Material or Metaphorical?

An Inquiry into the Spatialities of Actor-Network Theory

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Abstract

Since Actor-Network Theory emerged in the mid-1980s, the approach has transcended disciplinary boundaries and has similarly gained prominence within geography. Moreover, also the main proponents of the approach have endeavoured in linking Actor-Network Theory to geographical lines of inquiry and sought to develop a spatial vocabulary that matches its distinctive thought system. However, few attempts have been made to critically examine the spatial concepts developed within the approach and a systematic examination of these concepts seems to be fundamentally missing. A lack of such an examination may then lead to the expansion of the approach deprived of the consideration of its possible limitations and implications. The purpose of the present work, then, is to provide such an examination. This will be accomplished by a systematic literature study on the works of four main proponents of Actor-Network Theory, who suggests that the approach radically changes our view on space and the spatial. In this light, the present work seeks to position Actor-Network Theory's spatial conceptions in relation to realist conceptions of space and from this vantage point examine the possible limitations and implications their import entails for geography. On the basis of a systematic literature study of four of the main proponents, I argue that the concepts developed within the approach are intrinsically metaphorical and that their spatial conceptions juxtapose space with network formation, for in a second move to undercut any absolute and relative conceptions of space. Furthermore, I argue that not only is the spatial conceptions of Actor-Network Theory constituted by spatial metaphors, but that the import of Actor-Network Theory to geography may entail problematical constraints upon geographical lines of inquiry.

Contents

Chapter 1.   Introduction

'The subversiveness of space is too precious to be sacrificed blindly' (Smith 1990: 177).

In this thesis, I seek to open up and aerate a particular juncture in the geographical tradition, where a particular school of thought (or approach) have sought to confront conventional geographical lines of inquiry. This approach emerged in the mid-1980s and has since become known as Actor-Network Theory (ANT in short). Actor-Network Theory is at its core about uncovering complex processes and connections between humans and nonhumans (Bosco 2014). Actor-Network Theory originates from sociology, anthropology and philosophy and was initially an approach to studies of science, technology and society (STS), but has since transcended disciplinary fields and has been found useful for a wide range of purposes. Arguably, for the most part in addressing issues related to socio-materiality, but equally because the approach's epistemological vantage point has been found attractive in explaining societal matters more broadly (Fuglsang 2004). Accordingly, Actor-Network Theory has not gone unnoticed within geography (Bosco 2014; Laurier 2010) and the core developers and main proponents of the approach such as Bruno Latour, John Law and later, Annemarie Mol and Jonathan Murdoch have all striven to link Actor-Network Theory to geographical lines of inquiry, suggesting that Actor-Network Theory radically shifts our view on space and the spatial (Bosco 2014; Murdoch 2006). As such, a great deal of new-fangled concepts have come in vogue as the proponents of Actor-Network Theory have sought to develop a spatial vocabulary that matches its thought system.

However, while Actor-Network Theory gradually has gained prominence within geography, which is perhaps most evident in its frequent mentioning in introductory course books, such as *Approaches to Human Geography* (Aitken et al. 2014), *Key Thinkers on Space and Place* (Hubbard & Kitchin 2010) and *Geographical Thought* (Cresswell 2013), the approach has not always been considered a sound undertaking for geographical inquiry. As an example, José Corpataux and Olivier Crevoisier (2016: 611), analysing Actor-Network Theory's implications for the study of finance and economic geography, has recently raised concerns about the spatial conceptualisations of Actor-Network Theory, arguing that 'the conception of space which underpins [ANT] remains embryonic, if not entirely metaphorical'. In addition, they indicated that within Actor-Network Theory is an inherent

exclusion of spatial and historical context more generally. However, Corpataux and Crevoisier (2016) do not provide the only account where the spatial underpinnings of Actor-Network Theory have come into question (see for example Lee & Brown 1994; Jönsson 2016; Simonsen 2004). Noteworthy however, these accounts are seemingly relatively few in number, considering the attraction and magnitude of Actor-Network Theory in contemporary social sciences. Furthermore, most of these accounts have either taken the form of case studies (see for example Jönsson 2016) or have tended to turn towards other topics of criticism where the spatial has played a critical role but have not been imperative to the criticisms (see for example Lave 2015; Hornborg 2013; Elder-Vass 2008; 2015).

In this regard, any systematic examination of the concepts proposed by the central figures of Actor-Network Theory seems to be fundamentally missing. A lack of such an examination may then lead to the expansion of the approach deprived of the consideration of its possible limitations and implications. However, as Actor-Network Theory increasingly is gaining prominence within geography, it seems essential to address such potential implications. The purpose of the present work, then, is to provide such an examination. This will be accomplished by a careful and systematic reading of how space is conceived and conceptualised within the approach, which in turn, will provide an indication of what the import of Actor-Network Theory to geography entails for the study of space. In order to comprehend and assess the spatial conceptions of Actor-Network Theory and its potential implications, this thesis will draw on the work of David Harvey (2006; 2008; 2009) and his work on the tripartite division of absolute, relative and relational space, Henri Lefebvre (1991[1974]); 2012 [1970]) and his work on the triad of perceived, conceived and lived space and Cindy Katz's and Neil Smith's (1993) work on the notion of spatial metaphors and the problematics that accompanies them.

In this sense, the thesis is primarily intended as a theoretical contribution to geography and analyses of the spatial, rather than a study of the concrete. However, I wish to suggest, that in order to study the concrete we must insist on critically engaging with the concepts and categories we develop to understand it, and thus asses if they are at all appropriate for the task. In this light, the structure and intention of the thesis takes inspiration in Smith's (2010: 1) book, *Uneven Development*, in that 'if the work is theoretical in substance and exposition, it is quite immediate in motivation'.

For it might be, as David Livingstone (1992) has asserted, that contemporary geography is characterised by a plurality of different schools of thought, all with different lines of inquiry and argumentation, and are perhaps, 'each within their own cognitive rights to hold to theories that comport with their system of control beliefs' (Livingstone 1992: 345). However, this does not make

theories immune to critical examination. For as Livingstone (1992: 2-3) similarly stresses, 'accepting or rejecting any scientific theory is always and irreducibly a social act, by a specific social group, in particular cultural circumstances. Nor will we forget the practice of geography; that is, the expression of thought in action. Too often the practical outworkings of theory are overlooked'. In this sense, it is by no means inconsequential which conceptualisations and categorisations we choose to employ to study geographical phenomena. Some concepts may have serious political implications, while others may contain theoretical implications.

1.1.   Purpose and research questions

The present work seeks to provide a systematic examination of the spatial concepts developed by four of the main proponents of Actor-Network Theory, which outlines a more all-encompassing purpose; namely, what the import of Actor-Network Theory to geography entails for the study of space and, if any, what might the implications of its import imply.

1. What kind of spatial conceptualizations signify Actor-Network Theory?
2. How can the spatial conceptualizations within Actor-Network Theory be positioned in relation to realist conceptions of space?
3. What are the possible theoretical and political implications and limitations of the spatial conceptualisations developed by central proponents of Actor-Network Theory?

Although the research questions outlined above may give the impression of a somewhat naïve point of departure, considering the intention of the present work, they outline a much more critical designation and will in turn provide the basis for a qualified consideration of what the import of Actor-Network Theory to geography entails for the study of space.

1.2.   The progression of the thesis

In order to assess the spatial of Actor-Network Theory and its import to geography, the thesis will be divided into a range of chapters, all of equal importance but with different analytical purposes. The progression of the thesis will begin with an exposition of the methodological considerations that have gone into the forming of the present work (chapter 2), followed by an introduction to the object of study; Actor-Network Theory (chapter 3). Although somewhat descriptive, chapter 3 seeks to account for the emergence of Actor-Network Theory, its distinctive thought system and the central proponents

of the approach. Additionally, this chapter will provide an inventory of some of the most central concepts within the approach and its apparent appeal for geography.

In order to position Actor-Network Theory within geography, chapter 4 will provide a brief history of geographical thought. The purpose of this chapter is to provide historical context to the seemingly chaotic plurality that characterise contemporary geography, aimed at underscoring that gains may be achieved from retrospection. Chapter 5 is intended to form a theoretical basis of different conceptualisations of space and the spatial within geography, primarily drawing on the work of Harvey (2006; 2008; 2009), Lefebvre (1991 [1974]; 2012 [1970]), Katz (Katz & Smith 1993) and Smith (1990; 1993). The purpose of this chapter is to provide a theoretical framework from where Actor-Network Theory's spatial underpinnings can be positioned and possibly problematized. Furthermore, this chapter will similarly provide a conceptual framework for analysing potential metaphorical uses of space within the approach.

Following these theoretical considerations of space and the spatial, chapter 6 will provide the analysis of the spatial concepts developed by some of the central figures and main proponents of the approach. Furthermore, also the criticisms where the spatial underpinnings of Actor-Network Theory have come in question will be presented and discussed as the analysis unfolds. Finally, chapter 7 seeks to answer the research questions of which the thesis is concerned, and will on this basis consider what the import of Actor-Network Theory to geography entails for the study of space.

Chapter 2. A Conceptual Inquiry – Venturing into Abstractions

'While all of us are concerned to build a better world need to rethink politics and ways of knowing in ways appropriate to our complicated contemporary geographical and historical situation, it is hard to do so within a climate of distrust for all forms of intellectual abstraction' (Harvey 2010: ix).

As outlined in the introduction, the motivation for the present work is a central concern with spatial representations and the possible limitations that certain representations may comprise for describing, analysing and conceptualising the complex world that unfolds around us.

As Actor-Network Theory has transcended disciplinary boundaries and similarly gained prominence within geography, a multitude of spatial conceptualisations have been proposed as the central figures of the approach have contemplated on the nature of space and the spatial. In addition, I wish to unveil right away, some rather peculiar concepts that is, at least when considering more conventional spatial conceptions (see for example chapter 4 and chapter 5). In a sense, these new-fangled concepts pertain a certain unconventionality that may initially invoke curiosity, however, the curiosity may turn into scepticism if their possible limitations are uncovered. Especially, if they are to be taken to the level of methodological principles, then the examination of their overt designations and possible limitations (theoretically and politically) become all the more crucial.

It is worth noting, that for the present work I have quite deliberately chosen not to firmly position the thesis in a particular school of thought (any of the many isms), for the reason that it could all too easily turn into a clash of ontologies, favouring one school of thought while drawing a caricature of another, for eventually dismissing it (Flowerdew & Martin 2013). However, not grounding the work in a particular school of thought could (and perhaps should) be seen as a weakness (philosophically at least) of the present work; this cannot be objected. Conversely however, the intention is to provide a more unrestricted (or non-dogmatic) entrance for exploring the spatial conceptions of Actor-Network Theory. As such, the thesis is not an attempt to reject Actor-Network Theory altogether, nor is it to defend it. Rather, the present work should be seen as a thorough examination that seeks to deepen our understanding of the spatial conceptions that underpins the approach and investigate its possible limitations and implications.

However, although deliberately seeking not to conform to any isms, the present work takes inspiration in Critical Theory. Not only because of its insistence on separating theory and practice (the two must

not be conflated), or its assertion that theory itself can in fact be a transformational and productive force, but also its inherent realism that denotes that concepts absolutely do (and should) refer to aspects of the real world (the concrete) (Brenner et al 2012).

