity and experimentation (the common order of Nature). In this infinite causal series, bodies collide with other bodies, sometimes recoiling from each other, sometimes becoming embroiled with each other in complicated corporeal arrangements. As such, the common order of Nature constitutes a kind of production that is characterised by

an infinitely cascading activity unfolding in an open-ended ontogenetic process. It is this process that always is operating within the total face of the universe.

2.3.5. The essence of God is power (EIp29-36): The two parts of *de Deo* are collapsed into one

In the last propositions of *de Deo* Spinoza discusses the characteristics of God as these pertain to his way of producing (which is characterised as 'necessary') and his essence. Partly, these propositions are there to fend off Cartesians and Schoolmen for whom God produces in a different manner. Partly, they are there to outline an original take on the so-called Cosmological argument concerning the primary cause of causality (if the universe is causal, then who or what set this causal chain in motion?). Their main contribution, however, is to unite the two parts of *de Deo* - the one detailing the construction of God's essence, and the one detailing his productivity - into a single powerful proposition: that God's essence is identical to his power. It is in effect this proposition that the whole of *de Deo* builds toward.

Let us start with the first argument. To Cartesians and Schoolmen, God's productivity either is characterised by his creative Will (Descartes) or his providential Intellect (Schoolmen[74]). Accordingly, God produces the things in this world *voluntarily* (Descartes), or through a benevolent *reason* (Schoolmen, e.g.

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[74] Counter to Saint Thomas - who maintains that God is 'moved to act from some sort of [...] apprehended good' (SCG II, 24. 1-2) - it therefore is the 'will' of God which is determinative of 'the good' (not the other way around) for Cartesians. Dutton sums up the difference between Descartes and Saint Thomas rather nicely: [T]he goodness of [a given] mode of creation', he writes, 'is due entirely to God's ordination. And insofar as God's will is in no way determined by, but is the determiner of, the goodness of that which it creates, it can be said to be entirely indifferent. [Accordingly] indifference proceeds not from a failure to apprehend the good but from the fact that it is the divine will itself which establishes the good. Such indifference, then, follows directly from the infinitude of God's power and signifies not imperfection, but perfection' (Dutton, 1998: 195).

Saint Thomas[75]). In both cases, a certain level of arbitrariness exists insofar as God - in theory - may choose to order the world differently. For Descartes's God such changes might be precipitated by a whim, his God being essentially 'indifferent'[76]. For the God of Saint Thomas, it will be the realisation that another world could be more perfect, his God thereby a constantly calculating God (this of course later is taken up by Leibniz, who refers to this world as 'the best of all possible worlds', thereby indicating the choice of a divine maker).

Spinoza's God is radically different from these Gods. Rather than producing in accordance with a benefactual principle or an indifferent will, the chief characteristic of the God of *the Ethics* is that he produces *necessarily*. More specifically, Spinoza's God is compelled to produce in a necessary and rational manner which at once precludes *equivocation* (God cannot change the rules of the universe as he pleases) and *benefaction* (God is not restricted by concerns for 'the Good'). It thus

> follows from his perfection that things could have been created by God in no other way or order … [and] that all God's decrees have been established by God himself from eternity. For otherwise he would be convicted of imperfection and inconstancy. But since, in eternity, there is neither *when,* nor *before,* nor *after*, it follows, from God's perfection alone, that he can never decree anything different, and never could have, *or* that God was not before his decrees, and cannot be without them (EIp33schol.2; *original emphasis.*).

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[75] Saint Thomas writes: 'The 'good apprehended' [*bonum apprehensum*] is the object of the
will. Therefore the will tends to something only if it is apprehended under the aspect of good [*sub ratione boni*]' (ST IaIIae.8.1). The will referred to is of course the Divine will, i.e. the will of God. Later, Saint Thomas expands on this analysis, writing that the divine will be moved by 'that which is apprehended as being good and suitable' [*id quod apprehenditur sub ratione boni et convenientis*]' (ST IaIIae.9.2:). See also DM 6: 'The object that moves the will is the suitable good apprehended [*obiectum movens voluntatem est bonum conveniens apprehensum*].'

[76] As he writes: 'It is self-contradictory to suppose that the will of God was not *indifferent* from eternity with respect to everything which has happened or will ever happen; for it is impossible to imagine that anything is thought of in the divine intellect as good or true, or worthy of belief or action or omission, prior to the decision of the divine will to make it so. I am not speaking here of temporal priority: I mean that there is not even any priority of order, or nature, or of 'rationally determined reason' as they call it, such that God's idea of the good impelled him to choose one thing rather than another (AT VII: 431-32; *emphasis added*).

Does the exigency with which he acts deprive Spinoza's God of his power or make him a slave of events as they unfold? Is this a limited God? One might be lead to think so, but this is not the case according to Spinoza. The argument hinges on what it means to be 'limited'. In Spinozism, that thing is limited which is caused or determined by something else. This, for instance, is the case in the common order of Nature where one mode determines another into existence or annihilation in an infinite causal chain. On the other hand, that thing is free which is sovereign and acts solely in accordance with its own essence, unencumbered by affections or passions. This is the case for the attributes and for Substance which only *cause* but are not themselves *caused*, or at least are not caused by anything but themselves.

If God is not 'limited' in the Spinozist sense of the word despite the fact of acting in a necessary way it thus is because he acts exclusively in accordance with his own essence, which of course is what is expressed in the spontaneous integration of the infinite attributes. One here sees the influence of Stoicism on Spinoza. Stoicism is centred on that *ethical imperative* to live in accordance with one's own essence and to accept but not be affected by the turmoil of affects that surrounds one's body insofar as it exists (for this reason, the Greek Stoics strove to be *apathetic*: free from 'pathos' or emotions). This points to the significance of the essence as something which corresponds to a body. But it also reveals the essence's correspondence with power (i.e. the power not to be affected).

Power in the Spinozist sense of the term is to be able to act in accordance with one's own essence and one's own essence only, with 'necessity' signifying an unfaltering adherence to this principle. If God is infinitely powerful he therefore also must necessarily exist and act in absolute accordance with his essence, and so God therefore acts necessarily. These considerations are the premise of the absolutely central proposition 34, which states:

> *E1p34*: God's power is his essence. *Dem*: For from the necessity alone of God's essence it follows that God is the cause of himself (by P11) and (by P16 and

P16C) of all things. Therefore, God's power, by which he and all things are and act, is his essence, q.e.d.'[77]

The fact that power and essence are identical in God unites the two parts of *de Deo* whose split has otherwise defined its internal structure. On the one hand: God as essential being (the spontaneous integration of the attributes). On the other: God as powerful being (modal production as expressed through the attributes by way of the infinite modes). It thus pertains to God's essence to produce or cause which means that for Spinoza, the essence of God or substance - infinite and eternal as it is - effectively is identical to an infinite capacity for causation. What this means concretely is that the infinite chain of causation unfolding in the common order of Nature and the corresponding infinite chain of ideas implicated in God's infinite intellect thus express God's power to the extent that the latter constitutes an infinite capacity for production.

This causal exigency gives Spinoza's metaphysics a unique perspective on the so-called Cosmological Argument which concerns the order of the universe and its derivation from a first cause. The Cosmological Argument is primarily known from the work of the Schoolmen and as such is heavily imbricated with their theorisation of final ends and a great chain of being. Scholastic philosophy take it to be beyond discussion that a first cause [*primum movens*] or unmoved mover[78] exists and that the universe (and the processes unfolding in it) therefore must be non-eternal. The causes of this world thus refer back to the unmoved mover which is himself uncaused and so an infinite series of causes like the one imagined by Spinoza is an impossibility (the series is finite).

The brilliance of Spinoza's metaphysics therefore consists in demonstrating - as I believe he does in *de Deo* - that there can be an infinite series of causal action, i.e. that a causal series can be imagined that is not instantiated by a first instance

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[77] Spinoza makes a similar assertion in his book on Descartes' Principles of Philosophy: '[T]he power by which the substance preserves itself', he writes,' is nothing but its essence, and differs from it only in name ' (PPC, 1, P6).
[78] Cf. SCG 1.13; ST I, 2, iii.

or mover but rather refers to itself *qua* causa sui. The demonstration hinges on Spinoza showing how God or substance acts in accordance with his own essence and, secondly, that his essence constitutes an infinite and indeed eternal capacity for causation. Necessary causation thus becomes a means for overcoming the narrative of a non-eternal universe and unmoved movers. As Ramond observes 'if God is cause in Spinoza, he is not the origin of this cause; perhaps he even is cause in order not to be origin' (Ramond, 1987: 439; my translation).[79]

God or substance thus is no benevolent agent or unmoved mover but rather *action itself*; an eternal and infinitely powerful impulse coursing through the things of this world, mobilising their spontaneous interaction and interpenetration but with no end or goal in mind (there can be no end if the causal processes of this world are eternal). He thus is pure productivity, pure causality and so the *causa sui,* to use Deleuze's words*,* becomes 'the archetype of all causality, its originative and exhaustive meaning' (Deleuze, 1988: 53)[80]. With God conceived as pure causation, the question of origin that otherwise prevents an infinite series from being feasible is circumvented. It is, to be more specific, no longer a matter of comprehending the first cause in a finite series of causes, but of comprehending an infinite causal chain that mobilises itself across different scales and which exhausts itself towards an eternal horizon. With this, the question of God's motivation also becomes redundant. God *acts* as he *exists*: necessarily. It is as Spinoza later writes (in the preface to part IV of *the Ethics*):

> That eternal and infinite being we call God, *or* Nature, *acts* from the same necessity from which he *exists*. For we have shown (EP16) that the necessity of nature from which he *acts* is the same as that from which he *exists*. The reason, therefore, *or* cause, why God, *or* Nature, *acts*, and the reason why he *exists*, are one and the same. As he *exists* for the sake of no end, he also *acts* for the sake of no end. Rather, as he has no principle or end of existing, so he also has none

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[79]Cf. Lærke 2009, and Lærke 2011 for a superb discussion of Spinoza's cosmological argument.

[80] Carraud makes a similar point asserting that 'the *causa sui* [is] the *paradigm*, the regimenting cause of all else' (Carraud, 2002: 313; *my translation*).

of acting. What is called a final cause is nothing but a human appetite insofar as it is considered as a principle, *or* primary cause, of some thing (EIVpreface, emphasis added).

It therefore is not a *moral world* like for instance the Schoolmen would have it. Moral implies justice, and justice implies an understanding of what is Good and Bad and a judge that may sanction it. But it is an *ethical world;* ethics implying the affirmation of essence, which in this case is the necessary affirmation of force, of production. The existence of a thing therefore is neither good nor bad (such a qualification does not make sense for Spinoza). But it has validity on account of the power which has been imputed to it and which it expresses. *Vis (*or 'power') thus replaces *moralia* as the constitutive principle of *virtue* and so: virtue = vis. In this way, two of the key *motifs* of the Ethics - the equation of *being* with *action,* and of *essence* with *power* - is defined and demonstrated as regards the divine being. These are principles that also will be found in the physical constitution of individual bodies unfolded in *the Ethics's* second and third part, thus further underscoring the fractal nature of the treatise.

2.4. Body, essence and power: The ethical definition of form and formation

2.4.1. Mind, Body and composition (EIId1-EIId7): parallel modal realities

The second part of *the Ethics* is entitled 'On the nature and origin of mind' [*de natura et origine mentis*]. The title naturally gives the reader the expectation of a text devoted exclusively to the explication of the notions of mind, the soul and the essential (insofar as these all designate the same phenomenon in Spinozism). It therefore is surprising to find that this part of the treatise does not start out with a definition of mind, essence or soul. Instead its very first definition, EIId1, defines what a *body* is. Considered in isolation from the rest of the treatise, this might be regarded as something of a paradox. But the synchronisation of the corporeal with the essential in fact is symptomatic, not just for this second part but for *the Ethics* as a whole. 'Body' thus is presented alongside 'mind' or 'essence'

throughout the treatise, something which points to a correspondence (or *parallelism*[81]) existing between the different ethical realities.

Recall that an essence and a body are *modes* (i.e. forms of being) of the same modification, that modification expressing a particular aspect of the infinite power of God or substance. What this means is that they express the same modification but from different perspectives (a corporeal and an essential perspective, respectively). To the corporeal thing [*res*] therefore corresponds an essential thing or mind [*mens*] and it is the relationship between *res* and *mens* (and what this relationship means for modal *individuality* and modal *individuation)* that lies at the core of the second and third parts of the treatise.

What, then, are the characteristics of *res* and *mens*? The definition given by Spinoza for body is 'a mode that in a certain an determinate way expresses God's essence insofar as he is considered as an extended thing' (EIId1). This definition of body as something that expresses God's essence in a 'certain and determinate way' corroborates what Spinoza had already written in EIp25corol. regarding 'particular things'- namely that such 'things' express God or substance in a 'certain and determinate way'[82] - but here, the point is made particularly with respect to extended being, i.e. to body.

This remains quite a minimal improvement on what was already asserted in EIp25corol. and more ample qualifications are to follow. But it does emphasise

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[81] The words 'parallel' or 'parallelism' crucially are not part of Spinoza's vocabulary. In fact, 'parallelism' is more readily associated with Leibniz' monadology. Not without irony, it is however a designation that fits Spinozism better than Leibnizianism, with the former refusing to foreground either body or soul where the latter finds such a foregrounding (of the soul) necessary in order to avoid immoral forms of reasoning. The designation therefore is used here as it is by so many other writers. Deleuze for instance writes: 'One may indeed call 'parallel' two things or two series of things which bear to each other a constant relation, such that there is nothing in one to which there corresponds nothing in the other, while all real causality between them is excluded (Deleuze, 1990: 107).'

[82] 'Particular things', he writes, 'are nothing but affections of God's attributes, or modes by which God's attributes are expressed in a certain and determinate way' (EIP25corol.).

the fact that the individual body is in some way a *partial* expression of extended Body taken as *a whole*. The definition of essence then follows, the latter being defined thusly:

> I say to the essence [*essentiam*] of any thing belongs that which, being given, the thing [*res*] is necessarily posited and which, being taken away, the thing is necessarily taken away; or that without which the thing can neither be nor be conceived, and which can neither be nor be conceived without the thing (EIId2).

Compared to EIId1, this is a much richer and more complex definition. It also adds genuinely new information to what the reader already knows. The relationship between essence [*essentiam*] and body [*res*] is what is at stake, with essence being defined as 'that without which the thing [res] cannot *be* nor *be conceived*'[83]. When read alongside the preceding definition, this suggests the relationship between essence and thing as one of existence versus non-existence and reaffirms the correspondence between thing and essence (and between causation and conception) that Spinoza posits with his notion of *causa sive ratio*. If a concept or essence is affirmed, a thing is therefore necessarily constructed. And when, conversely, it is not affirmed - that is: if it is negated - so too is the existing thing negated. Crucially, this must not be taken to mean that the essence commands the body, but merely that its affirmation/negation *corresponds* to the individuation/annihilation of the body. The concept and the thing therefore constitute parallel but corresponding realities.

EIId7 provides a fuller and more adequate comprehension of the notion of body. 'By singular things', writes Spinoza, 'I understand things that are finite and have a determinate existence. *And if a number of individuals so concur in one action that together they are all the cause of one effect, I consider them all, to that extent, as one singular thing'* (EIId7, emphasis added). This is a key moment as regards the

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[83] Spinoza reiterates this point in EIIp10schol. which reads: 'But it have said that what necessarily constitutes the essence of a thing is that which, if it is given, the thing is posited, and if it is taken away, the thing is taken away, the thing is taken away, that is, the essence is what the thing can neither be nor be conceived without, and vice versa, what can neither be nor be conceived without the thing.'

ethical comprehension of body and corporeal individuality. Spinoza here asserts for the first time that a *body* in addition to expressing in a certain and determinate way the *essence* of God may be a composite entity; its corporeal existence thus potentially being made up of a series of other bodies that it somehow integrates or subsumes within itself.

This is a much more satisfactory definition of body than the one provided in EIId1 but it also raises some questions. Firstly, in accordance with *what principle* does the composite body incorporate the bodies involved in its constitution? And, secondly, by way of *what power* are the constitutive bodies subsumed in the composite body? It is these questions and their explication that structure the remainder of *de natura et origine mentis*.

2.4.2. Mind and Body (EIIp1-EIIp12): On the corresponding but discrete realities of corporeal and intellectual beings

Having affirmed that body and essence correspond to each other in the initial *definitions* of *de natura et origine mentis,* Spinoza uses the first *propositions* to reestablish the foundation of substantiality and substantial production as this is said to occur through the attributes. It therefore is established once more i) that God is both a thinking thing [*res cogitans*] (EIIp1), and ii) an extended thing [*res extensa*] (EIIp2), these qualities thus pertaining to God *qua* attribute (*Deus sive attributa)*. It also is reaffirmed iii) that 'God's power is nothing except God's active essence' (EIIp3), this proposition thus pertaining to God *qua* power as established in EIp34.

Spinoza then reasserts the *absolute separation* that must always exist between the corresponding but different realities of thinking things [*mentes*] and extended things [*res*] (EIIp5-p7). It is thus unequivocally affirmed that minds cannot interfere directly in matters regarding bodies and vice versa. Writes Spinoza: '[S]o long as things are considered as modes of thinking we must explain the order of the whole of Nature or the connection of causes, through the attribute of thought

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alone. And insofar as they are considered as modes of extension, the order of the whole of Nature must be explained through the attribute of extension alone'(EIIp7schol.).

Insofar as they are expressed by distinct attributes, modes therefore must remain absolutely distinct, their respective forms of being unfolding in absolute separation at the same time as they unfold in parallel. For this reason, 'the order and connection of *ideas*' must necessarily be 'the same as the order and connection of *things'* (EIIp7; emphasis added). For each corporeal cause there thus corresponds an implicative reason [*ratio*], i.e. a reason that involves other reasons. We may return to the example of the arm to illustrate this. If, in existence, an arm involves or contains a hand, then the corresponding concept or essence of the arm must also implicate the concept of a hand. And that hand: five fingers, and so on and so on till infinity.

The insistence on the absolute parallel states of being makes it impossible to foreground either form of reality. Mind thus *corresponds* to body, but it does not determine it and *vice versa*. This might seem like an odd specification, but there are some very good historical reasons for it. As is often the case in Spinoza, the spectre of Cartesianism looms large. Descartes also discussed the problem of the extended thing [*res extensa*] and the thinking thing [*res cogitans*] and so the reader of *the Ethics* might be forgiven for confusing the two philosophies or for assuming that they are identical. However, some important differences do pertain and it is those that Spinoza presumably wants to draw attention to.

Unlike Spinoza, Descartes does not specify the absolute separation of modes. While he asserts that most bodies (such as those of animals or celestial bodies) are machines or *automata*, he also holds that human bodies - and only human bodies - are controlled by a mind or soul thus granting them a freedom that *automata* do not have. There thus is in the case of the human mode a will that

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proceeds from the soul, via the mind[84] and into the body. This leads to Descartes infamous 'mind-body problem' - by way of what mechanisms does the mind control the body? - a problem which it is widely accepted that he never resolves.

Maintaining an absolute separation and parallelism between modal thought and modal body rules out this problem from the outset. Bodies thus are absolutely separated from the minds, even if they correspond to them. This spares Spinoza the trouble that Descartes had had whilst at the same time signalling the autonomy of his own philosophy from that of the latter. Spinoza also does another thing. He extends mental capacities to all modes including (but not exclusive to) Man. Ontologically speaking, Man therefore does not hold a place of particular importance in *the Ethics,* but rather is just another besouled (or 'animated) body among so many other animated bodies*.*

This inclusive ontology is reaffirmed in the scholium to EIIp13 which states that '[T]he things we have shown so far are completely general and do not pertain more to man than to other individuals, *all of which, though in different degrees, are nevertheless animate* [*animata tamen sunt*]. For each thing [*res*] there is necessarily an idea in God, of which God is the cause in the same way as he is of the idea of the human body. And so, whatever we have said of the idea of the

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[84] The overlap between body and soul is said to occur in the so-called 'penal gland', located in the human brain For Descartes, this gland - the seat of the soul - facilitated the soul's operation of the body and was located in the brain. '[A]lthough the soul is joined to the whole body,' writes Descartes', nevertheless there is a certain part of the body where it exercises its functions more particularly than in all the others. It is commonly held that this part is the brain, or possibly the heart - the brain, because the sense organs are related to it, and the heart because we feel the passions as if they were in it. But on carefully examining the matter I think I have clearly established that the part of the body in which the soul directly exercises its functions is not the heart at all, or the whole of the brain. It is rather the innermost part of the brain which is a certain very small gland situated in the middle of the brain's substance and suspended above the passage through which the spirits in the brain's anterior cavities communicate with those in its posterior cavities. The slightest movements on the part of this gland may alter very greatly the course of these spirits, and conversely any change, however slight, taking place in the course of the spirits may do much to change the movements of the gland (PA, XXXI; AT 352-53)'

human body must also be said of the idea of any thing' (EIIp13schol., emphasis added). (Note that Spinoza repeats this principle in EIVp57schol., which states: 'I wished to remind my readers here, in passing, in case anyone thought my purpose was only to tell about men's vices and their absurd deeds, and not *to demonstrate the nature and properties of things*. For as I said in the Preface to Part III, I consider men's affects and properties just like other natural things' (EIVp57schol.; emphasis added).

Spinoza thus subverts Descartes' ontological problem. Not by rejecting that the human body may have a soul or a mind, but by granting to *all bodies* in this world a corresponding mind or essence and by making the understanding of that essence crucial to the understanding of their nature. In this way, a dynamic principle (a mind, an essence) is installed at the heart of all existing things thus preparing the ground for a genetic and immanent ontology where all things purposefully act on each other in an ongoing, open-ended process of formation. Descartes' philosophical enquiry into bodies and souls is therefore in a sense exploded thereby ensuring that the ethical problematic pertains not just to Man but to existence as such.

2.4.3. The Small Physics (EIIp13-14): Movement, rest and the *ratio* of individuality

The principles and mechanics of these ontogenetic (or 'ethical') processes are discussed in the next section of the treatise, sometimes referred to as the 'Small Physics'[85]. Inserted between EIIp13 and EIIp14, the Small Physics remains one of the most important sections of the treatise and, I argue, in the history of modern philosophy. What makes it so significant is the fact that it elaborates a bold physical theory that is neither Aristotelian (i.e. defined by teleological ends), or Cartesian (i.e. defined by pure mechanics), appearing to both transcend and incorporate these theories at the same time. As Viljanen (2011) has argued, it

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[85] Cf. Gueroult, 1968: 338-39; Sévérac, 2011: 127.

may in fact be fruitful to comprehend the logic of the Small Physics as a negotiation between these two extreme positions, that is as a mechanical universe in which the soulful animation of bodies emerges from random mechanical collisions.

A 'treatise within the treatise', the Small Physics unfolds through a series of lemmas, axioms, definitions and postulates which build from a simple understanding towards a more complex comprehension of the matter at hand in the geometrical style favoured by Spinoza. The foundations of it are set out in the two first axioms in this inserted section; *A1'* and *A2'*, and the first lemma, *L1*. Detailing the characteristics of so-called *simple bodies,* they state:

> *A1'*: All [simple] bodies either move or are at rest.
> *A2'*: Each [simple] body moves, now more slowly, now more quickly.
> *L1*: [Simple bodies] are distinguished from one another by reason of motion and rest, speed and slowness, and not by reason of substance.

These preliminary statements bear a close resemblance to the physics advanced in Descartes' *Principles of philosophy;* a treatise which contains a heavy critique of Aristotelian reasoning and of the (hylomorphic) logic of substantial forms. Here, as in the *Principles*, things are theorised as 'bodies' rather than 'substantial forms' and they are characterised by 'relations of movement and rest' rather than by 'ends' [*teloi*]. It thus is a 'reason of motion and rest, speed and slowness' that characterises a simple body; not a metaphysical goal or purpose.

The third lemma, *L3,* goes on to assert what Spinoza already has suggested several times, namely that '[a] body which moves or is at rest must be determined to motion or rest by another body, which has also been determined to motion or rest by another, and that again by another, and so on, to infinity'. This reaffirms the absolute separation that must exist between modal realities (a body is determined into motion *only* by another body), but it also points to the mechanical-cum-causative logic at play in the common order of Nature. The very existence of the corporeal body thus is predicated on it being submerged in an infinite series of corporeal causality.

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Two further axioms follow - *A1"* and *A2"* - in which Spinoza discusses modal affection. Spinoza uses these axioms to distinguish between 'simple bodies' - 'distinguished from one another only by motion and rest, speed and slowness' (A2") - and 'complex bodies' thus preparing the ground for the explication of the nature and constitution of complex bodies. This transition towards the elaboration of the logic of complex bodies is made with the definition that follows *A2"*. It reads:

> *Definition*: When a number of bodies, whether of the same or of different size, are so constrained by other bodies that they lie upon one another, or if they so move, whether with the same degree or different degrees of speed, that they *communicate their motions to each other in a certain and fixed manner*, we shall say that *those bodies are united with one another and that they all together compose one body or individual*, which is distinguished from the others by *this union of bodies* (Small Physics, A2", emphasis added).

Whilst clearly echoing what Spinoza already has stated in EIId1-7 - namely that complex bodies subsume within themselves other bodies - this definition establishes in more detail and with more clarity the mechanics of this process. Complex bodies thus are assembled from a series of constituent bodies the movement and rest of which they somehow 'constrain'. A 'ratio of motion and rest' corresponding to the complex body furthermore is 'communicated' to the constituent bodies, thereby ensuring that these behave in accordance with the nature of the complex body.