Furthermore, it is no secret that the present work emphasises with the works of the authors of which the theoretical framework has been built upon (chapter 5). On this note, I wish to emphasise Harvey's (2010: viii) assertion, that 'the penchant for tough critique in academia has notably waned over the years [and has been] subject to dissolution in the tepid wash of identity politics and cultural theorizing'. This thesis, then, should precisely be viewed as an attempt to provide such an account (a tough critique). For if the ways we choose to conceptualise space, in effect, is acutely political and anything but academic (Smith 1990), and if the practical outworkings of theory is not inconsequential (Livingstone 1992), the task of examining concepts of the spatial and their, perhaps unintended, implications seems all the more essential.

In this light, the present work is a venture into the realm of abstractions and is primarily intended as a theoretical contribution to geographical (spatial) thought. Motivated by uncovering the possible implications of spatial conceptualisations of Actor-Network Theory, the thesis will present a qualitative and systematic analysis of the literature on spatial concepts and spatial representations that have been introduced by four of the main proponents of the approach.

2.1 "Armchair research" – a literature study

The selected proponents, whose work on the spatial that the thesis seeks to engage, is Bruno Latour, Jonathan Murdoch, Annemarie Mol and John Law. They are all frequent referents within the literature and main proponents of the approach (Bosco 2014; Laurier 2010; Cresswell 2013). Furthermore, both Latour and Law have been core developers of Actor-Network Theory since its emergence in the mid-1980s. Nevertheless, all of the abovementioned can be seen as central representatives of the approach, which constitutes an inclusion criterion for the selection of literature that will be analysed. Another inclusion criterion is the literatures explicit focus on the spatial. In a sense, because of their status as frequently referenced and main proponents, they can perhaps be viewed as "critical cases" and that reviewing their work and proposals of new spatial concepts allow for some generalisation of how the spatial is commonly conceived within the approach (Flyvbjerg 2006). But perhaps it is strange to put the case-criteria on people, and their respective publications may in all regards stand for their own accounts. Nonetheless, when analysing their spatial concepts, I will pertain to the authors' original

texts. As such, it is the literature that provides the primary data source and is the main focus of analysis (Ridley 2012; Flowerdew & Martin 2013). In this sense, the thesis is intended as an extensive literature study (or critical analysis) of a particular body of (geographical or spatial) knowledge that have been proposed by the abovementioned authors.

A critical analysis entails being aware of the authors' possible philosophical or theoretical biases and carefully follow their argumentations to avoid misreading their concepts' overt designations. As such, the work produced here should not only be judged by its content, but also by the precision of its interpretations (Ridley 2012; Haug et al 2013; Wallace & Wray 2016). For the authors in question, their arguments about how to conceive space have been developed over a series of publications (including books and academic articles). Thus, in order to achieve a deeper understanding and systematically assess their works on the spatial, necessitates following these arguments as they have been developed and elaborated over the years and occasionally advanced as responses to some of the critiques that have come to surround them. Furthermore, in order to validate my own assessment of the spatial conceptions of Actor-Network Theory, some of the critiques of the approach's spatial underpinnings will be taken into account and reflected upon as the analysis unfolds (Ridley 2012).

In the preface of the present work, a literature search was carried out via the online search engines: Web of Science, JSTOR, Scopus and Google Scholar. Partly to gather data (literature) on the work of the authors the thesis seeks to engage, and partly to discover criticisms concerned with the spatial of Actor-Network Theory and the authors in question. For the literature search, the following search words were applied in different combinations: Actor-Network Theory, ANT, assemblage, space/spatial, geography, metaphor and critique. This was followed by a careful reading of abstracts for a range of publications, sorting the relevant material from the irrelevant. Noteworthy however, the literature review showed relatively few accounts that explicitly addressed and questioned the spatial underpinnings of the approach. However, since the work of the selected authors have been cited in the hundreds, sometimes in the thousands, the literature that has emerged around Actor-Network Theory is too vast to cover in a single paper such as this. As such, the thesis unavoidably presents a partial and selective reading of the work concerning the approach. There may therefore exist potential interesting interpretations of Actor-Network Theory's spatial underpinnings, that have not been taken into account in the present work. However, this aspect will not affect the validity of the central conclusions drawn in the present work, since it is a question of dealing with a particular line of arguments about the spatial that have been proposed by the selected authors, which will be carefully analysed in chapter 5.

To sum up, the present work is intended as a theoretical contribution to geographical thought, founded upon a literature study of the spatial conceptions of four of the main proponents of Actor-Network Theory. Although the present work is concrete in motivation, it is unavoidably abstract in content. Thus, the knowledge produced here is intrinsically theoretical. As such, the methodological vantage point taken in this thesis, might as well be called by its more infamous name: "armchair research" (Ridley 2012, Haug et al. 2013; Flowerdew & Martin 2013). However, as also Stuart Aitken (2013: 234), explaining literature studies (or "armchair research's") relevance for geography, has emphasised, 'through an analysis of texts we refocus our intent upon theorising the workings of power […] Texts are inescapably political, and an engagement with them is about effecting change, perhaps through elaborating new meanings or perhaps by representing resistance to dominant narratives'. Literature studies (or armchair research) is crucial then, not only because of their theoretical relevance, but because they are a means for exposing the political implications that may be engrained in conceptual languages. Exposing such implications, then, unavoidably entails a venture into the realm of abstractions.

Chapter 3. Actor-Network Theory – The Object of Study

'"Do you believe in reality?" to ask such a question one has to become so distant from reality that the fear of losing it entirely becomes plausible' (Latour 1999: 3).

In order to apprehend the spatial underpinnings of Actor-Network Theory, a general consideration of the approach's emergence, its main proponents, its distinctive thought system and its view on power relations is essential. This chapter seeks to provide such an overview. Furthermore, this chapter will similarly provide an inventory of some of the most central concepts within the approach. In accordance with this conceptual inventory, also Actor-Network Theory's appeal to geographical lines of inquiry will be outlined in the end of the chapter. Noteworthy, this section will mainly serve as a somewhat descriptive overview of Actor-Network Theory. The concepts relating to the spatial will in chapter 6 be more extensively elaborated and a more thoroughgoing exposition of these concepts will be provided and analysed in accordance with answering the research questions of which the thesis is concerned.

3.1.   The emergence of Actor-Network Theory

Actor-Network Theory, also known as Sociology of Associations or Sociology of Translation, emerged in the mid-1980s and originates from sociology of science and technology studies (STS) (Fuglsang 2004), but has since entered a range of different disciplines (Fuglsang 2004; Bosco 2014). The main proponents and initial core developers of the approach is Bruno Latour, Michel Callon, John Law and later Annmarie Mol (Fuglsang 2004; Bosco 2014). Within Geography, Jonathan Murdoch is one of the more frequent referents within in the literature (Bosco 2014).

The initial concern for the proponents of the approach was founded upon a scepticism towards the universality of established facts, arguing that the truth claims they purport are mistakenly taken for granted (see for example Latour 1987; 1999). Instead, they argued for the importance of going into the laboratories and view "facts as made", and investigate how scientific facts are produced and circulates through the mediation between both human and non-human entities (for example, machines, texts, measuring devices and also human practices) (see for example Latour 1987; 1999).

Within Actor-Network Theory, nothing is static but always in the becoming or in dissolution. Everything is intrinsically processual and is always related to particular situations (including facts) (Bosco 2014; Fuglsang 2004). As such, the proponents of the approach have instead argued for the processual and place-bounded aspects (situtatedness) of fact making, and as Law and Mol (2001: 1) elatedly has put it, 'facts have been localised'.

Another core aspect of the approach is a concern with overcoming dualistic thinking and is thus heavily engaged in the debates about structure/agency, nature/culture, subject/object and macro/micro (Cresswell 2013; Bosco 2014). In this regard, the proponents of the approach have argued that such dualisms can (and should) be overcome by conceptualising them as interconnected and processual and never as static categories (Murdoch 2006; Cresswell 2013; Bosco 2014; Lave 2015). In this sense, Fernando Bosco (2014: 151) has asserted that Actor-Network Theory is at its core, 'about uncovering and tracing the many connections and relations among a variety of actors (human, non-human, material, discursive) that allow particular actors, events, and processes to become what they are'. This underscores a general understanding of Actor-Network Theory, but in order to uncover the theoretical basis that underlies the spatial conceptions of the approach, a deeper investigation of Actor-Network Theory's distinctive thought system is necessary.

3.1.1   *The Ontology of Actor-Network Theory*

Actor-Network Theory is a constructivist approach. It is concerned with investigating how objects are represented and constructed, and circulate in particular situations (Fuglsang 2004; Laurier 2010; Bosco 2014; Lave 2015) On this note, Actor-Network Theory contrasts social-constructivist approaches, in that objects (the material world) are not exclusively conceived as the product of social or human relations (Fuglsang 2004). Latour (1999) has in this regard made overtures toward viewing Actor-Network Theory as an approach firmly grounded in realism – as it does perceive objects (the material world, or as Latour (1999) prefer, the "outside world") as existing independently of humans recognition of it (Latour 1999; 2005). However, for Latour (1987; 1999), we know only very little of this "outside world", and that which we claim to know, is always contested and ripe for controversies. This proclamation however – that Actor-Network Theory should be viewed as a realist approach - has been overtly contested by Dave Elder-Vass (2008; 2015), suggesting that there is not much realism to be found in Actor-Network Theory (see also Lave 2015). However, as Latour (1999: 2; *original emphasis*) asserts, 'if science studies has achieved anything, I thought, surely it has *added*

reality to science, not withdrawn any from it'. For Latour (1999), adding realism to science means that the idea that a human can say anything profound about reality (the "outside world") gazing at it from what he refers to as a "mind-in-a-vat"[1] is highly speculative, or as he has put it: 'How is it possible to imagine an outside world? Has anyone seen such a bizarre oddity? No problem. We will make the world into a spectacle seen from the inside' (Latour 1999: 9). As we will see in chapter 6, this notion is similarly resounded in Latour's conception of space.

Nonetheless, although arguing for a somewhat iconoclastic realist stance, Actor-Network Theory puts an emphasis on how descriptions and representations of objects occur in many different ways and changes over time as descriptions and representations circulate in different (scientific) milieus. A central aspect is that representations are regarded highly dependent on the particular circumstances they are applied in (Fuglsang 2004). Within Actor-Network Theory, science (facts and truths), we are reminded, is foremost a social praxis entangled in material formations (Latour 1999).

In this sense, Actor-Network Theory's ontological[2] viewpoint is fundamentally relativistic (Fuglsang 2004). Meta-narratives or principal societal statements that proposes to be able to explain societal outcomes or social outbreaks as universal traits are fundamentally rejected within the approach (Fuglsang 2004). On this basis, there is instead an emphasis on analysing how different theories and definitions are applied and represented in concrete (local) practices. Meta-narratives, such as society, capitalism, system and structure are useless as explanatory foundations within Actor-Network Theory. Such narratives are perceived as effects, rather than structures or static categories. Callon (1990) has in this regard proposed to think of such effects as something that is performed in the interaction of complex and dynamic relations between heterogeneous (human and non-human) actors. Or as Bosco (2014: 151) similarly has put it, 'knowledge, agents, institutions, organisations, and society as a whole are effects, and […] such effects are the result of relations enacted through heterogeneous networks of humans and non-humans'.