The complex body is therefore characterised by its ability to orchestrate patterns of corporeal movement and rest in its constituent bodies. Such patterns do not constitute a predefined end or 'form', but rather are emergent schemata whose order arrises from the random collisions of bodies in the common order of Nature. (As I wrote earlier, God produces before he understands and so production necessarily must precede mind or essence). In this sense, the ratio of movement and rest must be said to constitute an emergent ontological schema - or syntax - from which the unified complexity of an individual body emerges.

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The definition evoked in *A''def.* describes how a complex body may constrain and order the movement of a series of external modes (i.e. its constituent bodies). But it does not touch on whether other bodies might impede its proper movement (or the movements of its constituent bodies) in a similar way. It therefore presupposes that the body (or the 'individual') be situated in an ontological vacuum, uncompromised by external interference like a geometrical figure drawn in a coordinate system.

The next lemmas move the definition of individuality out of this vacuum, returning the body to the hostile reality of the common order of Nature where bodies collide with other bodies in time and space. In such a scenario, the complex body's continued existence or endurance evidently depends on its ability to perpetuate over time the particular ratio of movement and rest that pertains to it, and so it is modal perpetuation rather than formation that is the concern of the next lemmas and their accompanying demonstration. These are of such a central importance to this thesis' concern that I quote them in their entirety.

> *L4*: If, of a body, *or* an individual, which is composed of a number of bodies, some are removed, and at the same time as many others of the same nature take their place, the individual will retain its nature, as before, without any change of its form. *Dem*: For (by L1) bodies are not distinguished in respect to substance; what constitutes the form of the individual consists in the union of bodies (by the preceding definition).
>
> L5: If the parts composing an individual become greater or less, but in such a proportion that they all keep the same ratio of motion and rest to each other as before, then the individual will likewise retain its nature, as before, without any change of form.
>
> L6: If certain bodies composing an individual are compelled to alter the motion they have from one direction to another, but so that they can continue their motions and communicate them to each other in the same ratio as before, the individual will likewise retain its nature, without any change of form.
>
> L7: Furthermore, the individual so composed retains its nature, whether it, as a whole, moves or is at rest, or whether it moves in this or that direction, so long as each part retains its motion, and communicates it, as before, to the others.

Whilst touching on different aspects of corporeality, these lemmas make apparent the relationship that Spinoza envisions between corporeal individuality and a

certain ratio of movement and rest. More particularly, they show i) how individuality relies on an ability in the individual to 'communicate' this ratio of movement and rest to other bodies which thereby become involved in the *constitution* of its body; and ii) how the integrity of that body (and in particular: its ratio of movement and rest) is to be constantly maintained if it is not to perish. What is not discussed explicitly - but which nevertheless is implied - is the fact that failure to maintain this particular ratio of movement and rest necessarily must lead to the disintegration and annihilation of the mode. In this sense, the endurance of the existing mode is encapsulated by the emergence and disintegration of a syntactic pattern that somehow corresponds to its proper nature.

Two things therefore are established in the 'Small Physics'. Firstly, it is established that a complex body will have a certain capacity for capturing and subsuming other bodies in a certain ratio of movement and rest that corresponds to its nature. This gives an indication of the logic of corporeal individuation or formation. Secondly, it also is established that such a body - once constituted - must involve a certain capacity for perpetuating itself in the case of collisions with exterior bodies, thus allowing the body to endure from one moment to the next.

These qualities of modality also raise some questions. By what *power* does a mode subjugate and *retain* other modes? And how does it *attain* them in the first place? Where, more particularly, do these *capacities* (for attainment, for subjugation) stem from? In order to answer these questions it is necessary to move from the explication of the body or individual to the individuating *force* that corresponds to this individual: its essence. In the next two sections of the thesis, I therefore first discuss the question of power in relation to modal perpetuation, before turning to the more complicated problem of power and corporeal genesis.

2.4.4. The *conatus* doctrine (EIIIp6-7): Perseverance, essence and power

The fundamental logic of essential force is alluded to on a few occasions in the *de natura et origine mentis*. EIIp24dem. for instance contends that the parts composing the human body '*pertain to the essence of the body itself* only insofar as they communicate their motion to one another in a certain and fixed manner […]'. This proposition accords with and expands on what already was stated in EIId2, namely that an essence designates a thing which 'being given, the thing is necessarily posited and which, being taken away, the thing is necessarily taken away' (EIId2). The suggestion, here, seems to be that the essential corresponds to the ratio of movement and rest discussed in the Small Physics.

The full explication of the problem is, however, deferred to the Ethics' part three: *On the Nature and Origin of the Affects* [*De Origine et Natura Affectuum*]*.* Here, in two central propositions - referred to Viljanen as 'the *conatus* doctrine' (Viljanen, 2008; Viljanen, 2011: 83-145.) - Spinoza expands on the relationship between body, essence, power and perpetuation at the same time as he introduces a particular term, *conatus* (*Lat*: 'tendency'; 'striving'; 'persistence')*,* that is to mediate between these different phenomena. *Conatus* thus designates a form of striving in the mode which is related to its persistence and, by extension, to the perpetuation of its corporeal relation of movement and rest.

The notion of *conatus,* it is true, does not originate with Spinozism. It is a term that has a strong rooting in the history of philosophy where derivations of it are found in the work of classical scholars such as Cicero (DO I, 132) and medieval philosophers such as Saint Thomas and Duns Scotus (see Wolfson: 1934: 196-202). The main inspiration for Spinoza, however, no doubt is Descartes, although Spinoza differentiates his conception of the term from the mechanical sense that the former attributes to it. To Descartes, *conatus* designates the tendency of extended bodies to move in a rectilinear motion. The presence of *conatus* in a body thus means that the body may continue on its trajectory as long as it is not affected by other bodies.

Crucially, however, the notion does not imply volition or mind, something which would contradict the principles of Descartes' mechanical universe (where only the human being and God have minds). Descartes thus writes:' When I say that the globules of the second element 'try' to move away from the centres around which they revolve, don't take me to mean that they are trying on the basis of some thought that they have! All I mean is that their location and their state of arousal [*incitatos*] are such that they will travel in that direction unless some cause prevents them from doing so'(Descartes, Pr III 56.)[86]. Mind and conatus therefore are dissociated in Descartes, as they would have to be given that only Man is granted a form of volition rooted in a mind.

The concept takes on a more complex - more *animated* - sense in Spinozism. Counter to Descartes, Spinoza reintroduces into the things an internal 'force' or capacity for self-preservation which is not reducible to mechanical rectilinearity but which does involve the presence of a mind or essence in the body (as already indicated in EIIp13schol.). Existing modes thus contain or 'involve' a force or power which is absolutely their own and which allows them to *persist in existence*. It is this force that corresponds to the ratio of movement and rest discussed in the Small Physics. As always, Spinoza advances cautiously, in defining the characteristics of the conatic element or drive. He thus first defines the meaning of the term *conatus* for itself and its relation to *power* (EIIIp6), before explicating its relation with body and essence (EIIIp6dem; EIIIp7).

> EIIIp6: *Each thing, as far as it can by its own power, strives to persevere in its being* [*perseverare conatur*]. Dem: For singular things are modes by which God's attributes are expressed in a certain and determinate way (by IP25C), that is (by IP34), *things that express, in a certain and determinate way, God's power, by which God is and acts.* And no thing has anything in itself by which it can be destroyed, *or* which takes its existence away (by P4). On the contrary, it is opposed to everything which can take its existence away (by P5). Therefore, as far as it can, and it lies in itself, it strives to persevere in its being, q.e.d. (emphasis added).

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[86] See Garber, 1992: 218-30 for a discussion of conatus, tendency, and persistence in Descartes and in the scholastic tradition.

What may be gleaned from this proposition - apart from the fact that the existing mode 'opposes' everything that may take its existence away (something that makes 'suicide' a particularly tricky subject for Spinoza; cf. EIVp18schol.) - is that its capacity to *persevere* (its *conatus*) corresponds to a *power* and that this power expresses in a certain and determinate way the infinite power of God, i.e. that power by which he 'is' and 'acts'. The wording of this demonstration echoes the definition of body - which earlier was given as a 'mode that in a certain and determinate way expresses God's essence insofar as he is considered as an extended thing (EIId1)' - but foregrounds the essential rather than the corporeal aspect.

Conatus therefore is not a corporeal phenomenon. Even if it concerns the perpetuation of a body, it in fact expresses an essential activity: something which might correspond to a corporeal state but which differs in its logic from it. EIIIp7 thus states that 'The striving by which each thing strives to persevere in its being is nothing but that *actual essence of the thing* (EIIIp7; emphasis added). This tells the reader two things. Firstly, that conatus is essential. And secondly, that it constitutes a kind of essentiality that pertains to the actual, or to the already actualised. If *conatus* is a force, it therefore constitutes a retentive force; one that empowers an already existing body to perpetuate a particular relation of movement and rest.

2.4.5. Knowledge and Beatitude: moving from the passions of the body to the affirmation of the soul.

One might be forgiven for thinking of modal power as just a reactive or preservative force but this would be a mistake. It also has an active sense, one that is to do with the affirmation of new modal relationships rather than their negation. Bove speaks of this power in terms of a modal capacity for 'composition and combination' (Bove, 1991: 37, my translation). Duffy makes a similar point arguing that the 'characterisation of the individual as power (*potentia*) indicates the individual's capacity to compose new relations with other individuals. […]

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Composition therefore refers not only to the characteristic relations between individuals, but also to the capacity or potential to create these kinds of relations' (Duffy, 2010: 157).

One may therefore distinguish between the the conservative power of the *actualised mode* (conatus) and the more explorative or affirmative power of the *actualising mode,* that is: of the mode that is in the process of being actualised or, to use a term introduced by Scotus and later taken up by Simondon and Deleuze, 'individuated'. Understanding this pre-individual modality involves taking a closer look at Spinoza's discussion of affectivity. Individuation thus passes through affection, even if the two are analytically distinct. An *affection* can be many things. It may for instance arise when a body collides with another body; the two bodies thus causing affect in one another. But it also may arise without direct corporeal collision, for instance when a mind involuntary remembers a particular event.

Technically speaking, affects are *passions* of the body; phenomena that the actualised mode or body is made to *suffer*. Whether it is a 'joyful' affect or a 'sad' affect does not matter in this regard. What matters is that it is a corporeal state that does not proceed from the essence of the mode but rather is imposed on it from without. Passion also relates to capacity or power. A passion may augment or reduce the capacity of the mode to act. But insofar as this augmentation is something that does not proceed from the essence of the thing it must be qualified as a passion. Spinoza thus writes:

> By affect, I understand affections of the body by which the body's power of acting is increased or diminished, aided or restrained, and at the same time, the ideas of these affections. Therefore, if we can be the adequate cause of these affections, I understand by the affect an action; otherwise a passion (EIIId3.).

The differentiation between 'action' and 'passion' is important, pointing to two fundamentally different modes of being. In Spinozism, action occurs when the essential mode expresses itself unconditionally in the body. This in effect only happens in the particular moment when it comes into existence. It follows, that if

passion is the plight of the actualised mode, then action is the privilege of the actualising one. This provides some clarification on the matter, but also raises further questions. If 'action' defines that moment when a new union of bodies is spontaneously actualised, then how may one move from the passions that pertain to the already actualised mode to the action which pertains to the actualising one?

Spinoza indicates that this transition towards action must be precipitated by the augmentation of joy (which is a passion), and so *passion* in a sense may lead to *action* even if the two processes must remain analytically irreducible. This for instance may be seen from EIIIp21dem. where Spinoza writes: 'But joy posits the existence of the joyous thing, and posits more existence, the greater the affect of joy is. For (by P11S) it is a transition to a greater perfection'. As we have seen, each modal essence expresses a certain degree of God's infinite perfection and so the transition towards a higher degree of perfection also must correspond, potentially at least, to the creation (or 'engendering'[87]) of a new mode in existence. *Action*, to the extent that it designates the actualisation of a new corporeal relationship, thus follows from joyful *passions*.

Unfortunately, the treatment of this question does not come together in a coherent series of propositions the way the *conatus* doctrine for instance does and it therefore remains an oddly underdeveloped aspect of *the Ethics*. Perhaps for this reason, it is an area of Spinozism that only has been taken into consideration by a few, mainly French, scholars. Of these, it arguably is Deleuze who has gone the furthest (although Viljanen, Duffy and Bove also treat of it[88]). Deleuze takes as his point of departure the joyful transition (or 'leap') towards greater perfection in his discussion of modal individuation, paying particular heed

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[87] I follow Gueroult in distinguishing between 'creation' and 'engendering'. Referring to the philosophical tradition - in particular the Schoolmen - he argues that only essences are 'created' whereas existing bodies are 'engendered'. More specifically, only essences are created directly or immediately by God whereas bodies are engendered mediately. Cf. Gueroult, 1968: 288-317.

[88] Cf. Viljanen, 2011; Duffy, 2006 & 2013; and Bove, 1991.

to the fact that joy *qua* affection constitutes something experienced by *the body* whereas perfection *qua* power is something expressed by *the soul or mind*.

This gives his discussion of individuation a complex duality insofar as what is being explored is both to do with the body (that is being actualised) and the mind (which presides over its actualisation). It is here worth recalling once more the parallelism that exists between mind and body in Spinozism. It is, as we have seen, impossible to imagine the affirmation of an essence without a corresponding body also materialising in existence, or to imagine that a body may perpetuate itself when the actual essence that corresponds to it has ceased to function. The same principle applies to the affections. To the mutilated body therefore corresponds a mutilated mind (or inadequate idea), and, conversely, to the body that rejoices corresponds a rejoicing mind (or adequate idea).

Deleuze explores the problem of individuation through Spinoza's discussion of different 'kinds of knowledge' (Deleuze 1992: 273-88; 1988: 54-58); perhaps taking his clue from EIIIp3 which states that 'The *actions* of the mind arise from adequate ideas alone; the *passions* depend on inadequate ideas alone'. Individuation thus is something that occurs in and between a given set of bodies. But it also is something which is predicated on the negotiation between essential forces in their minds. In explaining why that is, Deleuze makes a distinction between what he calls the *intensive* relationship existing between essences and the *extensive* relationship which exists between bodies (Deleuze, 1992: 191-99; 227-33; 203-14 & 303-20).

As we have seen, bodies are submerged in an infinite series of causes and determinations. They are created *mediately* in the common order of Nature and so are determined into existence as well as out of existence by other bodies which are extensive to them. Essences, on the other hand, do not strictly speaking *determine* each other insofar as determination does not pertain to the processes unfolding in God's infinite intellect (recall that ideas are posited *immediately* in the mind of God). They therefore might 'imply' each other, the way

the arm implies the hand, but they do not 'determine' each other the way extensive bodies do.

This does not mean that essences are not distinguished from each other. The arm might imply the hand, but the two are not identical. But how must this essential distinction be conceived? Deleuze argues that the distinction of essences derives from - or expresses - their power. To the extent that essences are distinguished from each other such a distinction therefore must be an internal or 'intensive' determination, i.e. a form of determination that refers to the quantum of power that pertains to the mode rather than its extension. According to Deleuze, this makes the essential realm a more apt site for individuation than existence. He thus writes that,

> Only a quantitative distinction of beings is consistent with the qualitative identity of the absolute [the latter being qualitative because it is beyond number]. And this quantitative distinction is no mere appearance, but an internal difference, a difference of intensity. So that each finite being must be said to express the absolute, according to the intensive quantity that constitutes its essence, according, that is, to the degree of its power. *Individuation is, in Spinoza, neither qualitative nor extrinsic, but quantitative and intrinsic, intensive* (Deleuze, 1992: 197; emphasis added)[89].

Essences thus refer to each other in an intensive or quantitative way which is fundamentally different from the way that bodies relate to each other but which nevertheless is to do with the particular way that those bodies come into existence. In a sense, minds or essences are like vectors, each of them constituting a particular quantum or degree of power, and so individuation may be conceived to unfold within a kind of vector space. Within this space, the essences or minds of colliding bodies explore the potential for augmenting their respective quanta of power through collaboration. When this exploration is successful, the quanta of power will be augmented and an adequate idea affirmed.

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[89] Whilst this thesis subscribes to this *intensive approach to individuation*, it is worth noting that Ramond's *Quantité et qualité dans la philosophie de Spinoza* (Ramond, 1995) - in many ways a response to Deleuze's Spinoza - unfolds an *extensive approach to individuation.*

Conversely, when it is unsuccessful, the quanta will not be augmented and only an inadequate idea is affirmed. In this way, the passage from passions to actions - and thus towards the actualisation of a new mode in existence - can be characterised as the passage from inadequate ideas to adequate ones. How must this passage then be understood? The answer to this question, Deleuze argues, must be found in Spinoza's discussion of the different kinds of knowledge[90]. He defines three: *Imagination* (knowledge of the first kind), *Reason* (knowledge of the second kind) and *Intuition* (knowledge of the third kind) (EIIp40schol.2.)[91].

Imagination refers to the cognitive state corresponding to the random encounters that might befall the body in the common order of Nature. Such encounters will be passionate for the body and will correspond to an inadequate idea in its mind. Passionate encounters therefore are said to provoke only imaginations or 'images' in the mind (by EIIp25; EIIp25dem; EIIp26corol.). This is not to say that affections cannot bring joy to the mode and thereby augment the spirit of it. But so long as they are passions such raised spirits merely will describe a state of

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[90] I also discuss the relevance of the three kinds of knowledge to the process of individuation in Weissenborn, 2015.

[91] Spinoza writes: 'From what has been said above, it is clear that we perceive many things and form universal notions: I. from singular things which have been represented to us through the senses in a way which is mutilated, confused, and without order for the intellect (see P29C); for that reason I have been accustomed to call such perceptions knowledge from random experience; II. from signs, for example, from the fact that, having hear or read certain words, we recollect things, and form certain ideas of them , like those through which we imagine things (P18S); these two ways of regarding things I shall henceforth call knowledge of the first kind, opinion or imagination. III. finally from the fact that we have common notions and adequate ideas of the properties of things (see P38C, P39, P39C, and P40). This I shall call reason and the second kind of knowledge. [IV]. In addition to these two kinds of knowledge, there is (as I shall show in what follows) another, third kind, which we shall call intuitive knowledge. And this kind of knowing proceeds from an adequate idea of the formal essence of certain attributes of God to the adequate knowledge of the essence of things' (EIIp40schol.2.). The reader might wish to note that Spinoza returns to the problem in the treatise's part V, more specifically in EVp20-EVp38.

modal elevation which, at this point, does not provoke a leap towards individuation.

More steps therefore are needed to arrive at the moment of individuation. The first one goes through *Reason* which, unlike the Imagination, operates rationally. The knowledge produced through reason is adequate. It is not confused, but refers to a particular state of affairs which it understands rationally. What are the characteristics of such reasonable knowledge? It is that it is common, creating common notions that bodies may agree in. As I write elsewhere, Reason aspires to establish between bodies a 'common ground or principle - known as a 'common notion' [*notione communes*] (EOO[37-40)[92] - that these bodies may agree in' (Weissenborn, 2005: 43). A common notion can be many things. It may consist simply in the fact that two bodies agree in being extended things. This would be a fact that all existing modes would agree in; a generic common notion, rather than a specific one.

But a common notion also may relate to less generic aspects of colliding bodies. Agreements of this kind concern a corporeal compatibility that goes beyond commonality and points towards specificity. When an encounter of this type occurs, the minds of the colliding modes will explore the possibility of collaborative implication at the same time as the corresponding bodies will begin to spontaneously adapt themselves to one another. This will provoke joyful sentiments in the modes involved, thereby augmenting the power of the latter, and so a rudimentary diagram of intermodal composition is constructed. However, whilst such tentative attempts at modal composition constitute an important step on the road to individuation, they still do not constitute an actual essence.

This is because the bodies remain in an external, passionate relationship to each other. Actualisation or individuation only occurs with the transition to the third kind

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[92] Cf. EIIp37-40.

of knowledge, *Intuition*. This kind of knowledge is fundamentally different to the adequate – but generic – knowledge of Reason. Said difference relates to the way that the two types of knowledge operate and to the constitutive elements that they involve. Intuition is not a generic knowledge. Nor is it a passionate knowledge. It moves beyond the passions, beyond the common order of Nature, in order to affirm an essence in existence. 'Like Reason', Weissenborn thus writes,

> Intuition concerns adequate ideas but unlike Reason these ideas are not general nor are they submerged in the common order of Nature. Where Reason concerns *bodies*, intuition concerns an *essence*, i.e. a powerful relational schema particular to an existing mode. The affirmation of an intuition [thus] signals the actualisation of an essence in duration; that is, the passing into existence of particular relational schema (Weissenborn, 2015: 44).

It is with the affirmation of an intuition that an otherwise *external* relation between bodies is transcended by an *internal* principle of organisation, or essence. This intensive process, which unfolds between essential modes or minds, corresponds to an involutive or complicative process in which a series of corporeal modes are determined to converge. In Spinozist terms, this convergence constitutes a 'beatific' rather than a joyful moment for the mode: 'beatitude' being the goal of ethical behaviour, something that allows the mode to transcend the passions[93]. Deleuze suggests that beatific affirmation should be thought of as an *active joy,* that is: as a form action. Action, here, is related to power: a compositional, ontogenetic power which pertains to the intensive modes. This is the power of formation, of individuation. But it is a power that relates to no prior formal schema. Indeed, the formal schema is emergent *qua* beatific.

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[93] Indeed, the final chapter of *The Ethics,* which as we know progresses in a geometrical-constructive way and thus builds towards this moment, concerns beatitude. The end goal of the synthetically presented argument therefore may be argued to be the attainment of beatitude.

As we have seen, the beatific principle only manifests itself when a series of bodies collide, something which provides a unique but also complex perspective on the philosophical problem of formation. In Spinozism, formation therefore cannot be adequately conceived as a form imposing itself on matter. Rather, formation relates to the spontaneous genesis of an emergent form from otherwise random material collisions. This formative process is driven by an active force (action, beatitude). But the action does not precede the collisions, it is their product. ('Action', as Lærke observes, 'therefore is not grounded in a subject, but it rather is the agent that constitutes itself in action'; Lærke, 2009: 189; my translation).

In this way, the hylomorphic ordering of form and matter is subverted. Individuation is no longer adequately understood as a process that relates to a prior ideal model. Indeed, the individuating principle cannot be dissociated from the collisions of material bodies since it is from these collisions that a modal capacity to act and form arises. There thus is, in *the Ethics,* a perspective that foregrounds modal perpetuation (the *conatic* perspective: the mode as an attractor state), and a perspective that foregrounds modal individuation (the *beatific* perspective: modality as a capacity for action, as the spontaneous exploration of limit states). Echoing the dual states of God or substance - his essence (*what he is*), and his productive capacity (*what he does*) - these two perspectives may be said to refer to what a mode *is* and what a mode *does.*

'Spinoza', Deleuze thus writes, 'can consider two fundamental questions as equivalent: What is the structure (*fabrica*) of a body? And: What can a body do? A body's structure is the composition of its relation. What a body can do corresponds to the nature and limits of its capacity to be affected' (Deleuze, 1992: 218). Viljanen makes a similar observation, writing: 'I believe that Spinoza thinks that it is possible to conceive any finite modification in a *reified way*, as a certain thing, or in a *dynamic way*, as a centre of causal activity, and that he regards the latter perspective as the metaphysically more adequate one,

revealing something fundamental about the inner workings of things' (Viljanen, 2011: 74-5; emphasis added.).

Is there a definition that may adequately describe the two perspectives at once? There might be but such a definition is tricky to define. In my opinion, Duffy and Deleuze are the philosophers that have gotten the closest to such a definition, conceiving of the transition between these two monadic states mathematically (see Duffy, 2006)[94]. In this particular theorisation of modality, the conatic perspective is said to unfold between two limit points which are significant to the existing mode. One concerns the *absolute minimum limit of its power;* power = 0. The transgression of this limit - precipitated by sad affections – will lead to the collapse of the corporeal union of the body, and thus to the disintegration of the existing mode or body.

The other concerns the *absolute maximum limit of its power.* The transgression of this limit - brought on by joyous affections - leads to the sublimation of the mode in a new corporeal relation and thus to the beatific actualisation of a new essence in existence. When this happens the retentive capacity of the conatic perspective is transcended by the spontaneous affirmation of the beatific one. At this point, the power of the mode exceeds its own finiteness and approaches the infinity of God or substance asymptotically; thus power $\approx \infty$. If this is a blessed moment it is because it transcends the quagmire of the passions. If it also is an infinite

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[94] Duffy writes: 'The maximum and minimum are determined as 'general limits, because Deleuze uses the term 'limit' in the singular to indicate that a finite mode is not so much limited between a maximum and a minimum, than it is by the passive affections that it experiences in its interactions with other more composite modes, which, at any given moment, have the potential to limit its further differenciation, and, therefore, the further deployment of its power to act, and by consequence, its actual existence. Passive affections, for Deleuze, therefore not only function as a limit of the expression of the mode's active affections, but also of the existence of the finite mode itself. This limit determines the margin of variation of the expression of the given finite mode's power to act, which varies from a minimum, below which it would cease to exist (intensity=0), to a maximum, which would be the extent to which its power to at is further differenciated at any given moment in more composite global relations' (Duffy, 2006: 155).

moment, it is because it approximates the properties of God or substance - affirmation, production, equanimity - if only momentarily.

2.5. Conclusion

In this second part of the thesis I have discussed the principles of modal form, formation and efficaciousness as these are found in Spinoza's *Ethics*. In doing so, I deployed Moureau's microanalysis, which focuses on certain parts of the treatise - in my case: those that are to do with modality - whilst taking into account those parts of the treatise that are relevant to the former's comprehension. In doing so, I have endeavoured to be as exact as possible, engaging with the treatise in the geometrical manner that Spinoza intends it to be read. However, I have tried to arrive as quickly as possible at the propositions where the matters of modality are discussed, all the while paying heed to those definitions and propositions that prepare these and that therefore are crucial to their comprehension.

If it has been necessary to go into details in the discussion of certain propositions which are not directly to do with modality it is because of the tight-knit relationship that exists between the different propositions of the treatise. It is for instance impossible to adequately understand modal individuation and causation without understanding the way the modes relate to God - as expressed in the two forms of immanence (panentheist, pantheist) that pertain to this relationship - or without understanding the way that essences and bodies are created immediately and mediately in accordance with the logics of the infinite modes. To understand the immanence of Spinozism, one furthermore must understand how 'being' and 'action' pertain to both substance and modes and how this dyad may be said to define the coordinates of Spinoza's ontology. Only when these different aspects of the ethical ontology are understood can an adequate understanding of modality (what a mode is) and modal productivity (what a mode does) be defined.

I showed how 'being', in Spinoza's problematic-geometrical reading, refers to an ability to integrate or involve a series of other entities in one's own image, that is: in accordance with one's essence. Thus God or Substance is that thing which involves an infinite series of attributes which it spontaneously unites and brings to order. Similarly, an existing mode, or 'body', is that thing which spontaneously integrates and unites a series of bodies, ordering these in accordance with a principle of movement and rest particular to its own nature. I also showed how existing modes, *qua* 'possible' beings, must be animated into existence by another body or mode; a proximate cause. However, I also showed that while they depend on other beings for 'animation', the manner whereby they come into existence is entirely their own; it reflects only their own (emergent) logic. Beatitude therefore is self-affirmation; the sudden involution of otherwise exterior bodies/forces.

As such, Spinozism may be said to provide a concept of formation that is radically different from hylomorphism. (Bodies do not represent a prior form, but rather are things that are created spontaneously in accordance with an emergent essence). However, it also acknowledges efficacy (or 'power') in all bodies, thereby infusing corporeality with an ontogenetic capacity. This makes it possible to conceptualise bodies and forms in a way that does not revert to the representational schemata of hylomorphism nor to the emergent but non-retentive principles of atomism where ultimately there is nothing that retains the form of the body from one moment t_0 to another moment t_1.

Modes therefore are not 'substantial beings', receiving their form from without. They also are something more than mere collections of extended matter or atoms whose emergent constellations are held together by a principle one does not adequately know. Rather, modes involve and express a capacity (or force) for retaining their shape over time, this force in turn relating actively with the forces of other modes submerged in the common order of Nature. Determined in a movement that shifts spontaneously from an outside to an inside, from passive affections to beatific actions, they constitute emergent schemata of power.

If one returns to Hillier's Newtonian principle of formation it is clear that this idea - predicated on random corporeal causation; on spontaneous formal emergence - sits just as well, if not better, within Spinozism where corporeal arrangements do indeed arise from random collisions of matter, but where those collisions are at the same time solidified in essential quanta of power that enable those assemblages to persist over time. This makes Spinozism's notion of modality an ideal platform from which a new image of the city may be explored.

3. A new image of the city - essence and efficacy of the urban artefact

3.1. Introduction

Having provided, first, an analysis of the particular image of the city suffusing Marxist geography (part I), and supplied, next, a principle of form and formation from which an alternative image may be constructed (part II), the thesis now can turn to the spatial philosophies of Portugali and Hillier and thereby to the definition of its own particular image of the city; one rooted in the concept of 'ontological materialism' rather than dialectical materialism. The coordinates of Spinozism, here, provide a useful starting point. It will be my argument that the urban artefact (or rather: aspects of it) may be conceived as what Spinoza calls a 'mode' and therefore theorised, firstly, as something that emerges from and presides over a series of material bodies; and, secondly, as something capable of expressing and asserting a real force on other bodies found in its vicinity.

Perceived through this Spinozist prism, the task facing the urban materialist becomes one of understanding the spontaneous emergence of urban form from the more or less random collisions of bodies in space, and how this form in turn may act back on its environment. The (rephrased) urban question thus may be said to involve i) identifying a discernible *morphological structure* (or 'pattern') in the urban artefact; ii) defining the emergent processes involved in this pattern's *morphogenesis*; and iii) comprehending the *causal power* that the actualised structure asserts on other modes in its vicinity. Framed in this manner, I argue, the Marxist rejection of urban autopoiesis and (active) urban sociogenesis can be transcended and its dialectical materialist image of the city replaced by one steeped in ontological materialist principles.

In what follows, I first explore the relationship between Spinozism and artefacticity. This is a necessary step which serves to anchor the Spinozist notion of modality in a wider discussion of artefacticity (section 3.2). I here devote

particular attention to the artefactual philosophy of Andre Leroi-Gourhan, showing how this philosophy conceptualises artefacts as involving their own 'artefactual' (as opposed to sociological) logic, and how these artefacts are in turn conjectured to become involved, emergently, in forms of social behaviour. Leroi-Gourhan divides the analysis of artefacts into a concern for their *surface* and *structure*, with different morphogenetic qualities pertaining to the genesis of the structure and that of the surface. I discuss this distinction and show how it provides a way of integrating into one model the theories of SIRN (which treat of the urban surface) and space syntax (which treat of the urban structure).

I then turn to the explication of Portugali's SIRN theory as this regards the urban surface, or 'face' of the city (section 3.3). I first show how SIRN outlines an understanding of the face of the city as a phenomenon suffused by a series of nascent, competing patterns which may or may not be actualised. More specifically, I discuss how such patterns are affirmed or 'selected' in emergent and spontaneously occurring pattern-making processes unfolding between different 'representational' systems, namely those anchored in and proceeding from the *embodied human mind* and those anchored in and proceeding from *the material urban artefact*. I then show how the changing face of the city in Portugali's analysis is conjectured to become involved in open-ended sociological processes, the latter manifesting themselves in the construction of cognitive maps with a sociogenetic component.

Having discussed the central elements of SIRN, I turn to Hillier and space syntax theory (section 3.4). I show, first, how Hillier elaborates a theory of urban morphogenesis which holds that urban systems will tend, *mutatis mutandis*, to converge towards a particular pattern (the so-called 'deformed wheel') as they actualise. This formal convergence is argued to be caused by a series of spatial 'laws' (of an increasing complexity) active in the forming process. I discuss these and show how they ground an emergent understanding of urban formation that is irreducible to sociological factors. I then discuss the way the urban artefact, once actualised, is conjectured to fold back on the urban social fact. Significant to this

discussion will be the notions of 'natural movement' and 'movement economy'; two concepts that, again, move from a lesser complexity (natural movement) towards a greater complexity (movement economy).

In concluding, I return to the question of the relationship between artefact and social fact. I show how, insofar as these may be said to involve their own proper logics, it is meaningless to speak of either the social fact or the artefact as ontologically prior or pre-eminent. Instead, social fact and artefact must be theorised as essentially irreducible phenomena (one does not 'represent' itself in the other) but nevertheless capable of being involved in co-determinant processes of creation. I return for one last time to Spinoza and to his assertion that modality involves emergent patterns of movement and rest, deploying this with respect to SIRN and space syntax' more or less explicit discussion of urban rhythmic patterns. In this way, a new image of the city is predicated on the conceptualisation of overlapping (but irreducible) architectural and sociological rhythms.

3.2 Leroi-Gourhan and the relationship between social fact and artefact

Before turning to Portugali and Hillier's particular theories of urban form, it first is necessary to contextualise the formal principles of Spinozism with respect to artefacts. Having demonstrated Spinozism's unique perspective on form and formation – what I call its 'principle of formation' - it therefore must be shown how this principle applies to those particular forms of being that are artefacts. The philosophy of artefacts is a relatively new field. Whilst it is true that the ancient philosophers also discuss artefacts - as for instance Aristotle does in his *Physics* - such discussions tend to remain rather tangential and underdeveloped, with artefactual or technical 'beings' not considered worthy objects of enquiry (as indicated by Aristotle's schematic categorisation of artefacts as things that exist 'by other causes', rather than 'by nature'; Aristotle, Ph, II, 192b).

This changes in the 20th century where a more profound philosophical interest in tools and artefacts begins to take hold. This interest (largely) may be divided in two tendencies. A phenomenological (or 'anti-realist') tendency found for instance in Heidegger's discussion of 'tool-being' (Heidegger, 1962) and its relationship - via the concept of Time - to human nature (or '*Dasein*'). And a materialist (or 'realist') tendency - in which one finds the work of André Leroi-Gourhan (1993), and Gilbert Simondon (2012) - where artefacts are treated as objects of enquiry in and for themselves, thereby rejecting the Aristotelian negation of artefactual 'natures' and the Heideggerian foregrounding of the human lifeworld. Artefacts may therefore exist 'by other causes' *at the same time* as they may be said to involve particular artefactual 'natures'.

As I indicate in the thesis' introduction, this thesis inscribes itself in a materialist-realist tradition. I therefore will not discuss Heidegger's phenomenological approach to artefacts, the reason being that it is not how an object or artefact helps a certain phenomenal 'lifeworld' appear that has my interest, but how those artefacts may be said to concurrently *involve* autopoietic processes of formation, and *express* sociogenetic potentials. I also will not discuss Simondon's work on technology (his so-called '*mécanologie*') insofar as most of the technologies that he explores are rather complex phenomena involving many overlapping layers of specialised technological innovations (see for instance his discussion of the Guimbal turbine, Simondon, 2012: 66-70).

Such a 'mechanological' approach to urban space - which would have to involve the many otherwise divergent technologies that converge in urban space, e.g. infrastructure, communication technologies, etc. - may be explored in later studies, but in order for such studies to be able to engage with the material urban artefact it first is necessary to understand the nature of this artefact in and for itself. Simondon's definition of emergent technological order (or 'concretisation') is worth noting inasmuch as it echoes his explication of non-hylomorphic design principles discussed elsewhere (Simondon, 1992). However, a similar - and in my

opinion: more pertinent - version of this discussion may be found in the work of Leroi-Gourhan on the production and social significance of artefacts.

A palaeontologist, Leroi-Gourhan explores a broad spectrum of technologies (or 'technics') ranging from the most primitive artefacts - such as prehistoric bifaces - to more advanced modern technologies such as automobile engines and jet planes. His work is, first and foremost, notable for his 'genetic' approach to artefacts. According to him, each artefact involves an emergent morphogenetic logic. It therefore is thought to express a particular form of self-organisation that pertains to its own 'nature'. Artefacts furthermore are conjectured to have a sociogenetic efficacy; an ability to produce and perpetuate certain 'rhythms' in the body politics.

As such, 'the *rhythms* and the *organization* of human society in space and time' are said to express the 'close connection between *social behaviour* and the *technoeconomic apparatus*' (Leroi-Gourhan, 1993: 148; emphasis added). Artefacts therefore constitute a kind of 'externalised cultural memory' (White, in Leroi-Gourhan, 1993: xix) thought to be expressive of a social group's 'forms, values, and rhythms' (Leroi-Gourhan, 1993; 278). These rhythms in turn are conjectured to reinforce what Leroi-Gourhan calls 'ethnic tonalities', and so artefact and social fact conjoin in rhythmical processes of emergent formation.

However, artefacts are not just expressive in sociological patterns of formation. According to Leroi-Gourhan, they themselves involve complex processes of formation. This means that the structure of the artefact cannot be reduced to a prior social logic, but is itself an emergent fact. In making this argument, Leroi-Gourhan shows how artefactual forming processes - such as for instance those pertaining to the dagger and the knife (Leroi-Gourhan, 1993: 299-313) - tend to converge towards similar shapes despite unfolding in different cultures. They therefore may be said to express their own logics before they express those of the culture. Such deep artefactual tendencies are argued to constitute a kind of artefactual lineages - Leroi-Gourhan calls them 'phyletic lines' (Leroi-Gourhan,

1993: 106) - which in turn are thought to be expressive of a particular morphogenetic process: the so-called 'operational chain' [*chaine opératoire*] (Leroi-Gourhan, 1993: 230-256).

Leroi-Gourhan's original theory of artefacts and social facts later has been discussed by a series of philosophers, including Derrida (1997), Stiegler (1998), and Deleuze and Guattari (2004). Of these, I find that the latter provide the most serious reading of him (although the other readings are by no means invalid). In their analysis, the artefactual lineage is said to be expressive of an emergent functional logic. A deep artefactual structure (or 'lineage') is therefore conjectured to emerge from the spontaneous convergence of otherwise divergent forces in the morphogenetic process. A simple instrument like the biface thus may be shown to express an emergent formal logic informed by the qualities of the material that it is made from (flint) and the dexterity of the end user for whom it is intended (human beings)[95].

Put in philosophical terms, the morphogenetic process may be said to constitute an intensive 'diagram' of morphogenetic possibility[96], which involves: i) *the materials* that the tool or artefact is made from, ii) the *technical skills* and *tools* available to the craftsman transforming these materials, and iii) the particular disposition of *the human body* (involved in the artefact as both manipulating artificer and subsequent consumer). Each of these elements constitutes a distinct power – an intensive vector - which informs the emergent order of the forming process and thus the final form. Not all materials may, for instance, be deployed in all technical processes (bronze swords thus tend to be cast not forged). Similarly, not all artefactual shapes will be useful in all situations. As Deleuze and Guattari write:

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[95] Cf. Leroi-Gourhan, 1993: 90-116.

[96] I use the word 'diagram', here, in the sense deployed by Deleuze (Deleuze, 2005) and by Allen (1998), i.e. as an intensive field of morphogenetic possibility. As Allen writes: ' A diagram is […] not a thing in itself but a description of potential relationships among elements, not only an abstract model of the way things behave in the world but a map of possible worlds' (Allen, 1998: 23.16). Cf. Delanda 2000 & Zdebik, 2012.

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The cast steel saber, often short and curved, a weapon for side attack with the edge of the blade [therefore] envelops a different dynamic space than the forged iron sword used for frontal attack with the point (Deleuze and Guattari, 2004: 446).

Such intensive qualities, or 'singularities', structure the functionality of the actualising artefact; not as Aristotelian forms would - by implementing an ideal and already conceived form - but by folding themselves into an emergent diagram of forces; the artefact's 'dynamic space' (Deleuze and Guattari, 2004: 446). The emergent relationships between the elements involved in the dynamic space of the artefact may therefore be said to 'suggest' a particular 'path' in its genesis which, finally, results in an artefactual form with a particular set of properties. As Deleuze and Guattari write apropos the divergent 'dynamic spaces' of the steel sabre and the iron sword:

The iron sword is associated with entirely different singularities [than the steel sabre] because it is forged and not cast or molded, quenched and not air cooled, produced by the piece and not in number; its traits of expression are necessarily very different because it pierces rather than hews, attacks from the front rather than from the side; even the expressive designs are obtained in an entirely different way, by inlay. *We may speak of a machinic phylum, or technological lineage, wherever we find a constellation of singularities, prolongable by certain operations, which converge, and make the operations converge upon one or several assignable traits of expression.* If the singularities or operations diverge, in different materials or in the same material, we must distinguish two different phyla: this is precisely the case for the iron sword, descended from the dagger, and the steel saber, descended from the knife (Deleuze and Guattari, 2004: 448; emphasis added).

The structure of the artefact may therefore be said to constitute an artefactual *resolution* to an intensive *functional problem*: 'Given these initial conditions - as represented by the available materials, technologies, technological knowhow, social needs, etc. - what type (or types) of form may be actualised'? In this sense, Leroi-Gourhan's artefactual philosophy can be argued to revolve around an emergent functional core, at least as far as the structure of the artefact goes.

However, Leroi-Gourhan also posits another, more superficial kind of differentiation in artefacts. This type of differentiation is not so much to do with

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the deep phyletic *structure* of the artefact as it is to do with the patterns of decoration and adornment proliferating on its *surface*. Leroi-Gourhan refers to this aspect of the artefact as the 'non-functional envelope' (cf. Leroi-Gourhan, 1993: 299-311) - thereby distinguishing its logic from that of the functionally determined structure - and so an artefact may be said to express both a functional and a non-functional logic. He writes:

> The relationship of function to form is actually of a different order from that of form to decoration. In animals as in humans, the nonfunctional envelope is a tissue of relics, vestiges of a phyletic origin that in the former is connected with the past of the species and in the latter with the past of the ethnic group. The fact that the decorative pattern on a butterfly's wing has mimetic value is of quite a different order from the wing's appropriateness for travel through air: The latter can be reduced to mechanical formulas and has the value of a physical law, whereas wing markings belong to the uncertain world of style even if, in Darwinian terms, they perform a protective function for a certain length of time in the history of the species. Human decoration only confirms the general rule of substitution of the ethnic group for the species; the same phenomena can be observed in the persistence of marks expressing the personality of a group (Leroi-Gourhan, 1993: 300).

Leroi-Gourhan's artefactual philosophy must therefore be subdivided into four separate - but interrelated - enquiries. There first of all is a *non-functional* enquiry relating to the formation of the artefact's *surface*. What forces does this formative process express? What is the emergent mimetic logic of artefactual adornment? There then is the enquiry into the way this surface informs other processes of formation, which here must be taken to mean processes of a sociogenetic kind (i.e. how does the artefact's surface inform the 'rhythms' of society?). Thirdly, there is a *functional* enquiry which refers to the emergent functional logic particular to the *structure* of the artefact. What morphogenetic process ('operational chain', 'dynamic space', 'intensive diagram') does the latter involve? And lastly, there is an enquiry into the way this structure *informs* still other material processes, for instance processes of social production and interaction (the 'rhythms' of society).

These different aspects of the artefact echo Spinoza's distinction between what a mode *is* and what a mode *does*. Indeed, the emergent functional logic that Leroi-

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Gourhan attributes to the artefact bears a strong resemblance to the intensive-essential logic at work in the transition from common notions to beatific intuitions, insofar as both refer to a series of divergent forces which - conjoined to certain bodies - begin to arrange themselves with respect to each other (implication of minds). In this way, Leroi-Gourhan's philosophy of artefacts brings us closer to an artefactual kind of ontological materialism; his differentiation between artefactual structure and surface adding yet another layer of comprehension to those provided by Spinozism.

It nevertheless must be noted that there are some challenges to transposing Leroi-Gourhan's artefactual philosophy to the analysis of the city. These are to do with the distributed kind of formation or morphogenesis that pertains to urban formation and with how they are 'consumed'. Whilst cities must be categorised as artefacts, they have the characteristic of being constructed not by one person but by a group of people distributed in time and space. This makes the problem of urban morphogenesis a case of particular complexity. They furthermore tend to be 'consumed' in a fragmented manner, with the individual urban dweller rarely engaging with the entire artefact at once.

If urban form nevertheless may be explored 'artificially' it is because cities, like other artefacts, may be shown to involve a *deep functional genotype* (this, I argue, is what space syntax demonstrates), and *superficial processes of mimesis* (this is what SIRN demonstrates). Cities also may be demonstrated to express a particular set of sociogenetic potentials, although these are often of such a quotidian nature that they are easily overlooked. Given the particular status of the material city, the question therefore becomes one of identifying the emergent, pervasive forming process particular to the urban artefact - and more particularly: to its surface and structure - and the way this react back on human social relationships. It is to this task that the thesis now turns, starting with SIRN's exploration of urban surface phenomena.

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3.3. Portugali: The map and the surface

3.3.1. The face of the city is its information: from Lynch' image of the city to
Portugali's Synergetic Inter-Representational Networks

SIRN stands for 'Synergetic Inter-Representation Networks'. What Portugali theorises with his theory are thus 'networks' that are created 'synergetically' - a term that designates emergent forms of self-organisation in far-from-equilibrium conditions - between different orders of 'representation'. I shall return to exact meaning of each of these terms and how they relate to each other in Portugali's explication of form, but first I will discuss the particular research object with which he is concerned. Portugali's primary concern is with the surface or *'face'* of the city (Haken and Portugali, 2003)*,* but his perspective is dual*.* He thus discusses, on the one hand, the *information involved* in the urban surface, e.g. the emergent pattern-making processes animated by transformations in the fronts of houses and the silhouettes of buildings. But he also explores, on the other, the *information expressed* by this surface, e.g. the 'remarkability' of the urban artefact as experienced by urban dwellers[97].

This choice of research object situates Portugali's work at the intersection of complexity theory, cognitive science and urban studies. What he calls the face of the city therefore is discussed in terms of theories from complex systems theory, cognitive science and urban studies. He is, it must be noted, not the first urbanist to explore the significance and complexity of the city's surface from a cognitive perspective. A considerable field of cognitive research into urban form predates SIRN of which Lynch' *Image of the City* arguably is the most significant (Lynch, 1960)[98]. The comparison between the two in fact is an apt one. Like Portugali, Lynch is interested in the information 'stored' in the face of the city and with the

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[97] Like Hillier, Portugali also touches on the role of the street network in urban sociogenesis. But this arguably is not his main focus and the observations regarding the street network remain rather marginal to his overall statement. Cf. Benenson & Portugali, 2005; Portugali, 2011: 184.
[98] Cf. also Dalton and Bafna, 2003.

way this information may be involved in the production of various forms of cognitive and proto-social behaviour. Lynch and Portugali also may be said to share a concern for the 'legibility' of the urban environment, although they define this differently.

Lynch identifies five archetypal urban elements - paths; edges; districts; nodes; landmarks - that he argues play a role in the construction of a 'legible' city image. These constitute 'the building blocks' that a planner may use to make 'firm, differentiated structures at the urban scale' (Lynch, 1960: 95) and thus are argued to be the means whereby urban distinctiveness or 'remarkability' are produced. Lynch takes this aspect of urban remarkability to be key to place-making and thus to the differentiation between urban neighbourhoods. If the environment is 'visibly organised and sharply identified', he writes, 'then the citizen can inform it with his own meanings and connections. Then it will become a true place, remarkable and unmistakeable'(Lynch, 1960: 91-92).

A neighbourhood's perceived 'remarkability' therefore is informed by the general availability (and the particular configuration) of noticeable elements in the urban fabric. In this way, an 'image' of the city - a term first used by Lynch - is thought to constitute a kind of information externalised in the surface of the urban artefact, yet active in the mind of the urban dweller (or 'citizen'). These no doubts are statements that Portugali would agree with; in particular as regards the informational aspect of the urban artefact and the circuitous logic that is supposed to unfold between citizen and environment. There are however also some rather significant differences between his position and that of Lynch. These mainly have to do with the granularity of their research and with the complexity of the associated conceptual frameworks.

Despite its status as a classic, the *Image of the city* in fact does not go into any significant detail in its discussion of the construction of remarkable urban phenomena - how are they ordered? what is the logic of this ordering? - and so the statements of the book remain somewhat vague. Lynch might acknowledge

the multiplex levels of information produced and represented in the city. Yet his research does not explain to a very great degree the nature of the processes whereby information is produced and externalised in the urban environment. Urban 'images' are thus conjectured to be manufactured by discrete agents the efforts of which sometimes converge in a unitarian whole. But the processes accountable for the emergence of such images are never described in any detail.

Portugali, here, offers some progress. Discussing different principles of formal emergence, he makes the explication of morphogenetic processes - their emergent logic, how they evolve over time - a central aspect of his theory. This ensures a much more thorough investigation of spatio-cognitive phenomena, one that discusses in detail not just the information that the face of the city 'conveys' (its remarkability) but also the information that it 'embodies' (Haken and Portugali, 2003: 385). A characteristic 'face' of the city will thus *communicate* information to the urban dweller, thereby making a certain place more or less meaningful to him/her, but it also will *incarnate* an emergent formal logic that involves informational elements particular to that place in the city.

3.3.2. Synergetics, Inter-Representation Networks and the construction of the urban artefact

Portugali thus asks two questions in his explication of the urban problem. What are the formal processes involved in the production of surface patterns? And what information do those patterns convey to the urban dweller and to the communities that s/he is part of? It is this dual problem that he seeks to resolve through the theory of Synergetic Inter-Representation Networks. The notion of 'synergetics' is one that Portugali takes from Hermann Haken; a physicist and long-term collaborator of his. Haken describes the basic synergetic event as a process in which a metastable systemic order spontaneously manifests itself in an otherwise non-stable - or 'far-from-equilibrium' - environment (as such, it bears a strong similarity to Prigogine's notion of 'dissipative structures' (Prigogine and Stingers, 1984).

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This process - which is defined as essentially self-organising - involves several steps of which the first is that of so-called 'enslavement'. Broadly put, enslavement may be described as an impulse that leads a subset of elements present in a non-equilibrium system down a path towards systemic order and unity (i.e. equilibrium). When a relative degree of stability is achieved, a so-called 'order parameter' is affirmed. This parameter then presides over the elements of the system for a given duration of time ensuring the integrity of the system until it passes out of phase. In this way, an emergent material pattern is first generated and then perpetuated following wholly self-organising principles.