Actor-Network Theory is thus relativistic, in the sense that theories and definitions (for example about the cohesion of society, or representations of social outbreaks) cannot be accepted as universal or regarded as principal societal laws (Fuglsang 2004). Theories within Actor-Network Theory, we are reminded, are ultimately local (relative) expressions (Fuglsang 2004). The acknowledgement of a

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[1] A "mind-in-vat" refers to a brain without a body. It is a notion Latour often applies to reject the idea of absolute certainty or knowledge (see for example Latour 1999).
[2] Ontology denotes how we (theoretically) perceive the world, and poses the question of 'what the world must be like for knowledge to be possible' (Roy Bhaskar 1978 cited in Gregory et al. 2000: 561).

given theory is according to the approach, only given status as the theory (initially a local expression) disperses to other (scientific) milieus and circulates within them. A theory thereby gains validity, not because of a status rendering it universal, but because it is adequately represented in praxis. It thus becomes itself an actor and activates itself elsewhere (Latour 1987; Fuglsang 2004). This latter sentence needs some clarification on how actors are defined within the approach, and how Actor-Network Theorists understand practices. The following will attempt to present such a clarification. Noteworthy however, as also Eric Laurier (2010: 276) has asserted: 'Latour is, it should always be born in mind, anti-theory'.

3.1.2   Actor-Networks and Relational Materiality

An *actor* within Actor-Network Theory is defined as something or someone that acts, or otherwise something that attributes or is attributed agency by others (Callon 1990; Latour 1996; 2005). An actor, within Actor-Network Theory terminology, can thus literally be anything (human or non-human) as long as it is a source of agency - both discursively (a theory) and materially (a thing). This claim, giving agency to things (non-humans) is often regarded the most radical claim and controversial aspect of the approach (Laurier 2010; Robbins 2012; Creswell 2013; Bosco 2014; Lave 2015). It is, however, this aspect (a thing's capacity to act) that allows the approach to advance some of its central claims (Latour 1996; 1999). Latour (1996) has in this regard suggested the definition actant as a replacement for actor, primarily because of the immediate confusion that springs from the term in its traditional sense – an intentional human. Humans, then, is not given privilege as the only distinctive actor, but non-humans upholds a central position within the approach. As such, Latour (1996; 2005) has proposed the concept of symmetrical anthropology as a way to erase the distinction between humans and non-humans and analytically treat them as equals. The fundamental understanding of an actor (actant) within the approach, is that it is active and performs and, perhaps most importantly, that its agency or performativity is represented (Fuglsang 2004).

The definition of *network* is just as controversial as the definition of actors within the approach. And all together, an actor can also be a network (or *hybrid-actor*, for example institutions or organizations) (Callon 1990). As such, the difference between an actor and a network lies in which perspective the network or actor is viewed, although no network can exist without actors (Mol 1999; Cressman 2009). The network is thus not perceived as a thing in itself, but rather as a path or striation that is formed through the activities, in which heterogeneous actors (human and non-human) interact with others to

form a network. A network, then, is rather perceived as a process of association between actors, in which actors define, relate and describe each other, which within the terminology of Actor-Network Theory is referred to as a *translation process* (Callon 1990). The notion of a network, within the approach, is thereby not a network of clear boundaries. Rather it is a network of activities and associations between heterogeneous actors that constantly change and redefines itself (Fuglsang 2004). *Assemblage* has often been used as an alternative expression for network in this regard, but the fundamental understanding of it remains unchanged. In a network process were actors interact, they define, redefine and relate to each other by means of representation, which eventually makes up something as volatile as a term called *actor-network*. An actor-network is thus a network (or assemblage) of activities that is performed by heterogeneous actors, which through interactions and relations can mobilize resources (practical or theoretical) between each other, and eventually form an actor-network. Two key concepts regarding actor-networks are *immutable mobiles* (an actor-network where the relations between actors are stable (immutable) and allows the network to "travel" (is mobile) and interact with other networks without losing its internal entities, for example a machine) and *centers of calculation* (a place where an immutable mobile will pass through and can eventually be dispersed out and expand to other networks, for example a laboratory) (Lave 2015; see also Latour 1987).

As for the concept actor-network, Latour (1999) has suggested the term *actant-rhizome*[3] as a replacement, since he found its designation to be more soothing to the program that lies at the root of Actor-Network Theory. Furthermore, partly because of a skepticism towards the application of meta-theories, Latour (1999) has preferred ontology as a replacement for theory, renaming the approach Actant-Rhizome Ontology. This latter notion (ontology) being more elaborated by Mol (1999), making a call for multiple ontologies, suggesting that we should leave the notions of theory and epistemology[4] for instead to investigate the possibility of multiple ontologies. Even so, Actor-Network Theory views society as a practice that constantly unfolds and changes. Our conception of it therefore has to be continuously redefined and expanded. Never through universal statements, but rather through the descriptions of diverse actor-networks. As such, any idea of fixity does not resonate with the vocabulary of the main proponents of the approach, which is perhaps better displayed as Latour (2005: 245) insists on science's uncertain nature: 'The world is not a solid continent of facts

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[3] *Rhizome* is a notion derived from botanic and expresses a root formation. Latour has applied it as an analogy to denote actor-networks' elusive forms (see for example Latour 1996).
[4] Epistemology denotes the rationality of knowledge. It is an expression for what counts as valid knowledge (Gregory et al. 2000)

sprinkled by a few lakes of uncertainties, but a vast ocean of uncertainties speckled by a few islands of calibrated and stabilized forms'.

Within Actor-Network Theory, what ultimately defines and designs the cohesion of society is the essential idea within the approach of an ever-changing relationship between actors who by virtue provides descriptions (if followed and traced) of why society unfolds in multifarious ways. Actor-Network Theory in this regard, and this is perhaps the most telling point about the ontology of the approach, is fundamentally relational (Murdoch 2006; Laurier 2010; Bosco 2014). Furthermore, it is about giving actors a central explanatory position. Or as Latour (2005: 32), retorting critical approaches to sociology, has put it: 'For (critical sociologists), actors do not see the whole picture but remain only 'informants'. This is why they have to be taught what is the context 'in which' they are situated and 'of which' they see only a tiny part, while the social scientist, floating above, sees the 'whole thing''.

3.1.3   Power and Relationality

Conceptualizations of power, and how power is exercised, is within Actor-Network Theory profoundly different from traditional views (Cresswell 2013; Robbins 2014). Power is here conceived as a *network effect*, rather than a discursive event or a product privileged to human intentionality or imposed by a structural logic (Fuglsang 2004). Thus, power is rather conceptualized as an effect of the interaction between a variety of heterogeneous actors (human and non-human) that comes together to form an actor-network. Power, then, is embedded within actor-networks and exercised by means of enrolling other actors to form new actor-networks, which requires a collective effort between humans and non-humans to be executed (Fuglsang 2004).

An actor is then not attributed the form of agency that makes it act by and of itself, but can only be attributed agency when enrolled into a network formation. This form of agency can be obtained over a distance and can come about semiotically[5] (Murdoch 2006). As such, an actor can equally be apprehended discursively, not by having a material presence in an actor-network, but because it is the basis of a form of agency in another actor-network (for example, as a response to a law, a new bill or institutions). Power relations thus arise, as actor-networks form stable relations (for example, an organization, a manifestation or even a machine) via shared empathy and mutual agreement of actors'

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[5] Semiotics is the study of sign systems. Semiotics is applied to investigate how communication between different entities become meaningful (Fuglsang 2004).

roles in diverse networks (Fuglsang 2004). Callon (1990) has in this regard suggested the concept convergence as a measure of the success of a network formation to become a stable formation.

Power as conceptualized within the approach, then, is not something pre-given which can be asserted on a categorical level, such as a hierarchical structure, rather it depends on the stability and extension of an actor-network. Or as Rebecca Lave (2015: 215), reviewing Actor-Network Theory's influence on contemporary Political Ecology, has put it, 'power relations [within ANT] can and should be explained solely on the basis of network size: extensive networks are more powerful, smaller networks less so. Inequalities are thus not the result of structural forces but of the expansion or contraction of networks'. There is, then, an interest in power relations within Actor-Network Theory, but as also Bosco (2014: 156) has noted, the interest with power within the approach is primarily concerned with 'how power gets activated as different actors are enrolled in networks and in how, through that process, things emerge and come to be'.

3.1.4   The Epistemological Underpinnings of Actor-Network Theory

As previously explained, Actor-Network Theory fundamentally rejects research that revolves around meta-narratives that attempts to prove principal societal laws. Instead, there is within the approach an emphasis on analyzing how different phenomena or social outbreaks arise as network effects, and how such effects is always a product of practices through the interaction of heterogeneous actors (Fuglsang 2004). A fact, in this instance, is then never accepted as a principle; taken as given. Facts and scientific truths is fundamentally conceived as a social practice that are represented in actor-networks and circulates in specific milieus, rather than taken-for-granted static explanations of an outside world (Latour 1999). The project of Actor-Network Theory (the principles of explanation) is then to investigate (or demonstrate) how different actor-networks emerge and how heterogeneous actors are enrolled, represented and translated into other actor-networks over time and over distances (Murdoch 2006; Bosco 2014).

As such, the epistemology inherent to Actor-Network Theory is concerned with demonstrating how decisions, activities and institutions, and on and on, is effects that are organized and constantly in motion through the interaction and mobilization of resources within actor-networks (Fuglsang 2004; Bosco 2014). There is, then, an emphasis on the concrete, and on explaining how processes and relations on the micro-level transforms into phenomena on the macro-level, rather than the other way around (Fuglsang 2004). As such, Actor-Network Theory entails, 'that we do not think about

hierarchies or categories, but rather about constant circulations and flows. In ANT, the social is a momentary association characterized by the ways it gathers together in new networks and shapes' (Bosco 2014: 154).

3.2. Actor-Network Theory and geography

As Actor-Network Theory has transcended disciplinary boundaries, it has not gone unnoticed within Geography (Murdoch 2006; Laurier 2010; Bosco 2014; Lave 2015). In addition, the main proponents of the approach have not refrained from using concepts with a geographical designation in their research (see for example Latour 1987; Law & Mol 1994; 2001).

The main appeal for geographers to turn towards Actor-Network Theory has been to emphasize how the emergence of geographical phenomena can be understood as formations of actor-networks (Bosco 2014). As such, Murdoch (2006; 1998) has suggested that the application of Actor-Network Theory in geography entails emphasizing the relationality of actor-networks as they emerge as striations within a topological conception of geography. In this regard, Murdoch (2006) evoked topological thinking (the study of how relationships emerge as continuous striations and connections within varying geometrical properties), as opposed to topographical thinking (the study of surfaces in a three-dimensional Euclidean space), to be the central geographical conception within Actor-Network Theory. Similarly, Murdoch (2006: 78) has underscored Law's proposal of a "new geography" and suggests, 'that we should abandon *topographical* notions of space – in which the space of absolute and fixed coordinates is necessarily dominant – in favour of *topological* conceptions'. Or as Law (1999: 7) himself has put it, '[ANT is] a machine for waging war on Euclideanism'.