In most systems treated by the field of synergetics - these may be physical, chemical, or biological - the enslaved elements will have no reflexive relation to their enslavement. Enslavement therefore is a fact that is unconsciously accepted (or 'endured') by the constitutive elements, not something that they 'reflect' on[99]. This makes it difficult to extend the synergetic model to social systems where the components involved in the process of enslavement - i.e. cognisant agents - often will have a reflexive relation to the process (or at least have the capacity for reflection). This, in turn, raises some problems for the theorisation of urban systems where at least part of the process refers to cognising agents.

In order to overcome this problem, Portugali adds another element to his synergetic description of the urban system. This is his notion of the 'Inter-Representation Networks' (IRN). Put abstractly, IRN stipulates a complex loop existing between two emergent representational networks, in this case: the *internal representations* manifested in the mind of the urban dweller; and the *external representation* manifested in the urban artefact. The basic conjecture is that the interaction of the two networks may cause spontaneous affirmations of patterns in one another - this is why their relation is 'synergetic' - thereby

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[99] Portugali discusses the emergent formation of a laser beam, the constitutive elements of which do not relate to the laser beam-making process in a way that may be characterised as reflexive. Cf. Portugali, 2011: 60-63.

affecting in a non-linear way either the agent's comprehension of the urban artefact, or the pattern-making processes that this artefact sustains. Representation thus is a two-way street, unfolding along an emergent (and always provisional) gradient.

SIRN processes are not exclusive to urban space but may be found in most artificial pattern-making processes. An example may be taken from the world of art where a painter will paint a picture referring at once to the manifestations that s/he brings forth on the canvas and to the particular images which arise in his/her mind. In this process, certain provisional nascent forms or motifs may manifest themselves in the painting; motifs which the painter may either ignore or act on. A kind of aesthetic resonance is thus set up between mind and painting, with either of these two 'representations' prolonging themselves in the other. (Similar processes may be found in sculpturing, pottery, etc. See for instance Malafouris (2013) on the emergent formative processes particular to pottery).

Representations have the capacity to condition and stabilise each other over time and so an emergent process of enslavement thereby may manifest itself somewhere between their respective positions. This is a process that, according to Portugali, '[…] evolves as a play between internal representations that are 'subevents' constructed by the mind, and external representations that are events constructed in the world [thereby giving] rise to an inter-representation network that in a process of circular causality constructs the world outside and inside' (Portugali, 2011: 126). The basic SIRN process thus constitutes the emergent operation in which a series of representations (cognitive as well as artefactual) spontaneously converge towards a certain pattern which is momentarily stabilised in the artificing mind and/or the artefact.

3.3.3. SIRN's three submodels

Portugali speaks of 'artefacts' in the broadest possible sense, including in this definition as apparently different phenomena as tools, artworks, cities and

language. Whilst such phenomena differ in their structural logics - not to mention their content - they all are conjectured to be variations of the same inter-representational process in which expressions in the mind of the artificer converge 'synergetically' with expressions in the artefactual world. Such processes therefore are not particular to cities and paintings, but occur in all forms of artefacts. What makes the city a special artefact in these regards is the fact that i) it is produced by a group of artificers distributed in time and space; and ii) that it is a 'very large artefact' (Portugali, 2011: 218) that the agent does not cognise in its entirety at the moment of artefactual production or consumption.

For this reason, the productive processes particular to cities practically always will be localised - an introduction or excision of an element (or series of elements) located in a certain part of the structure - rather than global. In this, the type of artefact that the city resembles most is not a hammer or a chair but 'language' which also is something organised at the intersection of a series of localised mental and material expressions whilst being reducible to neither. (Note that the so-called 'speech act' involves a material component insofar as both the human voice and ear operate with a limited set of sounds that they can express/detect determined by their respective material structures).

There thus are particular aspects that pertain to the production of certain kinds of artefacts which are of little relevance to the production of others. For this reason, SIRN operates with three categories - or 'submodels' - in which the basics of the SIRN process (the enslavement of an otherwise divergent series of representations; their progressive convergence under an emergent order parameter) are preserved but also modulated. Portugali thus distinguishes between an *intrapersonal submodel*, an *interpersonal submodel* and what he calls an *interpersonal submodel with a common reservoir* (Portugali, 2011: 160-66*),* these models making up the main categories of his artefactual enquiry.

The intrapersonal submodel concerns SIRN processes where only one mind is active/acted on. An example is the artistic process already discussed where a

painter refers only to the artefact in front of him/her and to the sensations that this causes in his/her mind. More relevant to the discussion of urban space, one also may imagine a person that comes to a city for the first time and begins to navigate it. As this person moves around in the new environment, the activity will be one of exploration and learning, the person effectively 'interiorising' the environment by constructing a cognitive map through 'landmarking, edging, pathing' (Portugali, 2011: 162). In this way the movement of the person in the city is accompanied by an cognitive 'movement' manifested in the establishment and progressive solidification of a cognitive map.

There then is the interpersonal collective process which Portugali splits in two: the *basic interpersonal collective process* and the *interpersonal collective process with a common reservoir*. In both of these submodels, the SIRN process involves several persons each of which participates in the inter-representational process with their own cognitive systems. The difference between the two models is a temporal one. In the former, the creative process that the agents are involved in is *sequential* - the individual agent thus engaging with (or 'consuming') a pattern produced at a prior time by another agent - whereas in the latter this process is *synchronic,* meaning that a series of agents are engaged in simultaneous processes of production and consumption.

In discussing the interpersonal collective process, Haken and Portugali (1996) refer to Frederic Bartlett's experiments with serial production SIRN (see figure 1). In one famous experiment, Bartlett gave participants a drawing that they were asked to replicate and pass on to another participant who then was asked to do the same and so one in a sequence (Bartlett, 1961). What Bartlett found was that the end result often would be dramatically different from the initial input due to the

accruement of individual distortions. Certain attributes of the drawing would thus be enhanced and reaffirmed over time whereas others would be suppressed.
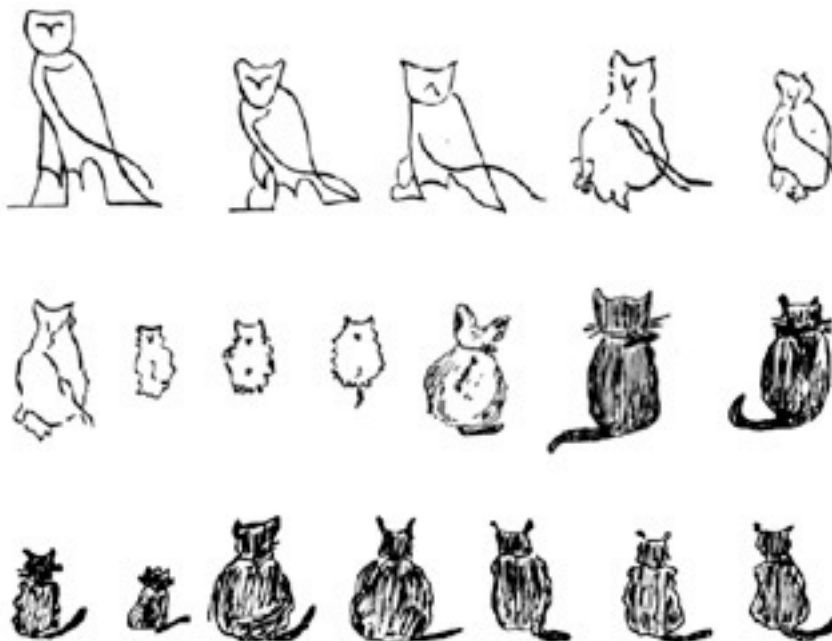

Figure 2: *Haken and Portugal evoke Frederic Bartlett's study of serial drawing phenomena, as an example of the basic interpersonal model. Bartlett's experiment was concerned with 'serial production', i.e. how producing in a sequence might affect the final outcome or product. Participants were given a drawing, then asked to reproduce it. In most cases, this would manifest itself in a transformational series where an initial input would go through one or several transformations - or 'phase changes' - before settling on a more or less stable pattern. Moving from top left towards bottom right, this image shows the transfiguration of what originally is a drawing of an Egyptian 'mulak' - a fabulous creature - into a cat. Source: Bartlett, 1961: 80.*

The drawing may thus be said to sustain what dynamic systems theory calls 'phase changes', that is: sudden qualitative (as opposed to quantitative) changes to its formal logic, with for instance the image of an owl turning into that of a cat. According to Portugali, this phenomenon may be explained as the product of an emergent synergetic inter-representation network manifested between the individuals involved in the experiment. The latter are thus "enslaved' by the collective order parameter that emerges in the process'(Portugali, 2011: 163), and so a particular pattern can manifest itself and take on consistency without a centralised agent ensuring this.

The other submodel concerns interpersonal SIRN processes with so-called *common reservoirs*. In Portugali's terminology, a 'common reservoir' designates a phenomenon which may be consumed *synchronically* by a group of agents.

Agents therefore do not relate to a particular artefact in a sequence but contemporaneously. However whereas *consumption* is synchronic in the common reservoir, *production* may in fact express a diachronic logic insofar as some features of the reservoir may have been produced at an earlier stage. It therefore involves a diachronous form of production and a synchronous form of consumption.
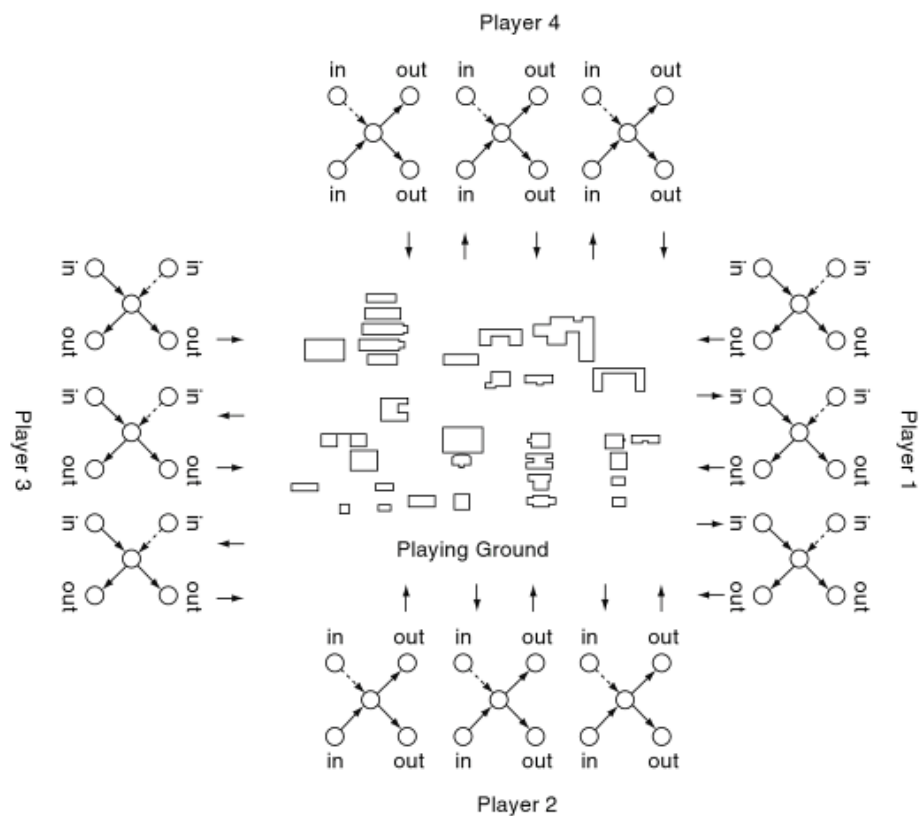
Figure 3: An example of SIRN system with a common reservoir; here with four agents or 'players'. Each agent internalises an informational input; processes it; and then externalises a decision which effectively corresponds to an externalised output. (Source: Portugali, 2011: 164).

A 'common reservoir', in Portugali's conceptualisation, therefore is characterised by being a product of many individual acts. But as a 'representation' it also is something that acts back on those cognitive agents which consume it in a potentially causal way. It might be the global product of many local acts, yet it nevertheless has the capacity for becoming active in the mind of the individual agent. The archetypical example of a interpersonal process with a common reservoir is language: an entity constituted in an emergent fashion by so many local speech acts distributed in time and space, but also a global system that

sanctions 'bad language' in a top-down manner. However other forms of common reservoirs also are conjectured to exist, for instance the Internet whose 'link structure' is both emergent and (weakly) deterministic (cf. Benkler, 2006).

According to Portugali, what characterises both language and the Internet is the way individuals and/or groups concurrently deposit and extract information from them in a distributed and non-ordered way. Portugal thus speaks of the SIRN model with a common reservoir in terms of 'an externalized nonbiological memory' (Portugali, 2011: 163), that is as a kind of memory store, or 'archive', that does not reside in the mind of the individual but in the artefactual environment. It is Portugali's assertion that also urban space may constitute such a type of externalised, nonbiological memory. Individual citizens as well as communities therefore may be said to draw on the particularities of urban space in creating and perpetuating forms of behaviour that may be meaningful to them.

It is important to note, here, that Portugali's artefactual archives are not static phenomena. They may be mnemonic devices predicated on some minimum degree of stability - the way language, for instance, involves a particular syntax - but they also are dynamic systems shot through with informational redundancy and emergent nonlinear processes, something which ensures that the global system is never finalised, always provisional. Whether it be language, the Internet or the face of the city, the artefactual archive of the common reservoir thus alway must be conceived as a metastable phenomena.

3.3.4. Quantitative and qualitative information in the city: forming the cognitive map

Like language, Portugali's argues that the construction of the face of the city proceeds in an autopoietic or self-organising manner. For him, the key element in this process of urban self-organisation is the notion of 'information'. Arguing that the face of the city both *compresses* and *expresses* information - it compresses distributed information into a more or less coherent ornamental expression; it

expresses that information, in turn, in relation to the inhabitants of the city - Portugali outlines a system where information circulates between these two states in accordance with a sometimes circuitous, sometimes non-linear logic. A certain pattern or figure may thus be entrenched in the face of the city only to be suddenly replaced by an emergent, new figure.

The relationship between information *compression* and information *expression* is here theorised in a non-hierarchical way. It may be argued that the former in a certain sense is anterior to the latter; the information expressed by the artefact effectively relying on the input provided in the information compressing process. But the circuitous nature of the SIRN process and the continuous process of urban space-making means that such a hierarchisation of the forms of information can only be analytical. In reality, the face of the city is a system of input and output, each iteration relating to previous iterations like so many Chinese whispers. In discussing this circuitous informational loop, Portugali distinguishes between two archetypal kinds of information - 'Shannonian information', and 'semantic information' - asserting that it is through the intermeshing of these kinds of information that the nonlinear SIRN process specific to the face of the city unfolds[100].

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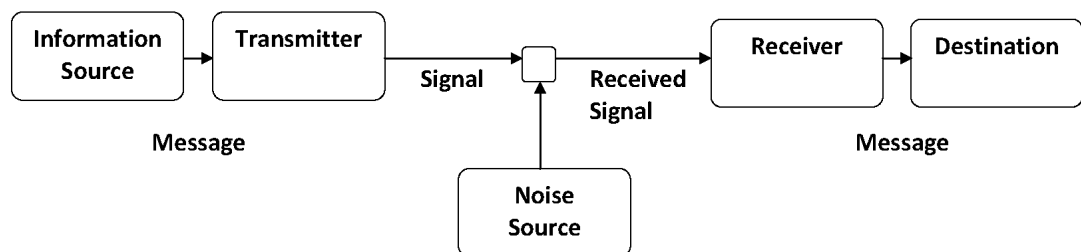
[100] 'The various artefacts that make up the face of the city', he writes with Haken, 'are perceived, remembered and imagined by virtue of, and according to the information they embrace - the Shannonian 'objective information and the 'subjective' semantic information (Haken and Portugali, in Portugali, 2011: 167)

Figure 4: *In Shannon & Weaver's model of a communication system, an initial message is transmitted via a transmitter to a destination by way of a receiver. Between the transmitter and the receiver, a level of noise may set in. Such noise will confuse or scramble the message thus affecting the transmission of knowledge. Source: Shannon & Weaver, 1963: 7.*

Shannonian information refers to the particular concept of information developed by Claude Shannon and popularised in his work with Warren Weaver (Shannon, 1948; Shannon & Weaver, 1963). It constitutes a quantifiable way of conceptualising and representing information, breaking phenomenal states into so-called binary digits (or 'bits') of information. The informational state particular to a given material phenomenon may thus be said to express a particular amount of bits which may be higher or lower than that expressed by another phenomenon, thereby making the informational content of material phenomena quantifiable and comparable.

The specific amount of bits involved in a particular informational state will correspond to the randomness, or structure, of that state (or 'message'). To take a simple example, the message 'ab-ab-ab' thus contains less information than the message 'alphabet', insofar as the randomness or unpredictability of the expression in the former - what might the next letter in the sequence be? - is lower than in the latter. An important relationship therefore exists between 'information' and 'unpredictability' (or uncertainty) in Shannon's model, meaning that a high degree of information expresses a high degree of uncertainty in the message.

Portugali argues that certain urban 'faces' will express a relatively low level of information on account of their predictability - e.g. the monochromatic house fronts on Parisian boulevards (my example) - whereas other will express higher levels of information on account of their unpredictability (e.g. the differentiated riverfront in London; my example). This is conjectured to be significant to the production of cognitive maps which are thought to depend on visual information in their actualisation. According to Portugali, information, here, must comply with a sort of 'Goldilocks principle'.

On the one hand, too much information (i.e. too heterogenous or unpredictable an environment) will make it difficult for the agent to memorise the individual elements of the urban system, thus leading to the perception of the neighbourhood as unintelligible. On the other, too little information (i.e. too similar or predicable an environment) will make it difficult to differentiate between different neighbourhoods, leading, in turn, to an impoverished understanding of the urban system. In actualising, cognitive maps thus depend on a certain degree of remarkability in the face of the city, this remarkability in turn being predicated on the amount of bits - or Shannonian information - that the face expresses at any given moment. This adds a quantifiable element to Lynch's image of the city.

Semantic information refers to a state of information that is not *quantifiable* (it cannot be reduced to bits) but *qualitative*. Unlike Shannonian information - where a message may be more or less intelligible but not, strictly speaking, 'meaningful' - semantic information is characterised by being imbued with 'meaning'. This therefore adds another layer of information to the surface of the urban artefact. For Portugali, 'semantic information' refers to informational states shared by certain social groups[101]. A particular memorial - Portugali discusses Yitzhak Rabin's memorial stone in Tel Aviv[102] - may thus have significance to the members of a certain group (e.g. Israelis, Tel Avivians, Jews), whilst being insignificant to others (e.g. tourists, *Gentiles*, etc.).

The face of the city will therefore express higher or lower degrees of legibility depending on the amount of bits (Shannonian information) expressed through it. This in turn will either hinder or facilitate urban navigation and wayfinding and thus the creation of cognitive maps. However the availability of semantic information may help further increase the legibility of the city by ascribing a qualitative socio-cultural value to certain parts of it. When this happens, different

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[101] In machine learning theory, 'semantic memory' is distinguished from so-called 'episodic memory', the latter referring to informational states that are entirely unique to the individual; see for instance Tulving, 2002.
[102] Cf. Haken & Portugali, 2003: 387; Portugali, 2011: 170

kinds of information thus come together in the mind of the agent, thereby creating a richer urban reality for him or her.

3.3.5. Surface phenomena: the intersection of semantic and Shannonian information and the process of urban formation

The overlap of different kinds of information is thus conjectured to have certain repercussions for the 'legibility' of urban space and for wayfinding. This is a case of the artefact with a common reservoir manifesting itself, as it were, in the mind of an urban inhabitant (or agent) and, more particularly, in the actualisation of a cognitive map. However according to Portugali, the reverse also is true. Patterns arising in the mind of the agent thus are argued to inform the genesis and organisation of emergent patterns in the face of the city. To understand how this occurs, one must again return to the relationship between Shannonian and semantic information.

Portugali argues that semantic information has a *categorising capacity.* It thus is an expression of semantic activity or knowledge when a given patterns is recognised and given a name. 'Zigzag' (my example) thus refers to a pattern with quantifiable properties - it is in other words expressible in bits - but also to a semantic concept that may be communicated with a relatively low level of information entropy. By categorising, in this way, a particular informational state or message, semantic information may therefore override Shannonian information, thus transforming the properties and communicability of that message. This makes it possible for an agent to categorise or label a particular phenomenon or informational state that s/he encounters in urban space. This could be a pattern already manifest in the face of the city, but it equally may be a still underdeveloped (or 'nascent') pattern that the agent chooses to affirm and develop.

According to Portugali, a multiplex set of patterns will be involved in the face of the city at any given time. These may be more or less completed - and will stand

in an open-ended relation to the patterns that surround them - but they will rely on an outside force for their completion; the agent or agents (this necessarily must be so insofar as urban patterns are artefacts). A nascent pattern will be actualised when one or more of the agents inhabiting the city - these may be architects, urban planners or regular home owners - choose to affirm and complete it. In itself, this is unremarkable. However it is Portugali's argument that the local actions of different agents have the capacity to give rise to the spontaneous affirmation of a new order parameter in the face of the city in what may be termed a distributed pattern-completing tendency.

According to Portugali, such tendencies are an expression of a desire for 'figurative goodness' (Portugali, 2011: 176)[103]. This is a term he takes from *Gestalt* theory where it refers to processes in which a human agent transforms a figure with high information entropy to an informational state (or *Gestalt*) where entropy is relatively speaking lower and more intelligible. The pursuit of figural goodness is thus a pursuit of more manageable informational states. It is a way for an agent to reduce informational 'noise' by transforming a particular figure based on whatever visual cues already exist in that figure (refer to figure 1 where the transformation of an owl into a cat may be said to be expressive of this principle).

Portugali takes this notion of figural goodness and applies it to the processes conjectured to unfold in the face of the city. One of the many nascent patterns subsisting here may, it is argued, be *recognised* and its completion *initiated* by an artificer, thus leading to the localised realisation of a particular pattern in space. However, given the fact that the city is a common reservoir, other agents may choose to either counteract or reaffirm this pattern thus providing the pattern-completing process with a certain degree of volatility and complexity.

An interesting series of shifts occur in the pattern-making process. A nascent pattern first is *recognised*, then *conceptualised* before, finally, it is *developed* and

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[103]Cf. also Attneave, 1959.

actualised. In this sequence, the SIRN process is said to spontaneously move from a purely *quantitative state* (the external input of the face of the urban artefact; its information expressed in bits), to a conceptual and thus *qualitative state* (the meaningful if nascent pattern that the figure conjures up in the mind of the artificer), and back (the output of a new pattern with a new informational state). Thus the circuitous logic of SIRN, as it unfolds at the intersection of mind and matter and different types of information.

There is, however, a problem. According to Portugali, adding *meaning* (concept, category) to what he argues to be a fundamentally *meaningless* state (semantic information, bits) goes against the very foundation of information theory. As he writes: 'An important achievement of Shannon's theory is the definition of information as a quantity that is 'free of meaning'' (Portugali, 2011: 187)[104]. This leaves a conceptual gap to be bridged. Another problem presents itself, to do with the 'open-ness' of the urban system. In information theory, systems of information are conjectured to be closed off, with a particular number of messages, *Z*, determining the boundary of the enquiry. According to Portugali, it therefore is not theoretically possible to apply or extract Shannonian information from an open system.

Yet cities are by definition open-ended systems; its face a continuously modified surface animated by the more or less concerted actions of its inhabitants. As such, its nature may be said to resists Shannonian analysis. This is where the importance of 'concept' comes in insofar as a concept is something that designates and thus *fixes* a particular state of affairs in a category. In adding a qualitative concept to a quantitative state, the open-ended process of formation that characterises the city therefore is conjectured to be momentarily closed off in the mind of the artificer. This allows the process of formation to be processed quantitatively, before being re-expressed in a new (quantitative) state of information. 'The logic behind this somewhat surprising property', writes Portugali,

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[104] Cf. Portugali, 2011: 195-210.

is that Shannonian information makes sense only with respect to *closed systems.* There must be «a fixed reservoirs of messages, whose number is Z» that will allow one to count the relative frequency of objects (Haken 1988/2000, p 16). On the other hand, however, cities like many of the systems we encounter in life are *open systems* in the mathematical sense: their number of objects is indefinite. *Here is where the process of pattern recognition of categories and its entailed semantic information comes in - it closes the system, distinguishes between objects, and allows one to count their relative frequency of appearance* (Portugali, 2011: 188; emphasis added).

In this transition from pattern-recognising to pattern-making processes, an external informational state is thus cognised, processed, and then, finally, put out as a local design decision. Given the emergent nature of the face of the city, such decisions may bring about a phase change in the surface pattern thus destabilising the face of the city. However such a process only is possible insofar as it prolongs itself over processes of *both* a quantitative and a qualitative nature. The concretisation and perpetuation of surface phenomena therefore are predicated on the overlap of Shannonian and semantic information.

3.3.6. Coordinates of the pattern-making process: phase transition, enslavement, order parameter, phase space

Portugali discusses these pattern-making processes with respect to a number of surface phenomena, including different types of adornment, particular kinds of neighbourhood styles, the distribution in urban space of monuments, and so on. All of these examples are evocative, but perhaps the most theoretically satisfying is his discussion of Tel Aviv's so-called 'jumping balconies' (E.g. Alfasi & Portugali, 2009; Portugali, 2011: 287-88.). 'Jumping balconies', in Portugali's definition, are 'ceiling-less' balconies that are 'technically impossible to close' (Alfasi and Portugali, 2009: 169). They are conjectured to constitute an aspect of Tel Aviv's 'face' which have undergone a particularly strong and discernible SIRN-driven reconfiguration, something which makes them well-suited to illustrate Portugali's principle of formation.

The historical period in which this reconfiguration is argued to take place is not particularly well-defined. Portugali only mentions that the first stage of the process occurs in 'the late 1950s' with an intermediary stage in the '1980s' and a 'current stage' (presumably the early 2000s; see Alfasi and Portugali, 2009). Given the lack of clarity, I have decided to refer to each stage as 't_x', with 't_0' designating the first phase in the evolution of the system, 't_1' the second phase of that evolution, and so on. This makes clearer the formal nature of the argument and also has the advantage of eradicating the uncertainty that pertains to the actual dates of the process.

Portugali's discussion of the jumping balconies start at a moment in the history of Tel Aviv, t_0, in which most apartments in the city have an open balcony. Speaking in terms borrowed from dynamic systems theory, this may be conceptualised as a stable or close-to-equilibrium state of the urban system, with the face of the city characterised by uniformity. Next, comes a moment, t_1, in which one proprietor decides to modify her balcony by closing it off, thus making it a 'half-room'. This example then is followed by one of her neighbours, and another, and a process of spontaneous information-dissemination then ensues, leading to a situation, t_2, where the majority of balconies are closed off in the half-room style.

At this moment, another kind of information adds itself to the purely architectural information of the balconies as the local council decides to change the tax status of balconies. This decision, Portugali indicates, is informed by the retrieval of information from the surface of the city and so the spontaneously generated series of balconies in a sense 'spills over' from the realm of architecture and form into the realm of policy-making. The new planning law exempts from taxation completely closed off balconies, and so the evolution of the system enters a new stage, t_3, where balconies of this new type prevail. Later still, at time t_4, the council decides to give tax exemptions to another type of balconies - one that is open and which cannot be closed off - and so a new style of balcony (the jumping balcony) begins to proliferate.

Borrowing the terms from dynamic systems theory, one may think of the instance that the first closed-off balcony is constructed, t_1, as that moment in which a phased system (t_0, characterised by having open balconies as the norm) is pushed out of phase and towards a new phase (t_2, characterised by having closed balconies as its norm). The phase change from t_0 to t_2 is caused by the introduction of an informational singularity (the first closed off balcony, t_1), followed by a series of sequence-completing processes which - arising from the dissemination and retrieval of Shannonian information across the face of the city - takes the evolution of the system in a particular formal direction.

What occurs at a certain moment in time - here: somewhere between t_1 and t_2 - is that a certain pattern comes to dominate whatever other nascent patterns there might have been present in the face of the city, thus directing the system towards a new figurative state. This new state is then comprehended and acted on by the planning authorities in t_3, and again in t_4 with their changes to the system of taxation initiating still further fluctuations in the system. The process is completed, for the time being at least, once a new category - the 'jumping balconies' - is affirmed and enters the popular psyche. (Note how the Shannonian information of superficial patterns here attains semantic significance).

Figure 5: *Pattern evolution in Tel Aviv's urban face. To the left is a closed-off balcony corresponding to the one introduced at time t_1 and made popular during t_2. The image in the centre shows the closed balcony popular during the period of taxation, corresponding to time t_3.*

To the right is an example of the so-called 'jumping balconies' of Tel Aviv, corresponding to time t₄. Source: Portugali, 2011: 229.

In synergetical terms, this pattern-affirming process may be described as the emergence of a so-called 'order parameter' from a non-equilibrium state. Moving through several phases of a lesser or greater stability, the style of the prevalent order parameter - i.e. the pattern that it expresses - is informed by the preceding steps in the SIRN process; a bit like a 'Markov chain' where the next phase always depends on the preceding one (Markov, 1971)[105]. A figural dissonance thus arises in the face of the city, one that - pending the emergence of a sufficient principle of enslavement - may lead to the spontaneous manifestation and consolidation of a new pattern or series of patterns.

The fact that new patterns may arise in what otherwise appears to be a saturated situation points to the many heterogeneous forces suffusing the city and to the fundamentally open-ended nature of its formation. Formal patterns thus constitute themselves at the intersection of these forces, bringing them momentarily under their control in patterns of a greater or less durability. An urban surface pattern is therefore a force in itself, but it also subsumes within itself other forces (e.g. notions of figural goodness, legal codes, economic and socio-cultural concerns). This gives it a certain duality. On the one hand, Portugali argues, space constitutes '[…] a landscape full of forces and on the other, a product – an order parameter that emerges out of the interactions that take place 'on it', but that once emerging/existing prescribes the behaviour and interaction of the parts' (Portugali, 2011: 235).

3.3.7. Cognitive dissonance and the city as metastable archive

The networked nature of the SIRN process - where cognitive representations relate 'synergetically' to artefactual representations - means that changes in the artefactual environment may have implications for the people that navigate and

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[105] Cf. Seneta, 1996, for a general description of the theory of Markov chains and the historical development.

inhabit it. This lends the artefactual environment a *sociogenetic capacity*, that is: a capacity for supporting and even engendering different kinds of social behaviour. This capacity may manifest itself in simple wayfinding-related events such as when an agent navigates the city in which he or she lives by way of environmental cues. But according to Portugali, it also may be found in more complex forms of social behaviour such as 'buying or renting houses or flats. […] choosing restaurants, theatres, performances and so on' (Portugali, 2011: 200).

Exploring these more complex kinds of socio-spatial behaviour, Portugali returns to the notion of the 'common reservoir'. As already established, artefacts with a common reservoir have a capacity for acting as an externalised information store - or 'archive' - that individuals and social groups may draw on as they go about their daily lives. These archives express a certain duality insofar as they are both something produced and something that is itself productive. They therefore might be caused by a multitude of discrete acts that converge in them; but they also may contain a cognitive or sociogenetic force affecting the individuals and communities that engage with them.

As I discussed earlier, examples of artefacts with a common reservoir include - in addition to cities - language and the Internet. Yet whilst the latter two are routinely attributed with mnemonic capacities[106], the city only rarely is conceptualised in this way. It is this omission that Portugali wants to correct through his explication of cognitive maps. For him, cognitive maps constitute a particular kind of socio-spatial representations containing a *wayfinding component* and a *cultural component* which - whilst analytically distinct - tend to overlap in reality. For instance the circulation within (and familiarity) with a particular geographical area might amplify a certain cultural affiliation. In this way the social and the spatial components overlap.

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[106] Cf. Derrida, 1996 (in which language is described as an emergent 'archive'), and Benkler, 2006 (in which the Internet is described as an emergent 'archive').

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Portugali explores different scenarios where this may be said to occur, including a politically sensitive study of a group of Israelis and a group of Palestinians living in the same region (Portugali, 1993). Asking 600 Jewish settlers, and 1500 Palestinians living in the occupied territories a series of simple spatial question - including: 'which is the nearest city'? - Portugali produces two collective cognitive maps the most striking common feature of which is their reciprocal exclusion of areas populated by the other people. In this way Portugali finds the fraught relationship that exists between these peoples to be both manifested and reproduced in their respective sets of cognitive maps. The Israelis and the Palestinians in the study therefore not only live different *physical* realities. They also live different *mental* realities.

The conjecture is that these two types of lived reality tend to overlap and reinforce each other over time. According to Portugali, the spatio-cognitive problem therefore informs the socio-spatial problem and vice versa. As he writes: 'Mental map processes are intimately connected with socio-cultural processes […] the external geo-social-political order participates in forming individuals' cognitive maps. The same can be said of results from systematic distortion studies in general. We seem to make use of political boundaries, architectural landmarks, cultural symbols, and other means by which society socio-spatially orders its external environment' (Portugali, 1993: 165).

The emergent order parameter of the spatial pattern-making process therefore may conspire with other emergent order parameters in creating and reinforcing particular mental states in an agent, something which would explain the differences between cognitive maps in Israeli settlers and Palestinians. As Portugali argues, 'the [cognitive] enslavement of the Israelis and the Palestinians by nationalism entail[s] a hermeneutical change - two different interpretations, two different languages, two different societies, two different cognitive environments' (Portugali, 1993: 173). Society thus may be folded into space through processes that proceed from an extended kind of cognition, but space folds itself back into the mind through emergent forms of socio-spatial production.

Caught between processes of pattern-making and pattern-recognition, the cognitive map thus becomes a political artefact; one which mediates between society and space by way of emergent pattern-making processes and their spontaneous semantic categorisation. As such, it is itself an order parametre, situated at the intersection of a series of emergent processes that it orders in a pattern of greater or lesser stability. It is here, in this spontaneous and self-organising ordering activity, that Portugali argues the overlap of society and space to exist. 'The fact that we make use of these social products in our cognitive processes', Portugali writes,

> indicates that we see the environment in a particular way: we search for ordering principles, we perceive not only Shannonian information from the environment, but most importantly its semantic information - its *gestalt*. The socio-spatial order (the subject-matter of social theory) thus enters naturally into the individual's cognitive system. Moreover, our cognitive system is not passive in its relation with the external, natural and socio-spatial environment. We shape and reshape the environment according to our internal representation of it and to our image of what it should be. We shape it so we'll be able to navigate in it, to identify our and our friends' homes, to distinguish between private and public spatial domains. We shape it to fit our values, our culture, and our social structure *[…] A cognitive map is thus not an ordinary cartographic map, but its socio-cultural order parameter in a complex hierarchy of levels of generality* (Portugali, 1993: 165 & 169; emphasis added*).

This does not mean that environments and cognitive maps always will correspond. One easily can imagine situations in which the order parameter of the environment will be incongruous with the order parameter of the mind. When this occurs, the competition between order parameters is conjectured by SIRN to give rise to a phenomenon that Portugali calls 'spatial-cognitive dissonance' (Portugali, 2011: 315-35)[107]. In Portugali's definition, spatio-cognitive dissonance describes the anxiety that may arise when a spatial order parameter contradicts the agent's mental order parameters, thus creating an existential conflict in the mind of the agent.

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[107] The term refers to Festinger's notion of 'cognitive dissonance', (Festinger, 1957).

This for instance may occur when an agent of a certain cultural disposition moves to a neighbourhood with a contradictory cultural character, or when a neighbourhood changes without the agent undergoing the same change. According to Portugali, spatio-cognitive dissonance will manifest itself as an anxious and conflicted state which may be tolerated by the agent for a while but not forever. At some point the agent will therefore have to alleviate the anxiety by either moving away from the locale or by adapting to its socio-cultural identity. As Portugali writes with Benenson and Omer,

> [F]rom the perspective of the individual a situation of cognitive dissonance drives the individual into a cognitive bifurcation point—to change behavior or to change intentions and value system. A typical case within a city would be that of an individual living in a neighborhood where he or she does not want to live. This frustrating situation can be resolved either by a change of wants, or by migration (Portugali, Benenson & Omer, 1997: 267-68).

Portugali is interested in such 'bifurcation points' insofar as they may be conjectured to inform settlement patterns over time (it is this aspect of urban life that he refers to when, earlier, he talks about the environmental influence on decisions to do with 'buying or renting houses or flats'). Using an agent-based model, Portugali is able to demonstrate the self-organising settlement patterns generated in urban space as a function of spatio-cognitive dissonance (Portugali, 2011: 319-34)[108]. Letting the analysis play out over a series of iterations (or 'generations') each agent is given certain preferences which - along with their environments - are allowed to fluctuate within certain bounds. As a neighbourhood changes, agents thus either move out or modify their beliefs to reflect those of the environment.

Given the richness of his ethnological research into sociocultural order parameters - expressed in his explication of Israeli and Palestinian cognitive maps - it is disappointing that Portugali does not seek to prove this empirically. However, the experiment does show some highly intriguing pattern-making

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[108] Cf. Benenson & Portugali, 1995; Portugali & Bennenson, 1997; Portugali, Bennenson & Omer, 1997; Portugali, 2000; Portugali, 2004.

processes, resulting both in changes of spatial states (the agent moves) and in changes of cognitive states (the agent adapts to the environment or becomes more agreeable to the information that it imparts). In this somewhat limited way, Portugali thus demonstrates the reciprocal relationship that he conjectures to exist between the city as artefact and the city as social fact. '[T]he city', he asserts,' is not just an empty container in which other social, cultural and political processes take place, but a social force in itself […] a force that participates in the spatio-cultural processes by which collective and personal identities of individuals and groups are determined'(Portugali, 2011: 334).

3.3.8. SIRN and the *aporia* of circular causality

So far, I have separated the processes of *cognitive involution* and *artefactual explication* discussed in SIRN. Proceeding in this manner has increased the clarity of the argument, helping ensure that the complex processes involved in the constitution of surface phenomena and cognitive maps, respectively, are clearly explained and understood. As a procedure it is however not entirely without problems insofar as it indicates separation where no separation exists. Mind and artefactual matter in fact only can be separated *analytically* in SIRN - in this sense, SIRN represents a post-Cartesian understanding of mentality, one where mind and world are fundamentally imbricated with one another - and the artefactual process therefore necessarily must unfold in an epistemology that does not acknowledge the *a priori* separation of these two categories.

The affirmation of this inseparability of mind and matter concerns the very heart of SIRN. If the SIRN process is a *complex process*, it is because it is not simply about mind folding itself into space or space folding itself into mind. Rather, it is about how space and mind spontaneously extend themselves into one another, destabilising each other through the open-ended exchange and production of information. These considerations are expressed the most clearly by Portugali's who sums up the SIRN doctrine: '(i) That the environment is enfolded in the mind in the form of internal representations; (ii) that the minds of individuals are

enfolded in the environment in the form of a multiplicity of external representations; (iii) that mind and environment are only relatively independent and thus form a single network which has implicate and explicate properties' (Portugali, 1996: 14). A separation between what the urban surface *is* and what the urban surface *does* therefore only can be analytical.

What the urban surface *is,* is an ongoing pattern-making process which *explicates* and *mediates between* different states of information (Shannonian and semantic). This process manifests itself in emergent patterns which can be sustained for a period of time. Yet what it *does* also is an expression of these processes, the pattern-making process thus *implicating* itself in the minds of the socio-cultural agents that inhabit a particular urban setting. The most adequate conceptualisation of the problem of SIRN as it relates to the urban artefact therefore is to view it as a problem constituted by several nonlinear processes unfolding concurrently over several implicative/explicative stages.

What unites these processes is the exploration of systemic limit-conditions, or 'thresholds', in which the system either maintains its structure or undergoes a spontaneous restructuring. In certain situations the threshold will not be transgressed and the system will be perpetuated. But at other moments, the SIRN process will lead to the transgression of the existing system and the creation of a new one with new patterns manifested either in the mind or in the environment. When this occurs, the system is spontaneously reorganised - such as for instance was the case in the 'jumping balconies' of Tel Aviv - and a new informational state constituted. Information thus is *externalised* in the surface of the city, at the same time creating the precondition for this information to behaviour progressively *internalised* in the cognitive map of the agents that inhabit it.

3.4. Hillier: Structure and structuration in the urban artefact

3.4.1. Universal city: variants and invariants of the urban street network

Turning to Bill Hillier and his space syntax theory, the focus of the argument moves from the surface of the city to its 'structure' which here is taken to designate the urban grid or 'street system' as this is constituted by blocks of houses. However whilst the emphasis is different from that of SIRN, the endogenous and emergent definition of urban formation is more or less retained, as I will now show. The urban artefact thus still is defined as a thing constituted by a multiplicity of non-coordinated spatial acts - its structure arising from an emergent formal process that progressively comes to order the spatial reality, bringing it together in arrangements of a certain coherence - even if it now is the structure that is theorised.

Arguably the most important tool in space syntax' explication of urban form is the so-called 'axial map'; a form of representation (see Hillier, Hanson and Peponis, 1987; Penn, 2003). Made by drawing the fewest and longest lines (the 'axial lines') through a given street system, the axial map is considered to be the simplest and most accurate way of representing structure in urban grids[109]. It furthermore is thought to reveal deep artefactual properties particular to the urban artefact - and about the morphogenetic logic that the latter involves - thereby making the detailed analysis of urban form feasible. Once analysis of one system is possible, so too is the comparison between systems. This further opens up the space syntax enquiry, making it possible to explore similarities and differences between urban systems.

As space syntax research has shown (Karimi, 1997; Hillier, 1999; Hillier, 2002), there are in fact some highly interesting *differences* in the way different cultures

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[109] 'An 'axial map'', writes Hillier, 'is the least set of longest lines of direct movement that pass through all the public space of a settlement and make all connections' (Hillier, 2002: 153).

organise their cities. These may be measured syntactically - i.e. by showing how their constitutive elements, the streets, join together in the axial map - but often they also may be grasped by simply observing obvious geometrical differences apparent in plain maps. Are for instance areas of commerce separated from areas of habitation, or are such areas connected by interconnecting streets? Does a particular axial map show permeability between public and non-public areas, or does it represent a more segregative spatial logic? Such spatial differences are conjectured to express socio-spatial relationships particular to that society or culture. Writes Hillier:

> In historic European cities, we find that local [residential] areas are for the most part easily permeable to strangers, with public spaces in locally central areas easily accessible by strong lines from the edge of the area. At the same time, fronts of dwellings are strongly developed as facades and interface directly with the street both in terms of visibility and movement. In many Arab cities, strangers tend to be guided much more to certain public areas in the town, and access to local [residential] areas is rendered much more forbidding by the more complex axial structure. At the same time, dwelling facades are much less developed, and the interface with the street tends to be much less direct both for visibility and for movement. The differences in the geometry of the axial maps seem to be a natural expression of [cultural] differences (Hillier, 2002: 154 & 157).

Axial maps thus seem to capture aspects of the way whereby different cultures distribute and control various kinds of social activity in space, with certain configurations being more conducive of social interaction, and others less so. As such, axial analysis is conjectured to reveal clear differences between spatial cultures in different societies. That urban structure should be different from society to society intuitively makes sense. Initial conditions, whether these be socio-economic, geological or geographical kind, would seem to dictate this. However according to Hillier, such clear *differences* in urban morphology are supplemented by certain *morphological invariances*. Despite initial conditions, urban systems thus seem to converge towards the same form.

Comparative analyses of axial maps carried out in numerous space syntax studies[110] thus reveal what Hillier calls 'powerful invariants in axial maps' which

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[110] Cf. Hillier, 2002; Hillier and Vaughan, 2007.

'seem to go across cultures and even across scales of settlement' (Hillier, 2002: 157). These invariances manifest themselves, first and foremost, in the statistical distribution of axial line lengths, more particularly: in the number of *long axial lines* found across different settlements relative to the number of *short axial lines*. As urban systems develop, there therefore appears to be a tendency for these systems to converge towards structures where the number of *long axial lines* make up an improbably small part of the total number of streets, with *shorter lines* being much more prevalent, all things being equal.

Figures 6: Axial maps of The Hague,Holland (left) and Hamedan, Iran (right); each with its own distinctive distribution of axial lines. In the Hague, the grid of axial lines ensures that areas of habitation are well-connected with areas of commerce, with the urban grid showing lattice-like properties. In Hamedan, areas are more clearly separated from each other, with the urban grid taking on more tree-like characteristics. Source: Hillier 2002, 156.

This tendency - which is conjectured to be scale-free and thus to be prevalent in the morphologies of small hamlets as well as vast megalopolises - is interesting in itself, however this is not the only invariant revealed by the analysis of axial maps. In non-orthogonal urban systems[111] - so-called 'organic cities' (Hillier,

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[111] Orthogonal grids is particularly prevalent in American cities - where so-called 'grid-iron plans' have been widely implemented - the most famous case arguably being the design of the New York urban grid as defined in the Commissioner's plan of 1811. Cf. Burrows & Wallace, 1999: 419-22 for a discussion of the development and implementation of this design. Orthogonal grids of course also are found in other cultures, with for example Greek urban systems tending to converge towards orthogonality.

1996: 186-89)[112] - another invariance manifests itself in *the way axial lines join*. Shorter lines thus tend to connect to other lines at orthogonal or near-orthogonal angles, whereas longer lines appear to connect with other lines at angles approximating zero degrees. 'This', writes Hillier, 'tends to happens at more than one scale, and at each scale the lines are locally longer than lines which lack this kind of angular connection. Probabilistically, we can say the longer the line, the more likely it is to end in a nearly straight connection to another line' (Hillier, 2012A: 26).

Axial analysis thus reveals regularities as well as differences in the structure of urban grids. But even in the irregularities there is regularity. The morphological differences existing between urban systems thus appear to manifest themselves predominantly in the shorter line sections of the axial map - these therefore making up the sections in which urban systems differentiate themselves from one another - whereas segments constituted by longer lines tend to converge towards the same form, or structure, irrespective of the culture.

There therefore is what might be termed 'a dual structure' of the city (Hillier and Vaughan, 2007). One of *variance and divergence* expressed in short-line sections. And one of *invariance and convergence* expressed in longer-line sections. '[S]treet networks', Hillier writes, 'acquire a dual structure, made up of a dominant *foreground network*, marked by linear continuity (and so in effect route continuity) and a *background network*, whose more localised character is formed through shorter lines and less linear continuity' (Hillier, 2012 A: 27; emphasis added). Drawing on this distinction between the foreground and the background network, Hillier makes the following observation about urban grid evolution:

> [C]ities of all kinds, and however they begin seem to evolve into a foreground network of linked centres at all scales, from a couple of shops and a café through to whole sub-cities, set into a background network of largely residential space. *The foreground network is made up of a relatively small number of longer lines, connected at their ends by open angles, and forming a super-ordinate structure* within which we find *the background network, made up of much larger numbers*

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[112] Cf. Karimi, 1998: 112-181.

of shorter lines, which tend to intersect each other and be connected at their ends by near right angles, and form local grid like clusters (Hillier, 2012 A: 30; emphasis added).

As an urban system grows, the global form of its street network will therefore tend to approximate a pattern characterised by *long 'spoke-like' radii* connecting the centre of the system with its periphery. These are the segments of the urban system which are said to constitute the invariant or superordinate sections of the structure (the 'foreground network'). There then are sections of shorter lines interspersed between these radii. These, in turn, are the segments which constitute the variant or subordinate sections of the system (the 'background network'). Foreground and background networks thus reveal in urban systems a deep formal tendency; a tendency towards the actualisation of morphologies of a particular kind.

This type of urban system - with its spoke-like segments connecting periphery to centre and shorter segments constituting more culturally volatile sections of the system - is referred to in space syntax theory as 'the deformed wheel' (Hillier et al, 1976: 150)[113]. According to Hillier, the deformed wheel is found in most non-orthogonal urban settlements, irrespective of the culture that inhabits it or the size of the settlement. In fact, the deformed wheel (or aspects of it) is conjectured to be found in such a large sample of urban systems that Hillier speaks of it as 'some kind of *universal city* underlying the diversity of real cities [...] a dominant structure' (Hillier, 2012 A: 26 & Hillier, 2012 A: 28; emphasis added).

3.4.2. Spatial emergence pt. I: non-teleological design and the random formation of the minimal initial system

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[113] See also Hillier (2002), where he writes: 'Each city has, when seen as a system of configurational inequalities, a certain similarity of structure. This is the pattern we call the 'deformed wheel': a hub, spokes in all main directions, sometimes a partial rim of major lines, with less integrated, usually more residential, areas in the interstice forms by the wheel' (Hillier, 2002: 159).

The conjectured existence of such a dominant structure posses difficult question not just about urban form but also about the urban forming process. Hillier rejects the idea 'that these […] patterns are in any sense 'designed in', although of course they may be in some [limited] cases. However, *the fact that most settlements evolve over long periods compels us to the view that the patterns arise from a largely 'distributed' or 'bottom-up' process, that is, from multiple interventions by many agents over time*. Even if single agencies are involved […] the fact that settlements evolve over such long periods implies that the process of settlement generation must be regarded as an essentially distributed one' (Hillier, 2002: 161; emphasis added).

How, then, can a universal city of the kind just described be explained? Where does this formal invariance come from? Hillier explores this problem by devising a formal experiment. He takes as his point of departure a stochastic process of formation, in which individual blocks are added and removed in a random fashion to a growing aggregate of blocks contained in space. The method of this approach - known as 'the minimal initial system' (Hillier and Hanson, 1984: 49)- is significant insofar as it allows Hillier to explore a non-linear and non-directed kind of 'formation' without referring to an already established 'form'. This safeguards his theory from the spectre of hylomorphic or end-governed design which he vehemently rejects[114].

The formal patterns expressed in this minimal initial system have little resemblance with actual urban form. More layers therefore must be added to the formal experiment if it is to produce forms that may be recognised as 'urban'. Hillier therefore devices a series of 'laws' that - when imposed on the minimal initial system - can lead the morphogenetic process down formal pathways more likely to yield outputs similar to the deformed wheel. Note that this imposition of spatial 'laws' does not reproduce the hylomorphic schema. The idea is one of

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[114] As indicated in the thesis introduction, Hillier rejects the notion of purposive design. He discusses this on several occasions. Cf. Hillier et al 1976: 150-51; Hillier & Hanson, 1984: 205-06; and Hillier, 1996: 288-305. See also Weissenborn (2015) where I discuss Hillier's formal process as a critique of and response to teleological schemata.

formation by way of *constraint* rather than *representation*. A design therefore does not impose itself as a *fait accompli* on the material system ('carving out space' from matter)*.* It rather constitutes an emergent logic which directs the system as this actualises within certain boundaries.