Fundamentally, then, a world of fixity (even in geographical sense) does not resonate with the vocabulary of Actor-Network Theorists. Instead, notions emphasizing fluidity has gained a more prominent role in the conceptions developed within the approach (see for example Law & Mol 1994; 2001). Actor-Network Theory is, as we are incessantly reminded, foremost a relational approach. And as Bosco (2014: 158-159) has noted, Actor-Network Theory provides an insight, that leads us to 'ponder how [...] relations and forms of power solidify both materially and discursively in places and flow through space-time'. As such, especially geographers who have been suspicious about hierarchical notions of geography, such as geographical scales (global to local), have taken an interest in the approach (Bosco 2014). Geographers attaining to Actor-Network Theory, have thus sought to further the development of space as relational, and sought to demonstrate how spatiality is embedded

within actor-networks (Bosco 2014). Or as Laurier (2010: 273) has asserted: '[ANT] radically shifts away from a Euclidian concept of space and time as universal abstract axes which contain and constrain events. [For ANT] space and time come about as consequences of the ways in which particular heterogeneous elements are related to one another'.

The conceptions of space, which underpins Actor-Network Theory, then, radically shifts from how space has been conceived in the past (see chapter 4). The notions of fluidity and relationality instead invites geographers to think of space as an effect rather than a medium. Or as Murdoch (2006: 73-74) has summarized the spatial underpinnings of the approach, ''space' is nothing more than a network 'effect' […] There is no absolute space (just as there is no absolute nature, no absolute society, no absolute time); only specific space-time configurations, conditioned by the rationalities and relations that run through networks'.

3.2.1   Actor-Network Theory's Relation to the Geographical Tradition

Throughout the present chapter, the distinctive thought system of Actor-Network Theory and the sometimes controversial notions that underlies the approach's spatial conceptions has been examined. Notably however, the spatial conceptions that underpins Actor-Network Theory have on more than one account come into question (see for example Brown & Lee 1994; Simonsen 2004; Corpataux & Crevoisier 2016; Jönsson 2016). In chapter 6, these accounts will be explored and taken into consideration through a more comprehensive analysis of the spatial conceptions of some of the main proponents of the approach. However, if we wish to consider the import of Actor-Network Theory (or any approach) to geography, it is essential to be aware about the historical context of geographical thought (Livingstone 1992). The following chapter, then, could be seen as a small, but necessary, detour that seeks to provide context for considering the import of the approach, and will therefore outline a brief exposition of the history of geographical thought.

Chapter 4. A Brief History of Geographical Thought

'History teaches us to be humble about any claims to knowledge. [By] demonstrating that the nature of geography has always been contested and negotiated, historical awareness helps to keep the subject open to dialogue and debate' (Livingstone 1992: 3).

This chapter seeks to provide a brief exposition of the history of the geographical tradition. Partly following David Livingstone's (1992: 3) argument that, 'there are gains to be had from retrospection', the chapter serves two main purposes. Firstly, the chapter will provide historical context for positioning Actor-Network Theory's spatial conceptions within the geographical tradition. Secondly, the chapter similarly serves as a contextualisation for the theoretical framework in chapter 5. For as we will see, the work of the authors that the theoretical framework will be founded upon was precisely developed as responses to some of the problematics that accompanies some of the spatial conceptualisations that have been proposed in the past (see chapter 5). Noteworthy, since the history of the geographical tradition is too vast to cover in a single thesis such as this, the outline will provide only a partial and selective coverage of the complicated history of geographical thought.

4.1.   Geography – "A diagnostic of a living tradition"

Geographical thought has long been subject to shifting notions of how space and the spatial is to be conceived (Massey 1985). Certainly, the geographical tradition has not developed in a vacuum, and advances in, and critiques of, geographical thought has not exclusively been emerging from within the discipline. Both historically, and indeed still, geographical thought has been under influence of, and has itself influenced, other related disciplines (Gregory et al. 1985; Livingstone 1992; Cresswell 2013). This transformative relationship between the development of geography as a discipline and other related disciplines, has at times led to fierce debates of how space itself is to be conceived (Gregory et al. 1985; Livingstone 1992; Creswell 2013). Doreen Massey, for example, sums up this interrelationship as follows:

'Those in the 'discipline' of geography have for long had a difficult relation to the notion of 'space' and 'the spatial'. There has been much head-scratching, much theorising, much changing of mind. Sometimes the notion has been clasped whole-heartedly as the only claimable distinguishing

characteristic within the academic division of labour. Sometimes it has been spurned as necessarily fetishized' (Massey 1985: 9).

Perhaps, and arguably, the most notable development in geographical thought occurred with the (academic) division of geography into human geography and physical geography in the nineteenth century (Livingstone 1992; Cresswell 2013). In addition, as Derek Gregory and John Urry (1985: 1) similarly point out: 'Both human geography and sociology emerged in their modern forms in the nineteenth century and in the shadows of the natural sciences'. This particular juncture in the geographical tradition represented a major shift in the division of academic labour within the discipline (Livingstone 1992; Cresswell 2013), and partly reflected a confrontation with the naturalistic view in which 'science was typically, though not universally, regarded as knowledge derived from the empirical observation of the facts of nature' (Livingstone 1992: 12). This view has since been elaborated and subsequently scrutinised, and a multitude of distinct schools of thought has since emerged and influenced both theory and practice within human geography (Livingstone 1992; Cresswell 2013). However, the history that appears most relevant for the present work begins in the twentieth century.

In the 1960s geography, as well as many other disciplines at the time, was deeply implicated in what has since been dubbed the quantitative revolution that emerged in the 1940s, and which by 1960 had become "conventional wisdom" within geography (Gregory et al. 1985; Livingston: 1992; Cresswell 2013). Whereas geographical inquiry since the nineteenth century till the 1940s (an approach known as Regional Geography) had been occupied with providing largely descriptive accounts of regions with a focus on place, difference, synthesis and uniqueness, geography in the 1960s (known as Spatial Science) aspired for other more ambitious objectives; ones that was only deemed worthy of scientific endeavour if it embraced the general and generalizable (Gregory et al. 1985; Livingstone 1992). Tim Cresswell (2013: 79) notes on this transition from Regional Geography to the Spatial Science in its prime in the 1960s, that the aspirations for generalisability 'was behind the declaration of geography as lacking in scientific rigor'. This particular transition period is similarly elaborated by Livingstone (1992: 311), who links it to a broader division of academic labour, and notes what was an archetypical reflection at the time, that 'the claim that regional synthesis constituted geography's essential identity gave the subject a dilettantish image among the practitioners of ever more specializing sciences'. Or as Massey (1985: 10) writes: 'The old regional geography was hidden away in embarrassment and the door closed firmly on it. It was explained away as part of our own Dark Ages, whence we had now emerged on to the High Plains of truly scientific endeavour'. The outcome being that geography

in the 1960s 'set itself up as the 'the science of the spatial'' (Massey 1985: 11). A central point within Geography during the 1960s was that interaction confined in space could be explained and understood devoid of social context, which in turn lead to theorisations about "spatial laws", "spatial relationships" and "spatial processes" (Massey 1985; Smith & Katz 1993). The story is well known for those trained in historical geography (Massey 1985), and it is well beyond the scope of this thesis to fully elucidate this particular history. Nevertheless, this particular instance in the geographical tradition is noteworthy, partly because of its demarcation of a somewhat programmatic school of thought (Logical Positivism)[6] that came to dominate geographical inquiry, and partly because of the criticisms of that same school of thought that came to follow, which in turn became transformational for subsequent and contemporary geographical thought (Livingstone 1992; Cresswell 2013).

In the 1970s the proposedly "neutral" position that had been predominant in the 1960s, that space could be explained via general law like statements devoid of wider social context, became for critics indefensible (Massey 1985). Whereas space and the spatial had been used as itself explanatory in the 1960s (usually in a "quantitative guise"), the critiques of the 1970s provided a countermeasure for this position (Massey 1985). Massey (1985: 11) explained this trend in geography as, 'the bulk of the 1970s and indeed until now, has been taken up with arguing that this is an untenable position, that there are no such thing as purely spatial processes; there are only particular social processes operating over space'. Space and the spatial was for the critiques emerging in the 1970s now seen as a symptom of social processes, and space was conceived as a social construct (Gregory et al. 1985). Again, Massey (1985: 11) noted on the 1970s critique of the spatial, 'it was argued – to such an extent that it became a theme tune of the times – that the spatial is a social construct'. Also Gregory and Urry (1985: 2), writing on the interlacings of Human Geography and Sociology (and social theory more broadly) of the 1970s, noted: 'Space was seen as somehow epiphenomenal, as a 'codification' or a 'reflection' of human intentionality or social structure. This meant that any explanation of spatial organisation – in so far as one was called for at all – had to be sought within what remained a primarily aspatial or, as some commentators would prefer, 'compositional' social theory'. Furthermore they noted: 'At best, the problematic of spatial structuring was peripheral […] at worst, it was flatly condemned as an irrelevant distraction' (Gregory & Urry 1985: 2-3).

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[6] Logical Positivism is the philosophy to science that emphasises that valid (verifiable) knowledge can only be obtained from empirical facts (Livingstone 1992; Cresswell 2013).

4.1.1. Interventions from a Realist Tradition

As I have briefly attempted to outline in the above, the 1960s and 1970s provides two instances, and indeed two polar positions in the history of the geographical tradition on how space and the spatial was, and arguably for some is, conceived (Cresswell 2013). The reason for this brief outline of a particular conjuncture in the history of geography, with oppositional views on space and the spatial, is that it paved the way for a strand of realist writing from within geography in the 1980s, arguably already in the 1970s, which later will serve as a point of departure for the theoretical framework in chapter 5 (see for example Gregory et al. 1985; Smith 1990).

This strand of writing sought to open up discussions and lines of inquiry about the relationship between social relations and spatial structures, without having to, on the one hand attain to the positivist school of the 1960s or, discard the social constructivist notions of space from the 1970s on the other. For Massey (1985: 9) the message was fairly simple, 'the radical critique of the 1970s – for very understandable reasons both intellectually and political – went far too far overboard in its rejection of the importance of the spatial organisation of things, of distance and perhaps above all, of geographical differentiation'.

A similar concern over the neglect of space and the spatial, is found in the work of Neil Smith (1990; 1993; 2010). Smith (1990) recognised that issues of space and the spatial was indeed returning to social analysis, but uttered concerns over prevailing alternative understandings of space. This was however not an attempt to 'exclude alternative understandings of space' altogether (Smith 1990: 167). Rather, Smith (1990) sought to problematize a trend he found, that space was increasingly being reduced to metaphor (spatial metaphor) without realising the problematics that accompanies material space (absolute space) (see chapter 5). If closely linked to a somewhat scepticism towards the established liaison between Human Geography and Sociology and directed towards postmodernist and poststructuralist approaches that similarly had begun to emerge in 1980s, which like Actor-Network Theory stressed the rejection of grand narratives, Smith (1990: 167) wrote: 'For those trained in social and especially literary theory […] space intervenes largely as metaphor. It is not that material space ceases to exist in these discourses; rather materiality is, for them, so unproblematic (absolute space) that it raises few if any worthwhile questions'. For Smith (1990), material and metaphorical space was, however, not perceived as in a crude dualistic relationship. Rather, he understood them as mutually formative and thus inseparable. The central concern for Smith (1990) over the application of spatial metaphors was that metaphorical space was inescapably an abstraction,

and in so being, a reaffirmation of abstract space, as had been envisioned by Henri Lefebvre already in the 1970s (see chapter 5).