3.4.3. Spatial emergence pt. II: aggregative and spatial laws

Hillier adds two sets of laws - what he calls the *aggregative* and *spatial laws* - to his theoretical model (Hillier, 2012 A: 15-16). These are deemed to be significant not only to the *actualisation* and *integrity* of the system - how does it arise? what is its resilience? - but also to its *functionality* (how is the performance of the system?). Functionality is therefore, in a sense, 'folded' into the artefact. But as I will show (and as was the case in Leroi-Gourhan's explication of artefactual genesis), this is an emergent, rather than preconceived, kind of functionality. What this means, concretely, is that the functionality of the urban artefact depends on the particular attributes of the material it is made from - i.e. blocks distributed in space - as well as those of the agent (or agents) that will 'consume' it.

The aggregative and spatial laws are predicated on a simple premise: place objects in space and observe the changes this causes to the coherence and performance of the system. However they express a rather more profound, if somewhat counterintuitive, insight: that the shape and placement of objects in space may 'determin[e] the emergent configurational properties of that space' (Hillier, 2012 A: 35). The actualising structure of the spatial system will therefore be informed, in an emergent way, by the constitutive elements that it involves. 'Space' in an important sense therefore may be said to constrain and inform its own morphogenetic process.

Of Hillier's laws the so-called aggregative laws are the most simple. They simply stipulate: i) that buildings *must never* join at their vertices; and ii) that a space *must always* be left open in at least one of the cells in the immediate adjacency to

the building. The first of these rules prevents what are deemed to be un-architectural joins in the emergent system - 'no one', writes Hillier, 'joins buildings corner to corner' (Hillier, 2012 A: 15) - whereas the second is a necessary requirement if an open street network is to be maintained as the system grows. (An open street-system should be maintained if one wants to approximate non-archaic forms of urban habitation[115] and therefore must be accounted for in the aggregative law).

Letting the minimal initial system play out constrained only by the aggregative laws, however, only yields spatial systems that bear a very vague resemblance to the ones found in real life. It generates non-conventional block sizes and a statistical distribution of line lengths that does not compare to those found in real urban systems. Consequently, Hillier adds the set of *spatial laws* to the process of urban formation, thereby further constraining the morphogenetic process. These comprise a 'law of centrality' and a 'law of compactness', which, in their most compact form, state: 'that an object placed centrally in a space will increase universal distance more than one placed peripherally' (Hillier, 2002: 169); and 'that the more compact an object or group of objects, that is the more its shape approximates a circle (or for practical purposes a square), then the less will be the increase in universal distance in the surrounding space' (Hillier, 2002: 170-71).

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[115] It must be noted that certain archaic types of urban systems - such as the settlements of the Zuni and Hopi communities where inhabitants would access their homes through their roofs - do not comply with these principles. See for instance Fergusson, 1996, on the settlements of the *Zuni*.
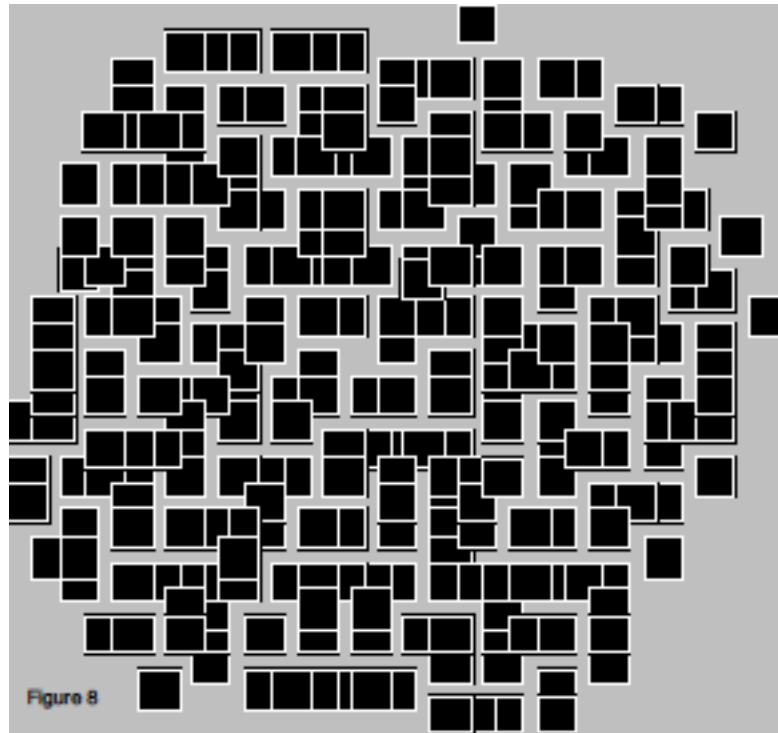
Figure 7: The emergent pattern generated by the addition of the aggregative laws - never join blocks vertex to vertex; always leave one space open in adjacency to the block - to the minimal initial system. The pattern is characterised by its 'ringyness' and by lack of long axial lines. This makes the grid more or less labyrinthine. Source: Hillier, 2003: 01.15.

Before discussing the two spatial laws in more detail, some preliminary considerations are in order. Like the aggregative laws, the spatial laws are taken to inform the morphogenetic process and thereby the properties of the emergent spatial system. Every time a block is placed in the spatial system it therefore is conjectured to affect the form and functionality of that system in predictable ways. Hillier devises a series of experiments which allow him to demonstrate how different block-placement strategies affects the functionality of the emergent spatial system as it actualises.

His starting point is that the placement of an extended object in space changes the *intervisibility* of that spatial system (i.e. how far can an agent see?), as well as the metric *depth* of journeys for that system (i.e. how far must the agent travel to navigate the system?). He then shows how different spatial configurations yield dissimilar increases in metric and visual depths, and that these increases follow a lawful pattern (see figure 7). Certain spatial configurations thus will increase

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depth - metric and/or visual - more than others, all things being equal. The impact that the placement of blocks has on the shortest routes between locales in the system is known as the actualising system's *'metric depth gain'*. A similar measure for *'visual depth gain'* is then introduced. This measures the impact that block placement has on system-wide 'intervisibility'.

In space syntax, depth gain always is measured for the entire spatial system (or 'configuration'). This is a necessary prerequisite if the analysis is to say anything about the affect that the placement of blocks have for the spatial system as a whole, not just sections of it. To emphasise this configurational aspect of depth gain, Hiller speaks of a 'universal metric distance' and a 'universal visual distance' of the spatial system (Hillier, 2012A: 15-17), thereby distinguishing such configurational depth measures from the journey-specific depth measures traditionally deployed in human geography[116].

Universal depth gain is measured by first calculating the impact that the placement of one or more blocks have on the individual depth gain for each cell in the emergent spatial system, i.e. how many additional steps does an agent travelling from this cell to all the other cells of the system have to take given the new spatial configuration. Once the *individual depth gain* for each cell has been calculated, these figures are then added together thereby yielding the *universal depth gain*. This provides the urbanist with an indication of the configurational changes sustained by the system as a whole and of their impact on the system's functionality.

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[116] '[I]nstead of being interested in […] the distance from a to b', he writes, 'we are interested in the distance, metric or visual, from each point in the system to all others' (Hillier, 2012A: 17).
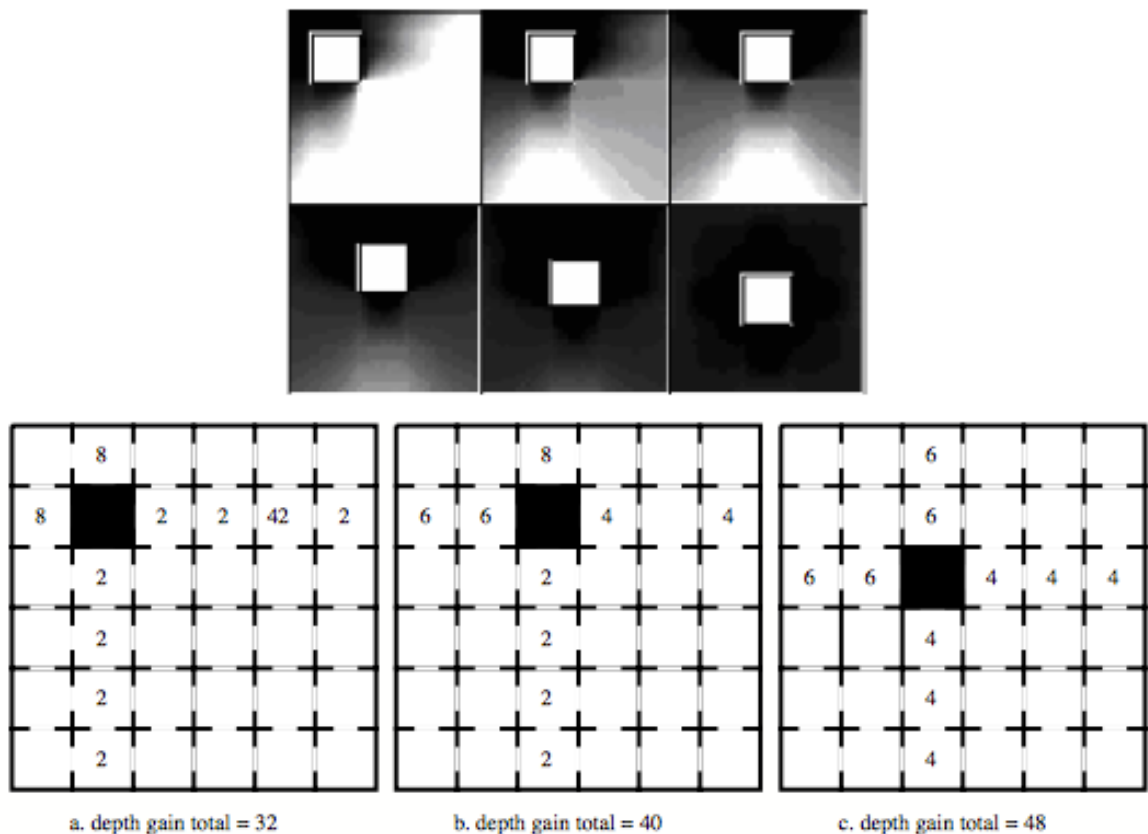
Figure 8: *These illustrations - demonstrating Hillier's law of centrality - show how different block placement strategies affect the metric depth gain (top row) and visual depth gain (bottom row) of an evolving spatial system. In the top row, individual metric depth gain is provided for each cell; cells where no depth gain is incurred are kept blank. A total metric depth gain is then calculated by adding together the individual depth gain figures. As is clear, total depth gain rises as the blocked off cell moves towards the centre. This indicates that blocking off a central part of a spatial configuration will, comparatively speaking, add more depth gain than blocking off a peripheral part. In the bottom row, visual metric depth gain is measured for different spatial permutations. Light areas indicate areas where intervisibility is not impeded at all or only slightly impeded. Dark areas on the other hand indicate areas where intervisibility is impeded to a significant degree. As is clear from the illustrations, intervisibility drops (and visual depth gain therefore rises) as the blocked off cell moves towards the centre of the configuration. Just as was the case for metric depth gain, visual depth gain thus increases more as blocks are added to central parts of the actualising spatial system vis-à-vis peripherally added blocks. Source: Hillier, 2002: 167 (top row; figure slightly modified by this thesis' author); & Hillier 2012 A: 12 (bottom row).*

The law of centrality describes how different block-placing strategies will affects universal metric distance and universal visual distance in different ways. It states that the universal metric depth gain in all-to-all journeys increases more if a block is added *centrally* in a spatial system than if the same object is added *eccentrically* (i.e. in the system's periphery) with certain spatial strategies thus augmenting universal metric distance to a greater degree than others (see figure 7). Similarly for universal visual distance (or 'intervisibility'), Hillier finds that a

centrally placed block reduces system-wide intervisibility to a relative larger extent than an eccentrically placed block (see figure 8). Both effects are conjectured to follow necessarily from the placement of objects (this is why they are designated as 'spatial laws') and will therefore pertain to an actualising spatial system.
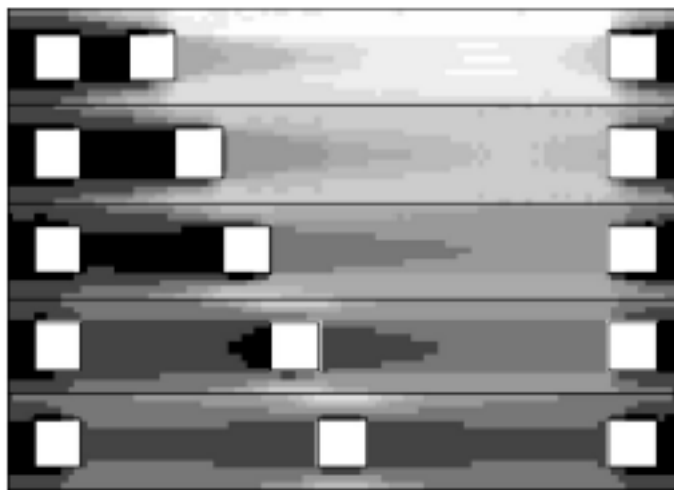
Figure 9: This figure demonstrates the law of centrality and its affect on system-wide intervisibility. A short and long line add relatively less depth gain to an evolving urban system than two lines of equal length. With darker shading indicating less visual distance, it is apparent that the visual integration of a spatial system tails off as a block moves to the centre of the system thus creating two equally long lines. Source: Hillier, 2012 B: 18.

There are two corollaries to the law of centrality. One states that blocks placed at a (relatively speaking) greater distance from each other must increase universal depth gain *less* than blocks placed 'equidistant' (Hillier's term[117]) to each other. When faced with the choice, an actualising system pursuing a depth minimising strategy will therefore 'choose' to place blocks either close to each other or far from each other, thereby foregoing configurations with 'equidistantly' placed blocks. This further constrains the formation of the spatial system, conditioning

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[117] By 'equidistant', Hillier ostensibly means 'neither very far nor very close' to each other (what might be termed 'medium-length'), but the designation is rather obscure. He writes: '[P]lacing two objects *equidistant from each other and from other objects* will increase universal distance more than placing them either close to each other or close to other objects, since the former will create many equal short lines, while the latter will create some longer and some shorter lines. In general, we may say that placing objects in proximity to each other increases universal distance less than placing them farther apart' (Hillier, 2002: 170; emphasis added).

the latter to follow morphogenetic paths where a few long lines and a great number of short lines are created at the expense of equidistant or 'medium-length lines'.

The second corollary to the law of centrality - known as the 'principles of extension'[118] - states that block placement strategies which impede long axial lines must be avoided. If a choice exists, a block must therefore be added to a short line rather than a long line in the emergent spatial system. In this way, long lines are preserved as the system actualises and so a morphology similar to the one known from the universal city (the 'deformed wheel') is produced. According to Hillier, the principle of extension is so powerful that it still applies even if the preservation of the longer line must be offset by the addition of a shorter line. '[I]n terms of configurational metrics', he writes, 'a short line and a long line are, other things being equal, metrically and visually more efficient in linking the system together than two lines of equal length, as would be a large space and a small space, compared to two equal spaces' (Hillier, 2012: 18).

A depth minimising system will therefore tend to conserve long lines at the expense of creating 'equidistant' lines, since the former increases systemic depth relatively less than the latter. A similar series of permutations are observed in the *law of compactness*, although certain differences do apply. The primary level of analysis for instance is not the location of the object (although this also matters) but its *shape* (see figure 9). According to Hillier, compact objects tend to preserve low universal depth measures whereas elongated objects increase it, all things being equal. Elongating a square object without increasing its size thus results in a universal depth gain of the spatial configuration, whereas the compression of an object will have the opposite effect.

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[118] '[O]nce a line is barred', writes Hillier, 'then depth gain from the next bar will be minimised by placing it within the shortest remaining line of cells, and maximised by placing it in the longest. We can call this the 'principle of extension': barring longer lines creates more depth gain than barring shorter lines' (Hillier, 1996: 228). Cf. Hillier 2002: 170.

'[A] compact form', Hillier writes, therefore 'will always generate less depth gain than an elongated form of equal area, and […] the difference increases rapidly with increased elongation' (Hillier, 2002: 174). Hillier then shows how elongation-induced depth gain may be off-set by placing elongated blocks at the periphery of the system, something which ensures the integration of the two spatial laws. In a depth minimising system, the issue then is one of ensuring that centrally placed

f. depth gain total =484   g. depth gain total = 420
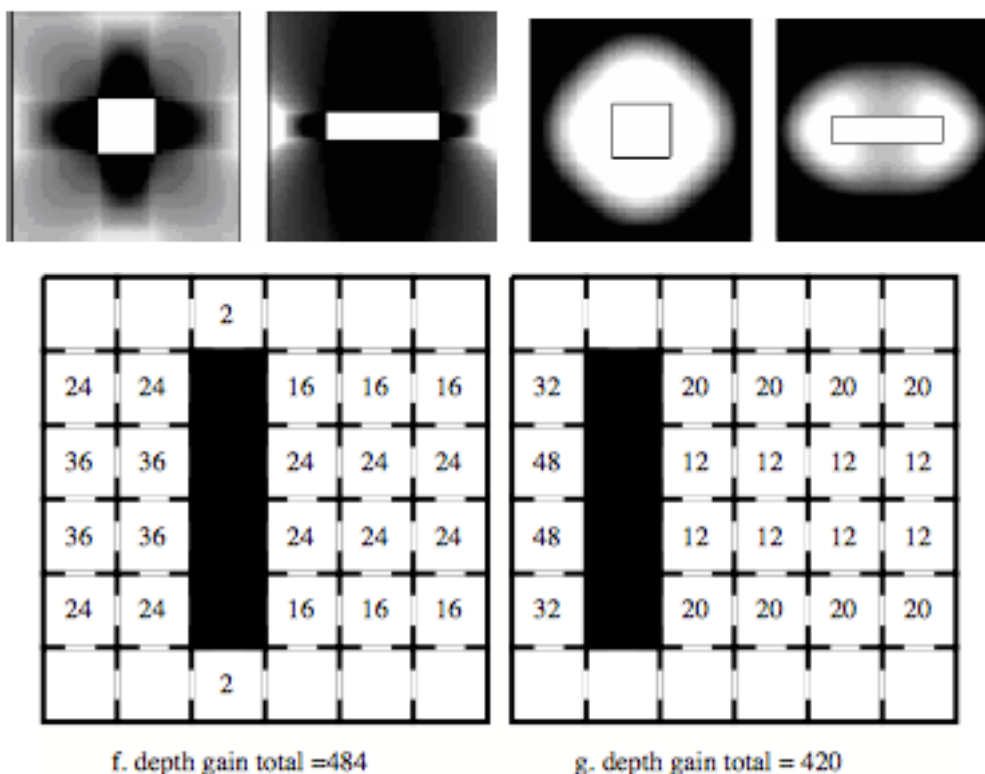
blocks be as compact as possible, even if that means elongating blocks at the periphery.

Figure 10: *These illustrations demonstrate Hillier's law of compactness. The top row shows how different 'block-shape strategies' will affect metric and visual depth gain of an actualising spatial system. The illustrations on the left indicate visual depth gain. The illustrations on the right indicate metric depth gain. Light areas indicate areas where the depth gain is lesser; dark areas indicate areas where depth gain is greater. As is clear from the illustrations, universal depth increases as the blocked off cell tends towards a rectangular shape, thus becoming less compact. The bottom row shows how depth gain caused by reducing elongating the block may be reduced by moving the blocks towards the periphery of the system. Source: Hillier, 2011: 141.*

Hillier's spatial laws thus express principles that are entirely geometrical (they have no inherent - only incidental - social components) at the same time as they can be seen to influence in a very real way the performance of the urban system (which of course includes a social component insofar as it is an artefact). They therefore cannot be conceived as 'representations' of society (the city does not

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represent a prior socio-economic state but an emergent geometrical logic). Yet they may be involved in the facilitation or obstruction of various forms of social behaviour insofar as lack of accessibility and visibility may be said to influence social encounter patterns.

To the extent that low degrees of depth gain may reasonably be said to be beneficial to the performance of the urban system - and therefore included as a 'constraining' factor in the morphogenetic evolution of that system - they thereby further reduce the field of possible forms that an actualising urban system might take on, at the same time as they bring the formal characteristics of the system produced in Hillier's experimental morphology closer to those found in the universal city (i.e. few long lines, many short lines). This makes the concept of the spatial laws a both powerful and elegant notion.

3.4.4. Spatial emergence pt. III: Description and genotype

So far, I have assumed that the urban artefact is involved in its own actualisation, as if an active force producing its own self. This in a sense is true, insofar as it does not receive a readymade design from an exogenous source, but rather actualises in accordance with rules that are endogenous to it. Yet it also constitutes an oversimplification, insofar as the urban artefact - *qua* artefact - necessarily must rely on the activity of artificers for its actualisation. For this reason, the artificer - and the role that s/he plays in the morphogenetic process - must be brought back into the model. This, however, is not a straightforward issue insofar as urban formation is not caused by a single artificer but by many and in a continuous fashion. Hillier's resolution of this issue involves several steps. One finds a first clue in Hillier's description of the *modus operandi* of spatial laws. The concept of 'spatial 'laws'', he writes,

> does not refer to universal human behaviours of the kind claimed, for example, for the theory of 'human territoriality' […], but to *'if–then' laws that say that if we place an object here or there within a spatial system then certain predictable consequences follow for the ambient spatial configuration.* Such effects are quite independent of human will or intention, but can be used by human beings to

achieve spatial and indeed social effects. *Human beings are bound by these laws in the sense that they form a system of possibilities and limits within which they evolve their spatial strategies. However, human agents decide   independently what their strategies should be.* Like language, the laws are then at once a constraining framework and a system of possibilities to be exploited by individuals (Hillier, 2002: 154; emphasis added)

As an urban system actualises its emergent geometrical forms thus are conjectured to 'suggest' certain strategies of construction to the artificers - 'if-*this*', 'then-*that*' - thereby progressively promoting a certain structural uniformity. Spatial laws therefore do not manifest themselves in the mind of the artificer as a total design scheme to be implemented *en bloc*. They rather are principles suggested and implemented at a local scale, operating according to an iterative and emergent logic. How does an agent understand and apply such laws? In order to answer this question, Hillier introduces the notion of 'description retrieval'(Hillier et al, 1976: 152-53). The concept is predicated on a situated agent's ability to capture and process the emergent logics of an actualising spatial system. As such, its concern is with nascent patterns and their completion much as Portugali's notion of SIRN.

Description retrieval occupies an absolutely central place in the theoretical architecture of space syntax, rendering the otherwise unexplainable leap from chaotic formation (minimal initial system) to constrained, emergent system possible. The logic is the following. As a particular configurational pattern (or 'description') manifests itself in space, this pattern will be 'retrievable' for the agent, thus providing him/her with a meaningful picture of the arrangement and with a set of possible next moves[119]. Description retrieval thus facilitates

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[119] According to Hillier, this in fact is not an ability that is particular to architectural form or spatial relations, but to *all forms of relations*, including social relationships. When an agent encounters a social organisation, s/he will automatically attempt to retrieve patterns from this group. Descriptions thus refer to social hierarchies and hierarchies of space which are manifest in the world that surrounds the agent, and in a sense s/he retrieves these descriptions in order to aid his/her thinking. As Hillier writes '[…]in many, if not most, circumstances we retrieve, or attempt to retrieve, something like an abstract relational scheme from concrete complexes of events in space-time, and then use it as a device to think with' (Hillier, 2003:01.8).

comprehension, but it also ensures the completion and reproduction of meaningful patterns in space.

The genesis of urban form therefore does not depend on a ready-made template but may operate in an iterative manner that ensures spatial consistency as long as descriptions are retrieved from the emergent spatial reality every step of the way. This means that *formation* analytically comes before *form*, insofar as the morphogenetic process emerges from random pattern-making processes and only later arrives at a state of formal consistency. As Hillier writes: '[T]he process by which the emergent objects are created can be a self-contained description retrieval cycle, since the local rule can be retrieved from the process by 'getting the idea' of the previous actions, and then using this as a template for the next stage of the process. The process does not depend on the prior existence of some rule in our heads. It involves brains, but brains interacting with reality, not simply imposing ideas on reality. In this sense the process is 'reality led'' (Hillier, 2003: 01.10).

Hillier illustrates how such a 'reality-led' process might lead to the formation of a series of proto-urban patterns such as 'streets' and '*piazzas'* (see figure 9). The example is quite simple but possesses considerable explanatory power. A block with a constitutive open space (see the second aggregative law) is added to another block with a similar setup. Depending on the positioning of the second block in relation to the first one - are they added to each other in a row or at a 90 degree angle? - a series of alternative morphogenetic pathways open up. If the second block is added next to the first block a row of terraced houses begins to manifest itself at the same time as a street is constituted. If it is added, on the other hand, at a 90 degree angle an emergent courtyard or plaza begins to manifest itself.
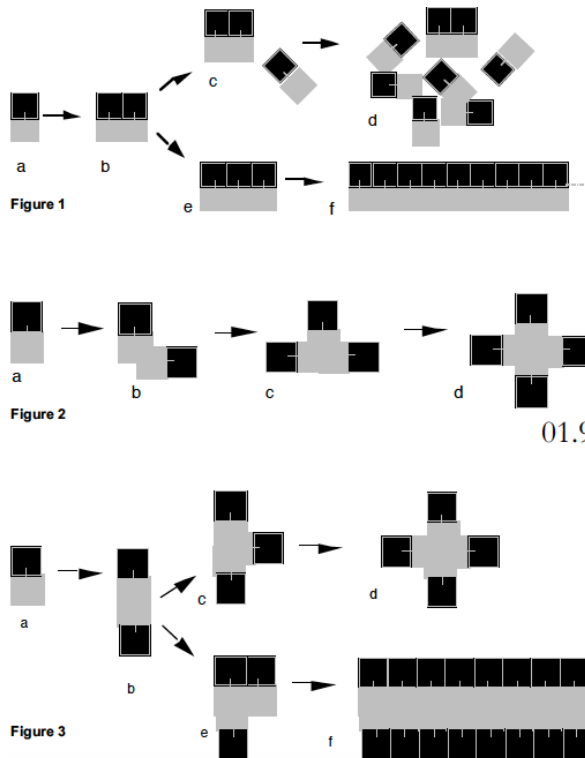
Figure 11: *Illustration of the description retrieval process as applied to an emergent spatial system. The illustration contains three figure - figures 1, 2 and 3 - each of which demonstrate the morphogenetic constraints emerging from within the spatial system. Moving from left to right, a second block is added to a first one, thereby committing the evolution of the spatial system to one (figures 1 and 2) or two possible scenarios (figure 3). In 1e a nascent row of terraced houses is constituted. In 2 c, a nascent square is constituted. In 3 c, a square is constituted as well; where as 3 e shows a nascent street pattern. The simple act of block placement thus conjure up nascent patterns which commit the evolving spatial system to certain evolutionary paths, thus progressively reducing the field of potential forms. Source: Hillier, 2003: 01.14.*

A more ambiguous example also may be conceived. If the second block is added to the first in an opposite position, the system might feasibly evolve both in the direction of the terraced house or in the direction of the courtyard, the direction of this evolutionary process in effect depending on the placement of a third block in the emergent arrangement. The power of his 'reality-led' process derives from the fact that it is constituted somewhere between an emergent spatial reality and a series of spatial laws that inform this. It furthermore operates in an iterative manner rather than *en bloc*. As such, the form of the spatial system is not something 'imposed' on that system but rather something that arises in and from the forming process.

3.4.5. Spatial agency pt I: movement is the lifeblood of the city

As I have shown, functionality plays a crucial role to space syntax' conceptualisation of urban form and formation. However it is a very basic kind of functionality that is at stake; one that is generic rather than specific. It therefore is not a question of particular sociological features impressing themselves on space. Rather, it is about allowing for generic forms of movement and co-presence (see Hillier, Burdett, Peponis, 1987). Movement in this sense folds itself into the morphogenetic process as a constraining and constitutive force

However, the opposite also turns out to be true. Analysing movement patterns relative to the topology of the urban street network (i.e. how the streets in the street system are connected to each other) space syntax research shows that the urban artefact folds itself back into global urban movement patterns. There thus appears to exist a correlation between patterns of movement and patterns of space and so the urban grid may be said to 'cause' the emergence of global patterns of movement; a phenomenon known in space syntax as 'natural movement' (Hillier et al, 1993)[120]. In this way, the urban grid - itself the outcome of a complex process - is conjectured to give rise to further kinds of complexity.

Natural movement is predicated on the universal movement principle discussed in the preceding section - that in cities aggregate movement over time must necessarily be from everywhere in the system to everywhere else - although here it is extended to real urban systems. As Hillier writes: 'The city is a structure in which origins and destinations tend to be diffused everywhere, though with obvious biases toward higher density areas and major traffic interchanges. So movement tends to be broadly from everywhere to everywhere else' (Hillier, 1996: 120). It thus is a probabilistic kind of determination, to do with aggregate patterns of movement rather than specific kinds of behaviour, that is at stake.

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[120] Cf. Hillier, 1996: 120-26

Natural movement is broken down into two further categories - so-called 'through-movement' and 'to-movement' - the respective values of which can be calculated for each segment of the street system. As the name suggests, *through-movement* concerns the movement that a street segment carries on account of people moving *through* it on their journeys through the urban system. This type of movement in a sense arises as a side effect - or 'by-product'[121] - to movement between 'origin-destination' pairs and so does not constitute a premeditated aspect of the journey.
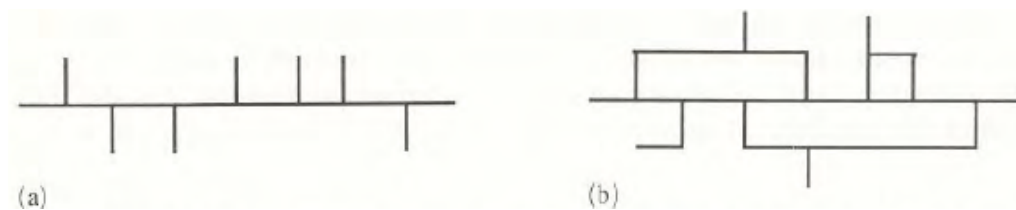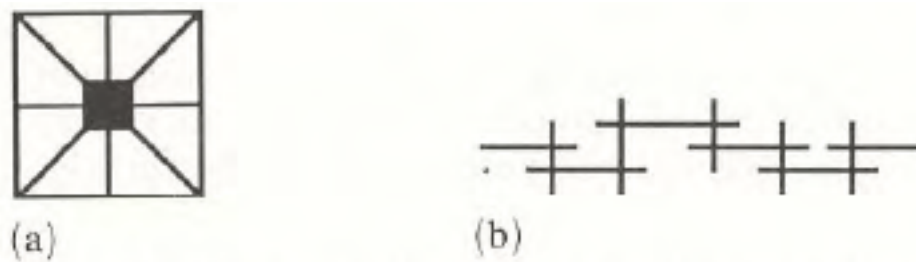

Figure 12: *These illustrations - demonstrating the principle of through-movement - show how certain streets will be more likely to carry movement simply on account of their position in the global system of streets. In illustration a), for instance, the horizontal road will necessarily carry the most movement of all the streets in the street system insofar as all movement between nodes necessitates passing through sections of it. Illustration b) is that same system but with a few more streets added. The principle is the same even if certain journeys do not necessitate passing through the 'main' horizontal street. The street systems found in these illustrations are highly abstract - devised so as to present the argument of through movement in the simplest possible way - but their principles also stand in more complex systems such as the ones found in cities. Source: Hillier et al, 1993: 29.*

Hillier shows how through-movement manifests itself with a regularity that is lawful and that this lawfulness derives from basic topological necessity. If a system of streets is represented as a network of possible routes - with each route representing a node in the global network - then some nodes therefore will express a higher through-movement potential than others simply on account of their topological position (that is: on account of being more or less 'integrated' in the spatial system). One may think of the node's through-movement value as reflecting its likelihood of carrying the movement of agents moving randomly through the system (see figure 10).

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[121] 'We can', writes Hillier, 'think of passage through these spaces as the by-product of going from a to b' (Hillier, 1996: 126).

To-movement, on the other hand, designates those kinds of movement where the segment is either the origin or the destination of the trip. As was the case with through-movement, to-movement is conjectured to demonstrate a certain lawfulness, with some nodes in the system being relatively more accessible than others irrespective of whether 'accessibility' is taken in a metric or topological sense. These nodes in turn are more likely to be either the origin or the destination of a given journey simply on account of their position in the global street network and therefore will carry a greater share of aggregate movement flow than those more peripherally situated (see figure 11).


(a)   (b)

Figure 13: *These illustrations demonstrate the principle of to-movement. A central square (as in illustration a)), and a central street segment (as in illustration b)), will according to Hillier be more likely to be destinations insofar as they are relatively close - topologically and metrically - to other segments in the system. Source: Hillier et al, 1993: 29.*

Overall, the theory of natural movement stipulates that movement in an important way is structured by the topology of the street network and thus ultimately: by the emergent pattern of the grid. At the end of the day this is a theoretical conjecture, but it has been shown to correlate well with actual patterns of movement in a series of empirical studies (Hillier et al, 1993; Hillier, 1996: 120-25; Penn et al, 1998; Hillier & Iida, 2005).

It is important to note that natural movement is not conjectured to account for all urban movement, nor for the biggest share of it. The existence of other kinds of lawful movement is accepted in space syntax theory. Certain nodes in a spatial system thus will act as 'attractors' to movement on account of the socio-economic functions that they contain (see for instance Pushkarev & Zupan, 1975). Such nodes may be tourist attractions, train stations or shopping destinations and are by no means excluded from space syntax analysis. What is conjectured, however, is that these attractors will be placed, all things being equal, on

syntactically integrated nodes; their distribution in space thus correlating with the distribution of natural movement. In this way, a complex multiplier effect is set up between the spatial system (or configuration), the movement potential and the attractors (see figure 12).
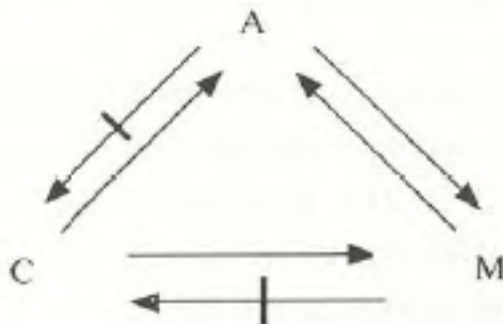
Figure 14: *The complex multiplier effect arising between spatial configuration (C), movement (M) and attractors (A). Source: Hillier et al, 1993: 31.*

It is Hillier's argument that certain socio-economic activities (such as commerce) will benefit from high and consistent footfall, whereas others (e.g. residential space) will rely on the opposite, i.e. a lack of footfall. Such kinds of land use in turn will tend to act as attractors and so a symbiosis is set up between the usage of space and the configuration of space. In this way*, attractors* are informed by *movement* which is itself conditioned by the *form* of the street network and the emergent spatial logic that this implies. Grid-induced movement thus feeds into patterns of land use, with certain types of socio-economic activity gravitating towards movement-heavy plots (often priced at a premium) and other kinds of activity gravitating towards plots where average footfall (and price/sq.ft.) is lower. This is what Hillier refers to as 'the movement economy' (Hillier, 1996)

In this sense, space does not just fold itself into movement. By way of movement, it folds itself into complex patterns of socioeconomic activity; its 'sequencing' of movement in a sense presiding over the distribution of socio-spatial behaviour. As Hillier writes:

> Because the network shapes movement, it also over time shapes land use
> patterns, in that movement-seeking land uses, such as retail, migrate to locations
> which the network has made movement-rich while others, such as residence,
> tend to stay at movement-poor locations. This creates multiplier and feedback

effects through which the city acquires its universal dual form as a foreground network of linked centres and sub-centres at all scales set into a background network of residential space. Through its impact on movement, the network has set in train the self-organising processes by which collections of buildingsbecome living cities (Hillier, 2012 A: 39).

The multiplier effect that space syntax posits between, on the one hand, the patterns of the urban grid and the patterns of urban movement and, on the other, the patterns of urban movement and the patterns of land-use is significant insofar as it uncovers the way that the urban artefact is conjectured to inform the urban social fact. This is a highly interesting theory inasmuch as it conjectures that certain zones of socio-economic activity may emerge from processes set in motion by the emergent grid-making process, that is: from the impact of a conjunction of aggregative and spatial laws on a process of random variation.

Ultimately, it describes the way in which an essentially 'geometrical logic' cascades through the entire urban system, influencing the distribution in urban space of movement and socio-economic activity. As Hillier asserts 'all cities are pervasively ordered by *geometric intuition*, so that neither the forms of the cities nor their functioning can be understood without insight into their distinctive and pervasive emergent geometrical forms' (Hillier, 2012 B: 12). The key driver in this is movement, which becomes the phenomenal link that ties together the different levels of the urban material reality (i.e. from morphogenesis to sociogenesis).

3.4.6. Spatial agency pt II: urban space as 'ethnic domain'

Movement is not just conjectured to be relevant to the distribution of particular forms of socio-economic activity such as retail and habitation. Hillier also finds that it informs the distribution of other kinds of socio-spatial behaviour such as the location of representational and symbol-heavy sites (e.g. religious temples, guild halls, seats of power; Hillier, 1996: 171-189), as well as less respectable forms of social behaviour (e.g. petty crime; e.g. Hillier & Schu, 2000[122]). As an emergent

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[122] Cf Hillier, 2004; Hillier & Sahbaz, 2005; Hillier & Sahbaz, 2007; Nubani & Wineman, 2005; Friedrich *et al*, 2009; Chiarida *et al*, 2009.

sociogenetic force, movement therefore is conjectured to penetrate a significant spectrum of social activity in urban space. This makes it, in Hillier's words, 'literally the lifeblood of the city' (Hillier, 2012 A: 31).

It may be argued that the urban street system constitutes another kind of externalised artefactual memory store similar to the one discussed by Portugali. Hillier never himself uses such terms and so there is no theory of 'nonbiological memory' as there was in Portugali. He does however (with Hanson; Hillier & Hanson, 1984: 271) put forward the idea that spatial configurations may constitute a form of 'ethnic domain'; a concept they take from Langer (1953: 95-103). According to Langer, an ethnic domain is a material reality that concurrently expresses and informs the customs and mores particular to a specific people (or '*ethnos*'), thereby helping to reinforce socio-cultural patterns in a visceral but non-discursive way.

'Rhythmicity' is thought to play a central role in this process, the idea being that the rhythmical in a sense both represents and constitutes a culture. According to Langer, what an ethnic domain creates therefore is 'a physically present human environment that expresses the characteristic rhythmic functional patterns which constitute a culture' (Langer, 1953: 96; emphasis added). While Langer is an art historian rather than an urbanist, there is a quite pronounced spatial aspect to her thinking about society and sociogenetic rhythms. This aspect is to do with organisation, more particularly: with the organisation of space itself and with the organisational processes that proceed from it. ("Organization", she argues, 'is the watchword of architecture'; Langer, 1953: 99). As such, space, rhythm and socio-cultural organisation coalesce in the ethnic domain, thereby evoking an aspect of social existence with a very real and very material component

This way of framing the socio-spatial question translates well to the space syntax enquiry. Rhythmicity, it is true, does not form part of the space syntax vocabulary[123]; it certainly is not a term explicitly discussed by Hillier. However the

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[123] See, however, Read: 2005; and Weissenborn, 2016.

evocation of the ethnic domain suggests that such concepts may be endemic to his thinking. Indeed, it is my argument that his explication of the emergent constitution of the artefact and that of the social fact both are both predicated on a rhythmical logic. Rhythm here comes in two waves. There first is the rhythm manifested in *the urban artefact* itself. This is a rhythm whose morphogenetic process proceeds over decades - if not centuries - but which nevertheless still constitutes a dynamic phenomenon. There then are the rhythms that this artefactual rhythm feeds into: natural movement, the emergent distribution of socio-economic activities and so on. Conceived thusly, an ethnic domain is a phenomenon constituted at the intersection of several kinds of rhythm.

3.4.7. Morphic languages

What is important to note in the discussion of these different kinds of rhythms is the way that a rhythm so to speak 'spills over' and instigates new rhythmical patterns outside of itself; one 'sphere' of material reality (e.g. Hillier's geometrical spatial laws) thus becoming productive in another (the emergent order of the city; and by extension: the ordering of encounter patterns specific to the ethnic domain). The point, here, is not that the patterns *determine* each other in an absolute and hylomorphic way. To suggest that would be to fall back in the society-first/space-first schism. It rather is that the two forms of rhythms - each involving their own proper logics; each remaining essentially irreducible to the other - are capable of informing one another in a spontaneous process of emergent codetermination.

Space therefore does not 'imprint' itself in society nor does society 'imprint' itself in space (as such, space syntax may be said to express a principle of form, formation and rhythm which is essentially beyond hylomorphism). Rather, the two may be said to 'fold' themselves into each other; with one emergent type of pattern becoming an active (but not absolutely determinant) force in the constitution of another. This non-hylomorphic principle is expressed the most clearly in Hillier's discussion of so-called 'morphic languages' (Hillier et al, 1976;

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Hillier & Hanson, 1984: 45-52). Morphic language is Hillier's term for expressions - or perhaps rather: forms of meaningful of relationships - that are predicated on syntactic relationships. This is a kind of syntactic meaning that he takes to include both spatial arrangements and social arrangements (e.g. the way people relate to each other in a social network; see Hillier and Penn, 1991).

A morphic language is thus characterised as being 'any set of entities that are ordered into different arrangements by a syntax so as to constitute social knowables. For example, space is a morphic language. […] But social relationships also are a morphic language' (Hillier and Hanson, 1984: 48). Space is argued to be a morphic language to the extent that it involves syntactic order. Thus the existence of structure in space - such as the structure defined in the 'deformed wheel' - is taken to be an expression of its morphic nature. Similarly, ordered forms of movement or encounter patterns - kinds of 'social relationships' in Hillier's terminology - are characterised as expressing syntactic qualities and therefore are argued to be morphic languages too.

There are, according to Hillier, three categories of language: natural language, mathematical language, and morphic language. These categories share certain principles, but they differ on others and so designate essentially distinct phenomena. (Indeed, it is in what they share and do not share that their distinctness must be found). 'The primary purpose of natural language' Hillier and Hanson write, 'is to represent the world as it appears, that is, to convey a meaning that in no way resembles the language itself' (Hillier & Hanson, 1984: 49). Thus statements may be imbued with meaning but do not resemble, structurally, what they express. Hillier argues that natural language's capacity to express meaningful statements about the phenomena of this world is predicated on its ability to incorporate a relatively weak syntactic principle (syntax is significant but some flexibility nevertheless pertains to its application, something which allows for a 'rule-governed creativity') with a highly differentiated set of words (or 'morphic units').

In contrast, mathematical languages are defined as being 'virtually useless for representing the world as it appears because the primary morphic units are not individuated at all, but rendered as homogeneous as possible - the members of a set, units of measurement, and so on. […] Mathematical languages [therefore] do not represent or mean anything except their own structure' (Hillier and Hanson, 1984: 49). Unlike natural language, mathematical languages thus depend strongly on syntactic structure, something which is manifested in a lack of (rule-governed) creativity and a weakly differentiated set of morphic units. Morphic languages, as Hillier defines them, are essentially different from both natural and mathematical languages. However they also are thought to share certain properties with these. 'From mathematical languages', Hillier and Hanson write,

> morphic languages take the small lexicon (that is, the homogeneity of its primary morphic units), the primacy of syntactic structure over semantic representation, the property of being built up from a minimal initial system, and *the property of not meaning anything except its own structure* (that is to say, they do not exist t*o represent other things, but to constitute patterns which are their own meaning*). From natural languages, morphic languages take the property of being realised in the experiential world, of being creatively used for social purposes, and of permitting a rule governed creativity […] In a morphic language the existence of syntactically well-formed sentences guarantees and indeed specifies a meaning, because the meaning is only the abstract structure of the pattern. Morphic languages [in this sense[are the realisation of abstract structure in the world. They convey meaning not in the sense of *representing something else*, but only in the sense of *constituting a pattern* (Hillier and Hanson, 1984: 49-50; emphasis added).

Morphic languages therefore do not 'represent', they 'constitute'. What this means is that their logic - which is said to emerge from the far-from-equilibrium conditions of a 'minimal initial system' (as defined earlier) - express a structural truth that refers only to its own genesis. As Hillier and Hanson write, 'to explain a set of spatio-temporal events we first [have to] describe the combinatorial principles that gave rise to it' (Hillier & Hanson, 1984: 48). The only thing that a morphic language expresses is therefore its own emergent formal logic, not something else; a meaning.

However, morphic languages do involve a capacity for becoming involved in still further kinds of morphic genesis. This is the case when space folds itself into

society or vice versa, as seen for instance in the discussion of the ethnic domain. Insofar as space and social encounter patterns are thought to be kinds of morphic languages, 'the construction of a social theory of space organisation [thus] becomes one of understanding the relations between the principles of pattern generation in both' (Hillier and Hanson, 1984: 50), i.e. the way the one folds into the other and vice versa. As such, the notion of morphic language may be argued to contain a potential for overcoming the society-first/space-first schism.

3.5. Conclusion: artefacticity and built form; towards a theoretical synthesis

3.5.1. Artefact and social fact

In this third part of the thesis I have discussed the theories of Portugali and Hillier, exploring in detail their particular understanding of the urban question. In doing so, I have showed the way both thinkers conceptualise, on the one hand, the form of the city and the way a particular (and emergent) process of formation is argued to be responsible for the manifestation and stabilisation of that form. I also have shown how, on the other hand, that form, once stabilised, is argued to fold back into emergent kinds of social behaviour as these manifest themselves in the urban environment.

In SIRN, the face of the city was conjectured to emerge from an essentially random process of formation in which nascent patterns embedded in the city surface are selected and undergo emergent morphogenetic processes before stabilising, momentarily at least, in a form with some degree of consistency. The stabilisation of a formal pattern was said to occur by way of 'enslavement' - an emergent process whereby a divergent series of patterns spontaneously converge towards an isomorphic shape - before being entrenched in a so-called 'order parameter'. Overlapping forms of meaning - Shannonian meaning and semantic meaning - were shown to contribute to this morphogenetic process, with

the former suggesting pathways for an actualising form, and the latter ensuring that the trajectory of the enslavement is effectuated.

However, enslavement was shown to run both ways. Urban space thus has the capacity to act as what Portugali calls an 'externalised nonbiological memory', i.e. a form of cognitive and/or social memory that is placed in the environment and which an individual or a community may draw on. That such a sociogenetic trait was attributable to urban space was due to the nature of the SIRN process according to which different types of 'representations' (those of the artefact and those of the arteficing mind) have the capacity to become involved in non-linear synergetic processes. Such inter-representational processes were shown to manifest themselves in forms of community cohesion - as in the case of the Jewish and Palestinian settlements - but also in social anxiety, or 'spatial cognitive dissonance', as this was conjectured to occur in situations where the urban archive contradicts the values of a particular agent.

In space syntax the structure of the city - its street system - was conjectured to emerge spontaneously from an otherwise random morphogenetic process: the 'minimal initial system'. Similar to SIRN, spatial patterns thus are believed to be churned out in a stochastic and distributed process of formation. However, in the street system this random process is conjectured to be stabilised in a deep functional pattern - 'the universal city', 'the deformed wheel' - by a combination of 'spatial laws' and what Hillier calls a 'description retrieving' subject. In this way, the structural order of the urban artefact can manifest itself in the vicinity of an emergent kind of functionality in which the function arises with material experimentation (as shown in the example with the different block-placement strategies; figure 9).

Space, in turn, is conjectured to affect global patterns of urban movement by in effect synthesising them, and so the urban artefact folds itself into the urban social fact, albeit in a stochastic rather than absolutely determinative way (space constitutes *global* rather than *individual* patterns of movement). This is what

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Hillier calls 'natural movement' and I discussed how this kind of movement is thought to arise from the particular way that the urban grid is ordered. Natural movement, in turn, is argued to give rise to what Hillier calls the 'movement economy', in which different types of activity - those that are 'movement dependent' and those that are not - are distributed, or rather distribute themselves, in space. In this way, the materiality of the urban artefact cascades through the urban system, affecting movement as well as more complex kinds of socio-spatial activity.

Both Portugali and Hillier thus theorise the urban artefact as a phenomenon that expresses an endogenous and emergent formal logic, as opposed to an exogenous social or economic logic. It therefore has the properties it has due to emergent forming processes that arise in and with the forming operation, not because of the imposition of an external form (e.g. 'society', 'the mode of production', etc.). Both furthermore attribute to space a certain efficacy whether that be in the form of affecting residential patterns (as discussed in relation to Portugali's notion of spatial cognitive dissonance), or by engendering movement patterns and patterns of socioeconomic behaviour (as discussed in Hillier's notion of 'movement economies'). The idea that the material urban artefact may act as an external memory store or 'ethnic domain' are both expressions of this principle of artefactual efficacy.

As I indicate in section 3.2., Hillier and Portugali's discussion of the urban artefact in many ways is reminiscent of Leroi-Gourhan's more general discussion of artefacts and technicity. Here, artefacts were theorised as informed by an emergent formal order that refers to the particularities of the material that it is made from as well as to the disposition of the human being which 'consumes' it. However, artefacts also were conjectured to express a capacity for creating sociogenetic rhythms, thus making the artefact a potentially affective force in regards to social behaviour. The link to Leroi-Gourhan is significant, not only because it shows a theoretical forebear in what might be called the 'sciences of

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the artificial', but also because it provides an opportunity for integrating SIRN and space syntax theory into a unified model that may transcend either paradigm.

One therefore may speak of certain morphogenetic processes that pertain to the urban artefact's *structure*. These are of a *functional* nature and involve both a geometrical component (the spatial laws) and an anthropological component (the description retrieving agent). However there also are *nonfunctional* or 'mimetic' processes that pertain to the urban artefact's *surface*. These processes - which are less constricted than those of the functional envelope insofar as they must not necessarily converge towards the same functional structure - for their part involve emergent notions of figural goodness which are retrieved and acted on by an agent or group of agent 'consuming' the urban environment as a common reservoir.