As such, in this realist strand of writing, we find not only a reassertion of spatial structures for lines of inquiry, which have been proposed as crucial for the analysis of geographical (spatial) differentiation (Massey 1985). Equally, we find a vantage point from where the different schools of thought that since have come to influence contemporary geographical inquiry (and those who came before) can be critically examined. Perhaps most urgently, in examining potential neglects of spatial structures and geography more broadly, which also Harvey (1985: 141) has suggested all too often has been 'a sadly neglected stepchild in all social theory'. In the same way, Massey (1985: 19; *original emphasis*) stated: 'Even while some of the more fundamental theoretical questions […] remain unresolved (or, as they may, remain forever in dispute), it is vital that we accept, and continue to insist upon, the importance of space and spatial variations in *concrete* analysis'.

4.1.2.   *From Realist Interventions to a Theoretical Framework*

Throughout this chapter, I have sought to demonstrate that the geographical tradition has co-developed, sometimes in liaisons with, and sometimes in contrast to, other disciplines. This has made for co-constitutive and co-transformational links between disciplines and opened up geography for a plethora of different schools of thought (including Actor-Network Theory) (Cresswell 2013). Similarly, this chapter has also revealed that not all lines of inquiry within geography comports to the notion that geography necessarily needs to grasp space as material (absolute), and that geography and the ways to conceive space have always been contested. However, as this brief historical outline have revealed, the realist strand of writing presents an interesting juncture in the geographical tradition, where the spatial conceptions of previously antagonistic approaches to geography has been consolidated into a more unified vantage point. It is this realist vantage point that will serve as the primary foundation for the theoretical framework of the present work, from where the spatial concepts of Actor-Network Theory can be critically engaged.

Chapter 5.   Spatial Conceptions and Dialectics

In analysing the spatial conceptualisations of Actor-Network Theory, a broader and more explicit exposition of how space and the spatial has been, and is, conceived within geography is needed in order to get a broader sense of the sometimes "lurching relationship" between social relations and spatial structures.

This chapter will present such an exposition and serve as a theoretical framework for analysing the spatial conceptions that have been proposed by some of the main proponents of Actor-Network Theory. In this chapter, I will pay particular notice to David Harvey's contributions to theorisations of space from the mid-late 2000s, but also draw on Henri Lefebvre's contributions from the early-mid 1970s. Furthermore, this chapter will pick up on the notion of spatial metaphors that was introduced in the previous chapter, primarily focusing on the works of Cindy Katz and Neil Smith from the early 1990s. As such, this chapter will provide a theoretical point of departure from where the spatial underpinnings of Actor-Network Theory can be critically examined, and their possible (theoretical and political) limitations and implications can be uncovered.

It would be mistaken, however, not to mention that most of Harvey's, Lefebvre's and Smith's work respectively revolves around close engagements with the writings of Karl Marx (see for example Harvey 2006; Lefebvre 1991 [1974]; Smith 1990; 2010). The spatial have therefore in their many respective accounts been closely related, and developed, to understand capital's history, its adaptability, causes and effects. However, I will in the following attempt, as far as possible, to put aside the connection between spatiality and the history of capital (however clear the connection is) and instead focus in a more systematic and direct manner with conceptualisations of spatiality.

5.1.   The tripartite division of absolute, relative and relational space

This subchapter will serve as a theoretical reference point for the remaining work. The subchapter builds primarily on Harvey (2006; 2008; 2009), and his work on the tripartite division of space - that space can be viewed as both absolute, relative and relational. These distinct views on space will be outlined in the following. Furthermore, these spatial conceptions will be positioned and related to the different periods in the geographical tradition (chapter 4) where they were predominant means of inquiry. Noteworthy, also Harvey's proposal of the tripartite division of absolute, relative and relational space was a way to retrospectively work through some of the distinctive spatial conceptions

that have been proposed in the past, for eventually developing a more all-encompassing framework to understand these conceptions (Harvey 2006; 2008; 2009). In the end of the subchapter, a consideration of how to benefit from understanding absolute, relative and relational space through dialectics will be offered.

5.1.1.   Absolute Space and Time

Absolute space is fixed. It is material and physical and often conceived as an immovable pre-existing grid that is open to standardised measurement and calculation (Harvey 2006; 2008; 2009). As such, absolute space represents a three-dimensional geometrical form (Euclidean space) and is a space that is closely associated with cartography (mapping) and navigation (Larsen 2011). In absolute space, distance and localities but also time is conceived as absolute, and is perhaps the sort of spatial conception that geography is most often associated with outside the discipline (Larsen 2011). Absolute space, then, is a three-dimensional space that, as a result of the conception as pre-existing and fixed, contains all discrete objects and bounded phenomena, including persons (Harvey 2006). From a perspective of social analysis, absolute space can be exemplified by private property and other 'bounded territorial designations (such as states, administrative units, city plans and urban grids)' (Harvey 2006: 271). However, although the seemingly easily graspable concept of absolute space immediately seems unproblematic, it is not necessarily so. Henrik G. Larsen (2011), tracing the tripartite division of space to historical contexts of geopolitical theory, notes that with a purely absolute conception of space lies an overarching danger of geographical determinism: 'Seen with geographical eyes, it is a fundamental problem that an absolute conception of space all too easily turns into geographical determinism: geographical factors like distance, localisation and dissemination gets independent explanatory power' (Larsen 2011: 47; *translated*). Here, Larsen (2011) links the absolute conception of space to geopolitical theory, especially within Regional Geography in the 1930s and 1940s, but also preceding geographical thought in late nineteenth century geopolitical theory.

5.1.2.   Relative Space-time

Relative space is most often conceived as absolute space imbued with time (Harvey 2006; 2009; 2008). But more generally, relative space is expressed as absolute space relative to something/anything else. As such, a relative conception of space would typically also conceive

absolute space as relative to costs/expenses. In other words, it makes sense to speak of relative distance (Larsen 2011). The relative conception of space, then, 'is pre-eminently the space of *process and of motion*' (Harvey 2008: 100; *original emphasis*).

Whereas the absolute conception of space is a three-dimensional geometric form, the relative conception of space is related to non-Euclidean geometry (Harvey 2006; 2008; 2009). Space is thereby relative in the sense that there exit multiple geometries, and that the spatial frame is dependent on how and what is being relativized, and equally by whom it is being relativized (the frame of reference) (Harvey 2006). In a relative conception of space Harvey (2006: 272) notes: 'It is impossible to understand space independent of time under this formulation and this mandates an important shift of language from space and time to space-time or spatio-temporality'. For the study of space, the relative notion then shifts from the absolute, although still categorically closely connected to it. Whereas examples of absolute space could be that of private property, relative space is perhaps better exemplified by different transportation forms or other topological relations (Harvey 2006). As such, the relative conception of space infers that differentiation can be measured between localities relative to, for example, cost or time (Harvey 2006; 2009). The relative conception of space therefore still renders space open to calculation, yet through different methods from those used in the conception of absolute space (Harvey 2006; 2009).

In relation to (historical) geographical thought, Larsen (2011) linked the relative conception of space to be of particular interest in the 1960s Positivist Geography, and especially for economically-oriented geographers. As mentioned in the introduction, the search for general law-like statements about space in the 1960s (spatial processes, spatial relationships and so on) often attained to this relative notion of space. Indeed still, the application of the relative concept of space is numerous, and gains convenience in many different contexts, such as planning, logistics and technological development in general (Larsen 2011). As such, the relative conception of space upholds a somewhat connection to societal dynamics, but as Larsen (2011) asserts - partly because relative space can to some degree be seen as an extension of absolute space - a danger of geographical determinism is similarly lurking in a purely relative conception of space. Connecting this to the historical outline in chapter 4, it was partly this objection that led some geographers in the 1970s to dissociate themselves from the programmatic positivist school (Spatial Science) in its prime in the 1960s - space, it was objected, was instead to be seen as a social construct (Massey 1985).

5.1.3.   Relational Spacetime

As an objection to absolute and relative notions of space, the relational conception of space was developed in the 1970s (Larsen 2011). Relational space, however, is not directly associated with geometrical form. In a relational conception of space, space and time is internal to processes and does not exist independent from process or matter (Harvey; 2006; 2008; 2009). As such, processes defines their own spatial frames, and as Harvey (2009: 137) has put it: 'In the relational view, matter and processes do not exist in spacetime or even affect it (as in the case of relative space-time). Space and time are internalized within matter and process'. This entails that in the relational notion of space, geography cannot be decoupled from historical or societal conditions, as would easily be the case in a purely absolute conception (Larsen 2011). Instead, space and time is understood as in relation to, and internalised within, both social, historical and geographical contexts (Larsen 2011). This relation or interconnectedness as conceptualised within relational space, renders any immediate understanding of time or space in isolation meaningless. A clarification is perhaps better given by Harvey (2006: 273-274) who explains that, 'as in the case of relative space, it is impossible to disentangle space from time. We must therefore focus on the relationality of space-time rather than of space in isolation. The relational notion of space-time implies the idea of internal relations; external influences get internalized in specific processes or things through time […] An event or a thing at a point in space cannot be understood by appeal to what exists only at that point. It depends upon everything else going on around it'. As such, standardised calculation, measurement and quantification becomes challenging in the relational conception of space because a variety of influences (from both past, present and future), that in strict absolute terms otherwise would be considered unrelated, gets internalised into matter and process and congeal in a particular point in both space and time (Harvey 2006; 2009; 2008). As such, '[i]ndividuation and identity become indistinct and immaterial even though objective' (Harvey 2008: 102). In other words, as Harvey (2006: 274) similarly asserts: 'In a way, relational conceptions of space-time bring us to the point where mathematics, poetry and music converge if not merge. And that, from a scientific (as opposed to aesthetic) viewpoint, is anathema to those of a positivist or crudely materialist bent'. In the relational view space and time is thereby understood in consideration to, and as a merging of, immaterial aspects, such as collective memories and emotions with otherwise discrete and material objects (Harvey 2006). 'Relationality is therefore in the first instance about events and phenomena that are immaterial (like collective memories) but objective.' (Harvey 2008: 102).

For Harvey (2008: 103), a relational conception of space should appeal to geographers, precisely because, 'there are certain topics, such as the political role of collective memories in urban processes, that can only be approached in this way'. The relational view on space, then, becomes crucial in providing a conceptual entrance to understanding that space is highly susceptible to political interventions. Some aspects of the spatial can then only be understood in relational terms. In a relational conception of space, then, there is an engrained aspect of seeking to accommodate the problematics of geographical determinism that is lurking within strict absolute and relative notions of space (Larsen 2011). In addition, Larsen (2011: 48; *translated*) has argued: 'Geography is important, but geographical conditions [should be] seen as fundamentally embedded in a history of political struggles of the shaping of the concrete (material) as well as the abstract (discursive) world'. Linking this to the historical exposition of geographical thought provided in chapter 4, it was partly this aspect (problematics concerning geographical determination) that made some geographers in the 1970s to the assertion that space verily was a social construct (Massey 1985).

5.1.4.   *Spatial Conceptions in Dialectical Tension*

The above provides an exposition of three ways of conceptualising space. Throughout this exposition it should have become evident, that the different conceptualisations provides quite distinct ways of viewing space, and thus analysis that attain to either one of these conceptions (absolute, relative or relational space), will come to quite different conclusions than by the application of another. However, while it could immediately seem appealing to turn to only one of these conceptualisations in the study of space (the history of the geographical tradition provides numerous examples where such accounts have provided the basis of explanation - see chapter 4), the import of a one-sided conceptualisation might prove limiting in what analyses can provide in understanding processes and relations as they are unfolding or have unfolded within a spatio-temporal frame. In this regard, Harvey (2006; 2008) argues that perhaps the best way of understanding such relations is to keep each spatial conceptualisation in dialectical tension: 'It is, I want to suggest, the dialectical relation between the categories that really counts, even though it is useful for purposes of understanding to crystallize each element out as distinctive moments to the experience of space and time' (Harvey 2006: 280).

Dialectics, or dialectical thinking, has its roots in philosophy, and is by no means a concept that holds significant consensus upon its nature (Ollman et al. 2008). However, I do not wish to go into the deeper philosophical debates concerning dialectical thinking. A simple definition will have to suffice.

Dialectics can be defined as a way of thinking, where a whole ("the truth/reality") can be obtained by putting together one-sided accounts (opposed positions) of partial truths. This means that otherwise 'previously antagonistic positions are reconciled within a higher-order framework' (Ollman et al. 2008: 3), which by reconciliation composes a more complete understanding of a complex reality. Thus, dialectical thinking helps to comprehend and investigate (and equally theorise) diverse relations and processes as they unfold (Ollman et al. 2008).

For the tripartite division of space, dialectical tension, then, implies that either one conception can provide a partial truth, that if reconciled, reveals a "higher-order framework" from where social relations and spatial structures, and the interconnections between, can be understood and investigated. In regards to Harvey's work, this has resulted in complex analyses of the history of capital, especially in relation to its consequential relationship with the spatial (for an overview of Harvey's work, see Harvey 2016).

By regarding the tripartite division of space in a dialectical relationship, then, means that either one conception cannot take precedence. Instead, when in dialectical tension, each conception helps in the investigation of how structures, processes and relations, are both constitutive, consequential and thus malleable and dynamic. As such, Harvey (2006; 2008) argues, it might be impossible to ontologically answer the question of whether space is then absolute, relative or relational. Instead, he has explained as follows:

'Space is neither absolute, relative or relational in itself, but it can become one or all simultaneously depending on the circumstances. 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 different conceptualizations of space?''
(Harvey 2006 [1979]: 275).

In conclusion, the tripartite division of space does not only provide an account of how space and the spatial historically has been conceived; hence the reason why I have here connected the absolute, relative and relational conceptions of space to the development of the geographical tradition outlined in chapter 4. Equally, it provides a basis for, when held in dialectical tension, a fundamental understanding of how space and the spatial is crucial in understanding the processes and dynamics that unfolds around us. Hence, each spatial conceptualisation, when thought of dialectically, expands

and deepens our analyses of geography. As such, Harvey (2006: 292) reassures: 'The more we move [dialectically between the tripartite division of space] the greater the depth and range of our understandings. There are no discrete and closed boxes in this system. The dialectical tensions must not only be kept intact. They must be continuously expanded.'

However, there is another aspect that is fundamental to the understanding of spatiality. Namely, how space both in an abstract sense and in a concrete sense is produced. This aspect of space (its production) is extensively explored and elaborated by Lefebvre (1991 [1974]; 2012 [1970]). It is to his work we will now turn.

5.2.   The triad of space

'Is space indeed a medium? A milieu? An intermediary? It is doubtless all of these, but its role is less and less neutral, more and more active, both as instrument and as goal, as means and as end. Confining it to so narrow a category as that of 'medium' is consequently woefully inadequate'

(Lefebvre 1991 [1974]: 411).

The following seeks to provide a brief outline of some of the most central concepts and general theoretical contributions to the study of space that Lefebvre (1991 [1974]) put forth in *The Production of Space.* As such, this subchapter seeks to provide some theoretical considerations of the complexity of spatial relations, which in turn will be used to position and problematize the spatial conceptualisations that have been proposed by some of the main proponents of Actor-Network Theory.

However, it seems worth recognising that this brief exposition cannot fully do just to the detail or the entirety of Lefebvre's contributions to the study of space. Therefore, it is with a sense of caution (and a general fear of over-simplification) that this brief outline will be provided. Sadly, the contributions that derives from Lefebvre's longstanding engagements with questions concerning space is both beyond the scope of the present work to fully elucidate and too vast to cover in a thesis such as this.

Noteworthy, as also Harvey (1991) has emphasised in the afterword to the 1991 edition of *The Production of Space*, the work can be seen as the culmination of a longstanding engagement for Lefebvre with questions concerning space and the spatial. Four years earlier, Lefebvre's (2012

[1970]) *The Urban Revolution* was published. Arguably, also here, although in somewhat more rigid theoretical formulations, had the relation between social relations and spatial structures been voiced. But whereas in *The Urban Revolution,* Lefebvre sought to open a more dynamic understanding of how to conceptualise processes of urbanisation and space (Schmid 2012), *The Production of Space* was a more direct theoretical engagement with space and its production.

5.2.1.   The Production of Space

In *The Production of Space*, Lefebvre (1991 [1974]) uttered concerns over what he regarded as inadequate explanations, both within the natural sciences and the social sciences to understand the nature of space and the problematics that accompanies it. For Lefebvre, an "abyss" between, on the one hand, the logico-mathematical sciences, and on the other, the philosophico-epistemological sciences had caused a theoretical impasse that was unable to cope with, or provide, any adequate basis for comprehending space (Lefebvre 1991 [1974]).

For Lefebvre, the mathematical perspective on space, emphasising a Euclidean order of things in space (a "dead neutral space", that of an indifferent medium), which prevailed in the natural sciences was insufficient in explaining social or mental aspects of spatiality. Conversely, Lefebvre criticised contemporaneous philosophical positions for reducing the spatial to an epistemological question of something as a "mental thing", that in and of itself could envelop both the physical and the social (Lefebvre 1991 [1974]). As such, Lefebvre argued: 'The quasi-logical presupposition of an identity between mental space (the space of the philosophers and epistemologists) and real space creates an abyss between the mental sphere on the one side and the physical and social spheres on the other'. (Lefebvre 1991 [1974]: 6). In a more polemical fashion, commenting on the inadequacy of such explanations, he asserted: 'The pre-existence of an objective, neutral and empty space is simply taken as read, and only the space of speech (and writing) is dealt with as something that must be created. These assumptions obviously cannot become the basis for an adequate account of social/spatial practice. They apply only to an imaginary society, an ideal type or model of society which this ideology dreams up and then arbitrarily identifies with 'real' societies' (Lefebvre 1991 [1974]: 36). Correspondingly, as both Harvey (1991) and Mark Gottdiener (1993) similarly have noted, engaging with *The Production of Space*, the problem with this distinction and the modes of inquiry it entails, is that it fails to consider the dialectical relationship of space between the material and the abstract. Or as Gottdiener (1993: 130) more directly has put it, '[Lefebvre identified that] space was both a

material product of social relations (the concrete) and a manifestation of relations, a relation itself (the abstract)'.

For Lefebvre (1991 [1974]), this concern resulted in the proposition that space had to be conceptualised in such a way that it could comprehend both the physical, mental and social aspects of space, and integrate the complex mutually formative relations between the three. As such, Lefebvre (1991 [1974]) proposed that this could be viewed as triple division of space that is physical in the sense that it can be *perceived* (semiotically or sensed), *conceived* (conceptually and theoretically) and *lived* (through the interaction of people's everyday lives). In addition, as also Gottdiener (1993) has noted, it then becomes meaningless to speak of social relations without also referring to spatial relations.

For Lefebvre (1991 [1974]), this implied that the relationship was only to be adequately comprehended within a single unitary theory, that could capture the notion that space in all regards is a product. As such, he proposed *the triad of space*; a spatially conceptualised extension of the triple conception of the perceived, conceived and lived. The triad of space is represented as, *spatial practice* (perceived space) that is external, material and concrete. *Representations of space* (conceived space) that is conceptualised and theoretically expressed space - used to direct spatial practice. And *spaces of representation* (lived space), spaces that are lived through the everyday interaction of people (Lefebvre 1991 [1974]). Just as the case with the tripartite division of absolute, relative and relational space, Lefebvre similarly evokes the importance of keeping these three conceptions in dialectical tension. For Lefebvre (1991 [1974]), it is the dialectic relationship that is the ultimate key for understanding the production of space.

5.2.2.   *From Absolute Space to Concrete Space*

In an attempt to put this dialectical relationship in a more blunt manner, the interrelationship of the concepts within the triad of space can be concretised and exemplified as follows:

Representations of space, be it a planning document (e.g. local plan) or a political strategy, perhaps in its initial stages when it is still just an abstract idea on a piece of paper (conceived), can then be carried out and thus materialise in the physical sense, perhaps as the building of an apartment block as a part of an urban renewal project. The plan or strategy (initially abstract) then materialises, and becomes a spatial practice, which can be perceived in its physical form. The physical form, no longer

an abstract model, but instead manifested and materialised (built), then affects spaces of representation (the realm of the lived and experienced). Abstract space thus becomes concrete, and a given space is simultaneously represented in all three dimensions of space; physically, socially and mentally.

In conclusion, *The Production of Space* provides a theoretical framework for understanding the complex relations between social relations and spatial structures. As for Lefebvre (1991 [1974]), the project seems quite clear. It was an attempt to overcome the "abyss" he identified between the logico-mathematical sciences on the one hand, and the philosophico-epistemological sciences on the other. A relationship he regarded as the root cause to inadequate theoretical explanations over questions concerning space. Explanations of spatiality for Lefebvre (1991 [1974]) instead had to be founded upon the integration of the physical, social and mental into a single unitary theory. Commenting on what he regarded as the contemporaneous philosophico-epistemological sciences fallacy – the reduction of space to that of a "mental thing" - Lefebvre (1991[1974]: 230; *original emphasis*) stressed: 'Knowledge falls into a trap when it makes representations of space the basis for the study of 'life', for in doing so it reduces lived experience. The *object* of knowledge is, precisely, the fragmented and uncertain connection between elaborated representations of space on the one hand and representational spaces (along with their underpinnings) on the other; and this 'object' implies (and explains) a *subject* – that subject in whom lived, perceived and conceived (known) come together within a spatial practice'.