A similarly strong link arguably exists between Leroi-Gourhan's affirmation of sociogenetic rhythms and the theories of SIRN and space syntax. There thus is a correlation between what Leroi-Gourhan calls the 'ethnic tonalities' of society and what Hillier calls the 'ethnic domain'. This is not just a semantic play on words. Both concepts concern the rhythms and structures of encounters and the way the latter may contribute to the reproduction of deep patterns of social behaviour. For the same reasons, Portugali's notion of an 'externalised nonbiological memory' store and Leroi-Gourhan's notion of an 'externalised cultural memory' also may be said to correspond. In this way, both SIRN and space syntax may be contained in Leroi-Gourhan's more general theory of artefacticity whilst retaining the theoretical principles of which they are made.

3.5.2. Modality of the urban artefact: *conatus*, *aptitudo* and urban space

In section 3.2. of this chapter, I argued that Leroi-Gourhan's artefactual philosophy may be said to express a Spinozan logic. The artefact thus is thought to involve an emergent morphogenetic logic (its dynamic space) that is particular to it, the latter arising from an otherwise divergent series of colliding bodies that spontaneously are brought to convergence and thereby to order. Once a series of

divergent corporeal rhythms had come together in an artefact, these rhythms in turn could start affecting rhythms unfolding in the social sphere. This, essentially, constitutes the two aspects of what Deleuze and Guattari calls Leroi-Gourhan's 'technological vitalism' (Deleuze and Guattari, 2004: 449), and may be thought of as a integrated ontology for the artefact and the social fact.

A similar thing seems to pertain to the urban artefact as this is theorised in SIRN and space syntax. Indeed, one may read Hillier and Portugali's respective genetic methods as extensions of those 'problematic' principles identified and described with such clarity in Spinoza's geometrical examples to the urban artefact. This is particularly apparent in Hillier who works back from a specific set of properties that he identifies in the urban artefact (the statistical distribution of line lengths in all urban systems; the angle of segment joins in organic urban systems) before developing a system of formation from which that particular set of properties can be reproduced. In this sense, Hillier's production of the artefactual city may be said to mimic Spinoza's production of the circle.

Aspects of such a 'geometrical' or 'problematic' way of approaching the issue of form and formation also may be found in SIRN, more particularly in Portugali's discussion of the 'principle of enslavement' and the emergence of a so-called 'order parameter'. Indeed, Portugali's description of the emergence of formal order in the face of the city – where a series of patterns compete for selection; each actualised pattern prolonging itself over many otherwise divergent forces that it orders in accordance with an emergent logic proper to itself - could well be described as 'essential' in the sense that Spinoza uses this term. What is at stake, in either theory, is the problem of spontaneous convergence in far-from-equilibrium conditions or, what amounts to the same thing: the common order of Nature.

The rhythmical quality of urban space that both Hillier and Portugali point to also makes the link to Spinozism appealing. Recall that Spinoza defines modality i) as something presiding over rhythmic pattern of movement and rest particular to a

given mode, and ii) as a capacity for rhythm-instantiation, that is: for the open-ended formation of still other patterns in the common order of Nature. Applied to the spatial philosophies of Hillier and Portugali, it therefore is a question of disentangling the rhythms that pertain to the city itself from the rhythms whose production it is involved in; a question which effectively reduces to the distinction between what a mode *is?* and what a mode *does*?

What a modal city is, can be answered by analysing its emergent production process - or processes - as these arise spontaneously in the structure and in the surface of the urban artefact. Bodies thus collide with each other - whether on the surface or in the structure of the urban artefact - much in the way that extensive modes (or 'bodies') do in the common order of Nature, and it is from these collisions that the spontaneous (and beatific) affirmation of form occurs. When this happens, a series of otherwise divergent bodies - whether balconies adorning the face of the city, or blocks involved in its structure - spontaneously converge with a particular relation of movement and rest which may be said to correspond to the essence of the city.

What a city does - its power of composition, or aptitude - for its part, corresponds to its capacity for creating still other rhythms, for engaging in still other forms of enslavement; such patterns of enslavement corresponding to the actualisation of new essences in existence. This is the city as ethnic domain or as externalised memory store; a sociogenetic phenomenon constructed at the intersection of otherwise independent rhythms of movement and social interaction. The entrenchment of ethnic tonalities in an ethnic domain. As such, the question is not whether the artefact or the social fact is prior. Rather, one must avoid such asymmetrical forms of reasoning altogether. An ethnic domain (or 'tonality') thus constitutes itself at the intersection of a social fact (*ethnos*) and an artefact (*tekhne*) in an emergent process that is fundamentally *co-determinant* and *complex*; not a thing that embodies a prior form.

Conclusion and discussion

Conclusion

In this conclusion I will review the arguments put forward in the thesis' three main parts. I then discuss these arguments in light of recent theories in human geography - particularly with respect to so-called 'Non-Representation Theories' (NRT) - in the ensuing discussion. This contextualisation is relevant to this thesis insofar as NRT may be said to have evolved out of the Marxist geographical school of thought but also because NRT incorporates some of the same materialist principles that this thesis subscribes to, and so a correspondence of sorts may be suggested between the NRT paradigm and the argument put forward here.

In the thesis introduction, I discussed the relationship between urban society and urban space and how this had been theorised, first in sociology, and later in the specialised fields of urban ecology (the Chicago School) and Marxist geography. Whilst important differences were shown to exist between these more recent schools of thought - notably in their contrasting perspectives on the efficacy of the urban environment - I also discussed how a similarity in their way of theorising the urban question could be detected. This was shown to manifest itself in a tendency to treat of urban space as a reification of a social 'before', thereby foregrounding 'society' in the socio-spatial enquiry.

The critique was one that I adopted from Hillier, who refers to this tendency as 'the society-first approach' to the urban question. Material urban space thus is theorised as an afterthought; an epiphenomenon to society's phenomenon. I then showed how a similar critique is found in Portugali's discussion of a 'Marxist image of the city'. Portugali argues that Marxist geography theorises the formal order of urban space as a 'representation' of a prior socio-economic force. Whilst processes of emergence and nonlinearity are readily theorised in the social realm, the existence of such properties in space itself therefore is negated. I

agreed with both Hillier's and Portugali's argument but also suggested that they could be expanded more and better contextualised.

By rejecting the idea that society imprints itself simply in space, Portugali and Hillier raise important questions about design or, more generally: form and formation. These are notions that have a strong grounding in philosophy where the field of 'ontology' may be said to concern the production and formation of things. However as I showed, it only is Hillier that seeks to root his discussion of form in the philosophical tradition (Portugali's enquiry remains, largely, within the scope of contemporary science). It is Hillier's argument that much design thinking is conceived in terms of an 'Aristotelian paradigm'; a tendency that he rejects.

Hillier tries to overcome this paradigm by engaging with Newton's mechanical physics and, more particularly, his principle of inertia. I argued that this was both a problematic and strangely weak argument, and pointed to the need of exhuming another more suitable principle of formation. I suggested that such a principle could be found in the work of Spinoza whose theorisation of formation has a mechanical component but also a notion of essentiality that is highly original and post-Aristotelian. As I argued (with Viljanen, 2011), the originality of Spinozism arguably consists in its ability to integrate an element of pure mechanicity and randomness with notions of emergent formation and endurance.

This provided the thesis with a general research question: can the society-first approach be overcome? and if so, is it possible to overcome it without reverting to a 'space-first' approach? It also provided the thesis with a framework to develop that question within. Answering the research question would thus depend on i) understanding, differentiating and critiquing Marxist geography's image of the city, ii) developing an understanding of form and formation in which a new image of the city could be rooted (what I call a principle of formation); and iii) discussing this new image of the city with respect to the spatial philosophies of Portugali and Hillier. The structure of the thesis followed from this.

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In part I - which discussed the Marxist image of the city - I explicated in detail the spatial philosophies of Henri Lefebvre, Manuel Castells and David Harvey. I first discussed the so-called 'socio-spatial dialectics' of Lefebvre and the way socio-economic evolution was conjectured to be expressed and reinforced in the spatial form of cities. More specifically, I showed how this dialectical process was conjectured to manifest itself in a specific form and ideology of the city particular to the 20th century and how this ideology - which is conjectured to be expressed in the rise of a managerialistic-positivistic and essentially hegemonic urbanism predicated on predictability in urban space and ennui in the urban inhabitant - was itself argued to constitute a dialectical moment whose necessary contradiction would eventually yield an 'urban society'.

I then discussed Castells' explication of the urban question showing how it transposed the structuralisms of Althusser and Poulantzas to the discussion of urban form and urban social movements. This is manifested in Castells' theorisation of the contemporary city as an expression of so-called 'Monopoly capitalism' with the particular order of the city structured around units of *consumption* (rather than *production* or *circulation*) thought to be arranged in accordance with a structuralist logic (more particularly: by a 'structure in dominance' as per Althusser's aleatory structuralism). I then showed how the ordering of units of consumption in the material city is argued to become an issue of social discontent - and possibly: revolution - with fissiparous so-called 'urban social movements' uniting around a common course .

If Castells' discussion of the urban question revolves around consumption, Harvey's approach to this question goes by way of production. As I showed, the role of urban space in Harvey is essentially to offset crises arising in the Capitalist mode of production by geographical means. As such, space represents one of three circuits of the crisis - 'production' and 'the credit system' being the other two - all of which emanate from a deeply-rooted and fundamentally dialectical problem particular to the capitalist definition of value. The ordering of space in this sense is thought to be a means whereby capital can gain certain strategic

advantages and postpone the collapse of the market. However postponement does not constitute a resolution and so the market eventually must crash with important consequences for urban space and urban inhabitants.

Having discussed the main principles of the three spatial theories, I then explored two tropes that I argued suffuse these theories: hylomorphism and anti-positivism. Hylomorphism is a term that I take from the history of philosophy where - as I discussed - it is particularly associated with Aristotelianism (thus forming a link to Hillier's discussion of design). The hylomorphic logic stipulates that form be divested from matter - which is conjectured to be amorphous, 'docile', devoid of a potential for differentiation - and that the things of this world therefore depend on an exogenous and essentially immaterial logic (Form) for their individuation. I showed how this principle applied to the Marxist enquiry into urban space, e.g. in the way that the logic of space was said to be 'essentially' economic or social.

I then discussed the trope of anti-positivism, showing how Lefebvre, Castells and Harvey all reject so-called 'positivist' approaches to the urban question. Such approaches were argued to express a 'fetishistic' tendency; a term borrowed from Marx. In the terminology of Marxist geography, a fetishistic approach to urban space is such an approach that ascribes sociogenetic efficacy to urban form, thereby supposedly excluding dialectical analysis. I noted how both of these tropes have the significant outcome of *negating* the materiality of the urban artefact albeit in different ways. The trope of hylomorphism thus rejects the idea that the materiality of built form may be involved in its own genesis whereas the anti-positivist trope denies space an active kind of sociogenetic efficacy. As such, the Marxist image of the city may be said to be predicated on a double castration of the material urban artefact.

Part II defined a principle of formation that can reverse this castration. I discussed how another image of the city could be grounded in Spinoza's conception of modal form and formation, noting how Spinoza's 'ethical' philosophy was better

suited to achieve this than Newton's mechanical physics. Having established that, I began explicating in detail - and in keeping with the treatise's so-called 'geometrical order' - the mechanics of Spinoza's ethical philosophy. This included explaining the meaning and relationships between different concepts such as God or substance, the attributes, and the modes.

Starting with the explication of the notion of God or substance, I showed how Spinoza's ontology conceptualises God as pure productivity. Things therefore are in God as in a perpetually productive state, but they also are themselves productive insofar as they involve God (or at least a part of him). I argued this to be expressive of two different - but complementary - kinds of immanence: a pantheist immanence and a panentheist immanence. Everything thus is in God, but God (*qua* power) also is in everything. I then discussed how this productivity is theorised to beget the modes, showing how Spinoza's philosophy moves from substance and attributes (*natura naturans*) towards the finite modes by way of the so-called 'infinite modes' (both *nature naturata*).

Having established that, I discussed the specific production of finite modes as this is defined in the 'Small physics'. More particularly, I showed how Spinoza conceives the essence (or 'mind') of a complex body as that incorporeal power whereby a series of bodies are held together for a given duration of time (this in effect is how modes 'endure' in existence). This power is identical to the nature of the actualised mode - its *conatus* - and in Deleuze's terms constitutes *what a thing is*: its structure or *fabrica*. I then showed, again by way of Deleuze (but also Bove and Viljanen) that essentiality divides itself into what a thing 'is' and what a thing 'does', the latter implicating a capacity for formation different to that of retention.

A mode therefore is something that is capable of maintaining a certain relationship of movement and rest between (elementary) bodies. As long as it does that, it is capable of enduring. But a mode also is capable of engaging in new emergent relationships with other bodies, this capacity referring to its power

of formation. The second kind of modal essentiality was argued to pertain exclusively to actualising (as opposed to already actualised) modes and thus: to constitute a principle of individuation. In explicating this, I showed how individuation was predicated on a move from *passive affections* (joyous encounters) towards *active blessedness* or beatitude. Beatific therefore is that particular moment where a series of otherwise distinct modal powers converge in the affirmation of a new essence in existence.

Conceptualising form and formation in this way is significant to this thesis overall enquiry insofar as it makes it possible to transcend the Marxist image of the city and its double castration of matter. In Spinozism, the world is therefore not split into ideal forms and amorphous matter. It rather involves material bodies whose corresponding essences (which involve and express a part of God's infinite power) are capable of arranging themselves according to emergent - or beatific - principles of formation. In this way, material collisions may lead to the preindividual (and beatific) exploration of form, something which affirms material efficacy (affect; 'what a thing does') as well as autopoietic capacity (essence; 'what a thing is').

These were considerations that I took with me in part III where I discussed the theories of SIRN (Portugali) and space syntax (Hillier), and the possibility of grounding a nonhylomorphic and affirmative image of the material city in their work. I discussed, firstly, the work of Andre Leroi-Gourhan on artefacts and social facts, arguing that this particular theoretician constitutes an important - but largely unacknowledged - theoretical forebear to both Hillier and Portugali; a different approach to the notion of a 'sciences of the artificial' that they take from Simon. The link to Leroi-Gourhan was useful because his understanding of artefacticity engages with the artefact's particular form as a product of an emergent kind of formation. He also attributes a sociogenetic efficacy to artefacts, finding artefacts to be productive of sociological rhythms as manifested in so-called 'ethnic tonalities'.

I then discussed Portugali's SIRN theory and its engagement with the surface of the urban artefact. SIRN stands for 'Synergetic Inter-Representation Networks', and its research concerns the synergetic (i.e. self-organising) relationship between different kinds of representations, which, in the case of the city, are the representations in the mind of the urban inhabitant and those in the artefactual environment. As I showed, Portugali argues that the same type of SIRN process may be found both in the genesis of the surface (or 'face') of the urban artefact and in the genesis of cognitive maps in the mind of the urban inhabitant. Indeed, SIRN's theory of the city may be said to be predicated on the applicability of this concept to two situations whose logic, in general, are thought to differ.

Taking a closer look at SIRN, I showed how both the patterns of the face of the city and those of the cognitive map are conjectured to emerge from far-from-equilibrium conditions. 'Representations' are thus theorised as emergent phenomena, their affirmation pertaining to the spontaneous 'enslavement' of patterns by an emergent 'order parameter'. Enslavement, in turn, is argued to be predicated on the overlap of Shannonian and semantic information; the attribution of a category to a given situation momentarily closing the otherwise open urban system so as to allow for the emergence of some kind of ordered form either in the mind of the artificer or in the surface pattern of the city.

I then discussed Hillier's theory of space syntax, showing, first, how so-called axial maps was used to demonstrate a deep structural tendency of the urban artefact (the 'universal city', the deformed wheel'). I then showed how Hillier works backwards from this finding, defining a 'minimal system' from which such a form can be produced. This system is predicated on a 'minimal initial system' - which essentially describes a situation of random formation - to which Hillier adds two series of aggregation and spatial laws, these providing an ontogenetic restraint on the system as it actualises, thereby allowing for an ordered structure to emerge.

I then discussed how the form of the material urban artefact is conjectured by Hillier to manifest itself in the urban social fact by way of movement. More particularly, I showed how the structure of urban space is conjectured to give rise to a stochastic sequencing of global movement patterns, a phenomenon known in space syntax theory as 'natural movement'. I then showed how natural movement, in turn, is conjectured to manifest itself in more complex forms of socio-spatial behaviour such as land-use patterns (a phenomenon known as the 'movement economy') and how this may be referred to as urban's space's 'ethnic domain'.

In the conclusion of part III, I reflected on the correspondence between SIRN and space syntax theory, arguing that the two paradigms may be incorporated in a more general discussion of artefacticity as this is found in Leroi-Gourhan's artefactual philosophy. I also discussed how this artefactual philosophy - by way of Deleuze and Guattari's reading of Leroi-Gourhan - may be associated with a deep, Spinozist kind of materialism; a materialism where the collisions of bodies result in the emergent and nonlinear formation of rhythms and corporeal relations.

Discussion

In this thesis, I have discussed two images of the city, a Marxist image of the city and a materialist image of the city. In doing so, I have shown the difference between one kind of socio-spatial dialectics predicated on a form of 'materialism' rooted in an essentially economic idea (historical materialism: the mode of production; the hegemonic structure, etc.); and another kind of socio-spatial dialectics predicated on another kind of materialism rooted in a concern for corporeality, efficacy and rhythm. Seen in this light, the binary that Hillier (2008) identifies in the spatial sciences may be theorised not just as a divide between a 'society-first' and a 'space-first' approach to the urban question, but as a divide between two types of 'materiality'.

In evoking this material binary, the thesis echoes similar discussions found elsewhere in the social sciences. A general shift may thus be argued to be underway - indeed: to have been underway for some time - towards analyses and models with an expressively material (as opposed to anthropocentric or economic) component. This for instance may be seen in the work of Bennett who, in her book *Vibrant Matter,* presents a theory of what she terms 'vibrant materialism'. Such a materialism, she contends

> would run parallel to a historical materialism focused more exclusively on economic and social structures of human power. It would be part *ad hoc* invention and part a gathering of elements from a previous tradition of thinking inhabited by Epicurus, Lucretius, Thomas Hobbes, Baruch Spinoza, Denis Diderot, Friedrich Nietzsche, Henry David Thoreau, and others. In that tradition, the distinction between life and matter, or organic and inorganic, or human and nonhuman, or man and god, is not always the most important and salient difference to recognise (Bennett, 2010: 62-3).

I remain somewhat critical of Bennett's listing of so many different philosophies under one heading. It may be true that Epicurus, Lucretius and Thomas Hobbes (all atomists) can be associated with an ontology where emergent corporeal constellations are formed from indivisible particles (or 'atoms') distributed in empty space. But that such a theory should be directly amenable to Spinozism (where among other things substance is said to be whole and indivisible, and where the notion of a void is rejected) is highly questionable. (Similar concerns can be raised for other of Bennett's theoretical pairings - what, for instance, does Henry David Thoreau have in common with Diderot?).

One nevertheless must acknowledge the evocativeness of Bennett's statement, not least because forms of vitalist materialism (although not just hers) have become important theoretical tropes in recent years' sociology and human sciences. One area where aspects of vitalist materialism has been particularly popular is in human geography where theories such as 'Non-Representation Theory' (NRT; cf. Thrift 2006[124]) and the related enquiry into so-called 'affective

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[124] See also Thrift, 1996; Anderson and Harrison, 2010; Anderson et al, 2012.

geographies' (e.g. Thrift, 2004; Anderson, 2006; Anderson & Harrison, 2006) have explored similar problems.

Both approaches owe a great deal to the materialist philosophies of Gilles Deleuze, of Michel Serres and to the materialist sociology of Bruno Latour. Latour's actor-network theory (ANT) in a sense extends the process philosophy of Deleuze and Serres to the social world in general and to the explication of everyday phenomena and emergent patterns in particular (agency, Latour tells us, ''resides in the blind spot in which society and matter exchange properties'; Latour 1999, p. 190). While NRT is an independent paradigm, it would not be unfair to suggest that it adopts many of the tropes that ANT has picked up from process philosophy and extended to the social realm.

What NRT does is to further specify these tropes with respect to processes occurring in geographical space and in the materialist city. Here, an extensive series of objects, artefacts and biological beings are considered and discussed. Bingham (2006) for instance reflects on the biopolitics of 'bees butterflies and bacteria', whereas Thrift discusses the 'networks of pipes and cables that are of such importance in providing the basic mechanics and root textures of urban life' (Thrift, 2004: 58). Humans as well as non-humans, technologies as well as social mores, climatic changes as well as geological phenomena thus come together in open-ended explorations of form, formation and sociality. Such is the imbrication of matter and society that Thrift defines cities as veritable 'maelstroms of affects'; places that 'exhibit intense expressivity' (Thrift, 2004: 57 & 58).

Such accounts have academic merit in and for themselves, but they also are interesting insofar as they push the paradigmatic boundaries of human geography. It is however impossible not to note how the artefactual city itself tends to recede into the background in these accounts. As other material aspects of urban social life are foregrounded there therefore seems to be a paradoxical exclusion from analysis of the material urban artefact. (It is, for instance, largely

ignored by Amin and Thrift, 2002, in their book *Cities: reimagining the urban,* a surprising discovery given the title of this book).

It is this reluctance to theorise the material urban artefact that this thesis hopes to overcome. True, its main aim is to put forward an artefactual corrective to the Marxist image of the city. As we saw, this involved replacing an ontological materialism for Marxism's dialectical materialism, and replacing for the mode of production a Spinozist form of modality as the main morphogenetic principle. However, in introducing aspects of Spinozist materialism into the discussion of urban form and formation, an opportunity also is created to extend the process philosophical approach practiced by NRT to the urban artefact itself.

Another paradigm that this thesis can engage with is the so-called school of Material Engagement Theory (MET). Presently, MET mainly is associated with the work of Collin Renfrew but recently it has been taken forward by a number of younger scholars, of which Lambros Malafouris is among the most interesting. An archaeologist by training, Malafouris explores the relationship between artefacts and evolution (both human and social). He also analyses the emergent material signalling processes involved in the formation of artefacts such as for example the clay pot (see Malafouris, 2008 & Malafouris, 2013). These are the main attributes of what he terms his 'non-anthropocentric' approach to archaeology, which in his terminology means that artefacts are analysed as phenomena involving a material as well as a social component, neither of which is foregrounded[125].

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[125] As he writes with Knapper: ']The] athropocentric worldview means that the material or environmental counterpoints to human agency have generally been given short shrift in scholarly discussion Indeed, while agency is a much-debated theme across the social sciences, the terms of the debate have remained rather narrow, focussing overwhelmingly on the relationship between agency and structure […]Yet while the concept of agency is much contested, it is done so within the theoretical margins of a narrow anthropocentric perspective. This anthropocentric view of agency is based upon a general agreement about a single undisputable fact: that agency, in the real sense of the word, is a property of the human individual – "the only true agents in history are human individuals" (Giddens and Pierson 1998, p. 89). Whether this individual is

There evidently are some interesting overlaps to be explored between MET and the theory of urban materialism put forward in this thesis. Certainly, there is a shared concern for the role of matter in the creation and efficacy of artefacts. Similarly, an affirmation of a non-anthropocentric perspective is shared. There are however also some differences. At the present moment, the two theories differ on account of the complexity of the objects that they explore. MET mainly is concerned with artefacts produced by a single artificer; something which makes it difficult to deploy with respect to the more complex kinds of artefacts that cities (insofar as produced by multiple artificers distributed in time and space) are. It therefore is the hope that the theoretical model discussed in this thesis might help facilitate a dialogue between MET and the space syntax and SIRN theories.

Lastly, the thesis opens up the possibility of extending Henri Lefebvre's (incomplete) work on rhythmanalysis. Such a move might seem paradoxical, given the thesis' critical engagement with Lefebvre's *oeuvre.* However, Lefebvre's enquiry into the rhythms, not just of society, but of geological, biological, and technical phenomena, resonates well with Hillier and Portugali's affirmation of emergent urban patterns (whether those are involved or expressed by the artefact's structure or surface) and with Leroi-Gourhan's more general analysis of artefactual rhythms. In fact, one already finds in Lefebvre a discussion of wave-like rhythms produced by material urban space. He writes

> There on the square, there is something maritime about the rhythms. Currents traverse the masses. Streams break off, which bring or take away new participants. Some of them go towards the jaws of the monster, which gobbles them down in order quite quickly to throw them back up. The tide invades the immense square, then withdraws: flux and reflux (Lefebvre, 1992: 35)

conceived through a Cartesian or an existential lens makes no important difference. What is important is that when we speak about agents proper, we are referring to human individuals, and preferably of the modern Western-type. In short, agency is an attribute of the human substance' (Knapper & Malafouris, 2008: ix-x)

Perhaps this is the most exciting theoretical opening of all. It may well be that it is in the interplay of various kinds of urban rhythms – how they emerge from far-from-equilibrium conditions, how they beget yet other rhythms in processes of distributed, non-linear genesis, etc.[126] – that the paradigms of ANT, NRT, and MET can come together. A polyrhythmic explication of urban space and its many emergent material processes. However, such an approach would have to take into account not just the rhythms of planets, humans, animals and modern technologies. It also would have to take into account that ancient technology that is the material city and the rhythms that it concurrently involves and expresses. Approached in this way, a new urban materialism is possible.

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[126] As Lefebvre writes: '[Y]ou cannot observe a wave without bearing in mind the complex features that concur in shaping it and the other, equally complex ones that the wave itself originates' (Lefebvre, quoted in Meyer, 2008: 152)

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