In addition, as the above quotation displays, the project is also acutely political. It is here Lefebvre's insistence of a life and the lived, as the most prominent pursuit both politically and intellectually, that renders it political (see also Harvey 1991). This becomes especially clear when the triad of space is applied to concrete analysis of relations of power (Gottdiener 1993). For whereas representations of space, most often, is a praxis only applicable for intervention or execution in a spatial practice from privileged positions by (state) authorities or otherwise powerful institutions, spaces of representation is then subject to differentiation, uneven development unavoidable (Lefebvre 1991 [1974]; Smith 2010).

5.3.   Spatial metaphors

'The breath of interest in space is matched by the breath of spatial concepts newly in vogue. In social theory and literary criticism, spatial metaphors have become a predominant means by which social life is understood. 'Theoretical spaces' have been 'explored', 'mapped', 'charted', 'contested', 'colonised', 'decolonised', and everyone seems to be 'traveling'. But, perhaps surprisingly, there has been little, if any, attempt to examine the different implications of material and metaphorical space.' (Katz & Smith 1993: 68).

So far, this chapter have sought to cover how space can be, and historically has been conceived within different approaches to the geographical tradition, and what potential dangers such conceptions upholds in the tripartite division of absolute, relative and relational space. In addition, the dialectical relationship between the tripartite division of space has also been explored. This chapter has also included a section of the abstract and concrete dimensions of space, and how space can be conceptualised within the triad of space. However, there is an aspect of the spatial that so far only has been dealt with somewhat sporadically in the previous sections of this chapter, namely, the potential dangers that lurks in the application of spatial metaphors. As indicated in the introduction, Corpataux and Crevoisier (2016) has pointed towards a metaphorical conception of space within Actor-Network Theory. This section, then, seeks to clarify the meaning of metaphor and what it implies for the study of space. This can then be seen as a conceptual exposition, which will assist in the subsequent analysis of the spatial conceptions of Actor-Network Theory.

5.3.1.   Meaning through Metaphor

Spatial metaphors have on more than one occasion, been taken up as an aspect within geographical thought worth of more explicit examination. Not only because of the potential dangers that accompanies them (practically and theoretically) but also because of the strengths they pertain in generating new systems of meaning (Harrison & Livingstone 1981). As an example, Richard Harrison and David Livingstone (1981) have emphasised how metaphors in general is an inevitable means in developing theory, both in generating new models, new lines of thought, and more generally, in assisting in constituting meaning of the world (Harrison & Livingstone 1981).

However, although Livingstone and Harrison (1981) evoked metaphor as an inescapable and indeed fundamental revelatory aspect of human thought (and geographical thought), they also uttered a measure of caution of an unreflected application. As such, they came to the conclusion: 'Since metaphorical usage is inescapable, it must be more explicitly articulated. Since it has explanatory value, it must be consciously encouraged' (Harrison & Livingstone 1981: 106). In addition, they stated, 'a prohibition against their use would be a wilful and harmful restriction upon our powers of inquiry' (Harrison & Livingstone 1981: 98).

However, while Harrison and Livingstone (1981) provides an account and a reaffirmation of metaphor as a commendable pursuit within geographical thought, others have been more critical towards metaphorization, here especially in relation to the limits of explanation it implies for the study of space. This aspect of metaphor has been more widely covered by Neil Smith in a series of writings in the early 1990s, whereof one was co-authored with Cindy Katz (1993), whose engagements with spatial metaphors similarly resounds cautionary remarks on an unreflected application. It is to Smith's (1990; 1993) and Katz's and Smith's (1993) engagements we will now turn. Yet, it is noteworthy, that similar to Harrison's and Livingstone's (1981) account of metaphors, Katz and Smith (1993: 68) also asserted: 'Metaphor is inseparable from the generation of meaning, from language and thought. Any project to abolish metaphor is not only doomed to failure but is, literally, absurd'. However, before venturing into the debates that have come to surround the notion of spatial metaphor, a general clarification of metaphor and how it connects to the spatial is necessary.

For Katz and Smith (1993), the fundamental explanation of a metaphor, is that it 'works by invoking one meaning system to explain or clarify another' (Katz & Smith 1993: 69). A similar explanation is found in Harrison & Livingstone (1981: 98), were metaphor is taken as, 'a novel configuration [that] has been produced by the juxtaposition of two frames of reference of which the reader must be simultaneously aware' (Ian Barbour 1974 cited in Harrison & Livingstone 1981: 98). A metaphor is thereby a way of attributing meaning to an object, by describing it in the attributes (the terms) of another. As such, there is a distinction between a *source domain*, from where the explanatory attributes originates, and a *target domain* to which the explanatory attributes applies (Katz & Smith 1993). At the immediate level, a metaphor is then a rhetorical exercise that serves to clarify, or otherwise create discourse, of a certain object or phenomena. For Harrison and Livingstone (1981), the immediate strength of a metaphor, is that metaphors attains a certain categorical "open-endedness", which by virtue makes for new dynamic interpretations of the object it seeks to describe. This then makes for "fertile grounds" (metaphorically speaking) of generating new theories, new

conceptualisations and new categories of meaning of that object. As such, for Harrison and Livingstone (1981), a metaphor can then enhance the development of theory, because it suggests a hypothesis about the object, which in turn can be examined.

Harrison and Livingstone (1981) educed the metaphors "concrete jungle" and "city wilderness" as examples of metaphors that seeks to portray the same object (the city/urban structure), but at the same time are antithetical. "Concrete jungle", they explained, evokes an image of the urban as claustrophobic and a place of struggle, whereas "city wilderness" evokes the images of isolation or bareness (Harrison and Livingstone 1981). So whereas the object of study, the target domain (the city/the urban) remains the same, the psychological underpinnings of the metaphors, the source domains (jungle and wilderness) suggests opposing interpretations of the object. For Harrison and Livingstone (1981), these metaphors, then, opens up the urban to be examined with new hypotheses. However, a measure of caution is advised here, because the objective reality of the target domain (the city/urban structure) ultimately loses imperative to the psychological import of the source domains (jungle and wilderness). As such, each metaphor then organise entirely different conceptions of the same object. So at the same time as metaphors can advance the development of new theories by suggesting new hypotheses for investigation, they similarly holds a sense of obscurity towards the objects they seek to portray. Or as Andrew Sayer (1995: 102), more pragmatically, has put it: 'There is no objection in principle to metaphors in science, indeed they are indispensable, but there are some which are fanciful rather than the best available representation of their objects'.

5.3.2. *The Pitfalls of an Unreflected Application of Spatial Metaphors*

Whereas Harrison's and Livingstone's (1981) account focused on explaining metaphor as a way to give meaning to the world, Smith's (1990, 1993) and later Katz's and Smith's (1993) accounts pay more interest towards the potential dangers that lurks in the application of metaphors for geographical inquiry (spatial metaphors), drawing a distinction to be made between material space and metaphorical space. For Katz and Smith (1993: 68) the message was simple: 'The lack of enquiry concerning the implications of spatial metaphors suggests an undifferentiated fusion of material and metaphorical space, and it is this false unity that we seek to open up and aerate, however cautiously'. Three years earlier, in the 1990 afterword to *Uneven Development,* Smith had similarly expressed a more outspoken critique of the unreflected application of spatial metaphors, recognising that space had again risen to the foreground in social theory. Here Smith (1990: 169), commenting on the aspect

of obscurity in metaphors, stated: 'Metaphor is inherently juxtapositional; it reveals one truth by asserting it as another', and linked the application of metaphors to be especially popular within postmodernist and poststructuralist approaches (Smith 1990 1993; Katz & Smith 1993).

A spatial metaphor is a metaphor that describes an object by reference to space (Katz and Smith 1993). The examples Smith and Katz (1993) educed where, among other, "(multi)-positionality", "subject position" and "social location". All these concepts refers to space by geographical designations such as position or location, but have little geographical import, and tend to focus on social relations without reference to spatial relations (Katz & Smith 1993). The appeal for turning to such spatial metaphors, Katz and Smith (1993) explained, is that the spatial (the geographical) succeeds in adding an aspect of fixity, concreteness or order, to what might otherwise seem like a "chaotic mélange" in the differences and variances that make up social relations. Or as Katz and Smith (1993: 80) has put it: 'The widespread appeal to spatial metaphors, in fact, appears to result from a radical questioning of all else, a decentering and destabilization of previously fixed realities and assumptions; space is largely exempted from such sceptical scrutiny precisely so it can be held constant to provide some semblance of order for an otherwise floating world of ideas'. The problem, however, lies within, as Smith (1990; 1993) and Katz and Smith (1993) observed, that all too often spatial metaphors are 'carried forward without critical qualification' (Katz & Smith 1993: 72) and clings to a static conception of space, which as a result, all too 'often embody an unintended political conception' (Katz and Smith 1993: 68).

In principle, however, there is nothing wrong with spatial metaphors; they are inherent to both language and meaning. The problem appears that the conception of space that underpins spatial metaphors, according to Katz and Smith (1993), upholds that space is neutral in form, consequently rendering its production unexamined, as they stressed: 'Spatial metaphors are problematic in so far as they presume that space is not. And they are problematic in political as much as philosophical terms.' (Katz & Smith 1993: 75). However, this neutrality is only neutral insofar as the production of space is not considered. The belief that space is neutral, as Katz and Smith (1993: 76) emphasizes, drawing on Lefebvre, 'is a conception of space appropriate for a project of social domination'.

As such, spatial metaphors may then contain unintended political implications. Smith (1993) for example, connected the problematic of spatial metaphors in relation to political appropriations of scale (global to local), and the production scale. Here he evoked the politics of scale as one aspect that would suffer from such conceptualisation (spatial metaphors), since scale is central in both

delineating geographical differences (in absolute space), but also because scale can be used as a mean for constructing difference and ultimately produce uneven development (Smith 1993a). Again, the production of space and scale is crucial, but also who commands such spaces and scales. In this sense Smith (1990: 173) asserted: 'Geographical scale is political precisely because it is the technology according to which events and people are, quite literally, 'contained in space''.

Nevertheless, as for spatial metaphors, there is a tendency of naturalization of space inherent within them. As such, spatial metaphors come to possess the character of a somewhat free-floating abstraction that fails to recognize that space is a product, and the means of how it is produced. Spatial Metaphors, then, has no reference to their material results, and as such, they maintain an unawareness of the spatial politics that produces space (Katz & Smith 1993). The paradoxical problematic being that, as Katz and Smith (1993: 79) has put it: 'The unexamined silences of spatial metaphors, then, may covertly constrain the formation of the very political alliances and possibilities they seem to invoke'.

This in turn, then, implies that whereas the source domain (the psychological underpinnings) in a spatial metaphor often excellences in problematizing and expressing the relationality of highly complex relations between social agents and institutions – be it mundane practices of everyday life, or relations of powerful institutions (economic, political or juridical) – spatial metaphors fails to acknowledge that social agents and institutions are itself active in the producing of space (Smith 1990; 1993; Katz & Smith 1993). As such, Katz and Smith (1993) found it paradoxical, that whereas spatial metaphors often succeeds in capturing the complex and dynamic relationships of social life, they do so on the basis of a perceived neutrality of an underlying static spatial structure, that in the end fails to recognize the co-transformational relationship between social relations and spatial structures (consider for example the triad of space), and as a result, space and its production is rendered unproblematic. As such, Katz and Smith (1993) argued, that if spatial metaphors is to uphold any theoretical significance, they have to go beyond the one-dimensionality that hitherto accompanies them, and be able to both, 'maintain the relationality of social identity, without slipping into a formless relativism, and at the same time disarrange the received fixity of social *and* geographical location' (Katz and Smith 1993: 77). The most crucial concern over the application of spatial metaphors, however, is perhaps best expressed by Smith (1990: 177) when he stressed: 'The subversiveness of space is too precious to be sacrificed blindly in this way; the solution to multi-positionality must be sought in a more directly political fashion rather than smuggled in as

unexamined metaphor among the dead. From the most popular to the most philosophical discourse, then, the struggle for space is acutely political. The stakes are anything but academic.'

5.3.3.   *The Troubled Past of Spatial Metaphors*

Whereas contemporary spatial metaphors such as "social position" have a political dimension that at first glance seems laudable, the theoretical outworkings of spatial metaphors have in the past had horrific outcomes, leading to the most tragic of events when acted upon politically. As Harvey (2017: para. 9) has recently put it: 'Metaphors and analogies […] are helpful, but only up to a point. Pushed beyond their limits, they can become misleading if not dangerous. It is one thing, for example, to regard the state organically and quite another to see it as an actual organism craving and requiring living space to survive (as became the case in German Nazi geopolitics with its emphasis on lebensraum)'. Or as Smith (1990: 177) reassuringly reminds us that, 'the revival of space in social theory is hardly unproblematic, then. It involves basic political oppositions over who controls geographical knowledge, who uses it and how, and how it is produced and for whom'.

In conclusion, it seems appropriate to round up this section with some cautionary remarks. For although spatial metaphors enhances our understandings of the world, indeed they may be indispensable, they also obscure it. They cling to a conception of a neutral space, rendering its production unexamined, even unproblematic. The practical outworkings of such conceptualizations (spatial metaphors) may have, then, both unintended and terrible outcomes, if simply taken as read, without auxiliary critical reflection.

5.4.   An inquiry into the spatialities Actor-Network Theory

Throughout this chapter, it should have become evident that the ways in which we chose to conceptualise space can have both theoretical and political implications. Our conceptualisations of space, then, is by no means inconsequential. As such, having explicated the problematics that accompanies certain spatial conceptualisations will then serve as a theoretical framework from where the spatial conceptions that underpins Actor-Network Theory can be critically examined. For as the main proponents of Actor-Network Theory have striven to link the approach's distinctive thought system to geographical lines of inquiry, some extraordinary claims and views on space have been presented.

Chapter 6.   The Spatial Conceptions of Actor-Network Theory

This chapter seeks to provide a systematic examination of the spatial conceptions that have been proposed as the main proponents of Actor-Network Theory since its introduction in the mid-1980s have sought to develop a spatial vocabulary of their own, purported to radically shift our view on space and the spatial (Murdoch 2006; Bosco 2014). This examination will be accomplished by analysing the argumentations and particular lines of reasoning of four of the main proponents and central figures within the approach, which are all frequent referents in the literature and have been fairly insisting in suggesting this alleged radical shift in geographical thought. The selected proponents are Bruno Latour, Jonathan Murdoch, Annemarie Mol and John Law.

In order to systematically assess what the import of Actor-Network Theory entails for geography, this chapter will similarly seek to collect and exposit some of the, seemingly few and somewhat sporadic, assessments that have come to question the approach's spatial underpinnings. On occasion, some of these assessments have been responded to by the main proponents, which in turn have led to the development of new conceptions of space, which have been added to the emergent spatial vocabulary of Actor-Network Theory.

This chapter, then, seeks to provide a systematic examination and an inventory of the spatial conceptions of the approach, and accordingly follow the developments of the selected four main proponents' argumentations regarding their view on space and the spatial. The progression of the analysis will be divided into three subchapters, starting with an analysis of Bruno Latour's view on space, followed by an analysis of Jonathan Murdoch's contributions to geographical thought, and lastly, Annemarie Mol's and John Law's conceptions of the spatial will be examined.

6.1.   A Latourian perspective on geography

Bruno Latour is professor of philosophy and anthropology at the Paris Institute of Political Studies. Latour has been one of the core proponents of Actor-Network Theory since its emergence in the mid-1980s, and has been a leading figure in proposing the notion of agency among things, reclassifying the meaning of the word actor altogether (see for example Latour 1987). Furthermore, he proposes to combine the newly found concept of actor with network as way to conceive agency as the redistributed effect of heterogeneous actors coming together to form actor-networks (Latour 1996). Notably however, the very notion of actor-network was proposed, not as a substitute for what Latour

considered a methodological shortcoming within social theory, but as a way to overturn conventional social theory altogether. As such, Latour (2010: 796) asserts, 'for about 30 years now, I have found in the notion of network a powerful way of rephrasing basic issues of social theory, epistemology and philosophy'. And as he elatedly has claimed: 'Thanks to the notion of networks, universality is now fully localizable' (Latour 2010: 802).

Ever since the emergence of Actor-Network Theory, Latour (1987) has disputed the conceptualisation of space as absolute. For Latour, the general notion that space and time could exist independently - conceptualised as an unwavering and overarching frame of reference where all discrete objects and phenomena occurs and resides - is fundamentally rejected (Latour 1987; 1996). From this vantage point, Latour has uttered the concern that such a conceptualisation is, in effect, the main hindrance for reaching a relational understanding of space. Perhaps not surprisingly, then, what Latour suggests is to conceptualise space and time as the effect of how actor-networks emerge (Latour 1987). As an alternative, Latour has emphasised how actor-networks, in effect, produces different times and different spaces, and that spaces (in the plural) are in all regards constructed locally. Or as he has put it: 'It seems strange at first to claim that space and time may be constructed locally, but these are the most common of all constructions. Space is constituted by reversible and time by irreversible displacements. Since everything depends on having elements displaced each invention of a new immutable mobile is going to trace a different space-time' (Latour 1987: 230). Latour argues that it is not a matter of being contained or to live "inside" space, rather space (or spaces) is something that comes about, is semiotically enacted and is generated exclusively as actor-networks emerge and disperse. It is a matter of constructing novel and diverse space-times (Latour 1987; 1996).

As Latour (1987; 1996; 2009; 2010) has engaged in the debates concerning space and the spatial, he has more recently made overtures towards a new spatial representation of actor-networks (Latour 2010). For Latour (2010), the way in which networks are represented (visually) has created a limitation for understanding their dynamic formations, innately interwoven in a vast sea of evermore, materially conditioned actor-networks, continuously expanding and contracting (Latour 2010). 'Visually', Latour (2010: 800) writes, 'there is something deeply wrong in the way we represent networks, since we are never able to use them to draw enclosed and habitable spaces and envelopes'. In this regard, he asks us to view actor-networks in the form of spheres, linking it to the art-installations of Tomas Saraceno (For a visualization of Tomas Saraceno's spheres see Latour 2010: 800-801). Latour then proposes to view networks as complex formations where agency is a distributed effect of actors forming networks, which on an aggregate level envelops all global phenomena,

however, not as an absolute "outside" global space, but as formations of only "insides" (Latour 2009; 20010). 'The great paradox of our two enterprises is that spheres and networks are ways first to localize the global so as, in a second move, to provide more space in the end than the mythical "outside" that had been devised by the nature-and-society mythology' (Latour 2009: 141).

It is within these formations (networks and spheres) that Latour suggests, that the conventional dualism between the individual and the notion of society is wholly broken down, and argues, 'we are now faced with the multiple and fully reversible combinations of highly complex individual constituents and multiple and fully reversible aggregates' (Latour 2010: 804-805). Any absolute conception of space, Latour (2009: 141) suggests, is an intoxicating manipulation of geometric form and ultimately due to 'the confusion of space with paper'. For Latour, nothing is absolute; especially space. Rather than conceiving a space in which material objects (humans and nonhumans) resides and navigates, we should understand space as a relational concept and represent it as spherical formations, where actor-networks serves as spatial fabricators (Latour 2009; 2010). 'It is such a mimetic description of the world that the whole real world of living organisms should migrate out of the *res extensa*, now construed as "space," as the only thing that really stands' (Latour 2009: 142). For Latour (2009: 144): 'The disappearance of the outside is certainly the defining trait of our epoch'.

6.1.1.   Spherical Network Formations – A Representation of Space

To conclude, Latour's conception of space is wholly relational; there is no "outside", only "insides". As actor-networks emerge, they create novel and diverse space-times and affects each other's internal spatial arrangements when they interact. In this sense, we can view the notion of actor-networks as an articulation of a mutable material interconnection between spatial practices and representational spaces, discursively informed by diverse and local representations of space. However, Latour's engagements with the spatial does not stop there. As such, he proposes to view actor-networks as spherical formations, thereby employing a somewhat arbitrary representation of space (conceived space), with analogy to the art-installation by Tomas Saraceno (Latour 2010). In this way, spheres become a metaphor for understanding the fluctuating spatial textures of actor-networks.

Latour's intention might appear laudable at first glance – breaking down culture-nature and individual-society dichotomies – but his way of representing space appears somewhat obscure. Or as Alf Hornborg (2013) has noted, referring David Bloor and analysing a potential fetishism with objects in Latour's writings: 'Latour's reasoning frequently 'looks like a formula for imposing confusion on

ourselves: it is obscurantism raised to the level of a general methodological principle' (David Bloor 1999 cited in Hornborg 2013: 124).

However, if we put aside Latour's writing style, which nonetheless seem to invoke more confusion than conceptual clarity, there is a more overt designation to his metaphorical employment of spheres as spatial representations of actor-networks. This designation, I take, can be uncovered in Latour's (1987) emphasis on space as the reversible variable and time as the irreversible. In this light, the analogy to spheres is a spatial metaphor where the target domain (In this instance actor-networks) is used to underscore the reversibility of highly dynamic actor-networks' different combinations. But since the general conception of space within Actor-Network Theory is exclusively relational – space and time is internalised within matter and process - the source domain (In this instance space) necessarily has to be construed in such a way that it allows for such dynamism to occur; actor-networks, then, fabricate space rather than reside or navigate in space.

In this way, the representation of space as spherical formations is designed to underscore the dynamic relations between interacting actor-networks, but in doing so, I wish to suggest, it juxtaposes space with actor-network formation, consequently neglecting those (perhaps not so reversible) spatial arrangements (or structures) that, I take, to be more systematically comprehended within an absolute conception of space. For example, national borders, municipal boundaries and property boundaries (see also Brenner et al. 2012; Corpataux and Crevoisier 2016; Jönsson 2016).

There is, then, a sense of one-dimensionality of the sphere metaphor that emphasises dynamism in actor-networks but neglects spatial context, rendering the historical production of space unexamined. On the same note, also Elder-Vass (2008: 466) has emphasised that 'ANT's refusal to theorize structural stability must count as one of its gravest weaknesses'.

As we will see in the following sections of the analysis, many of Latour's general considerations and reasoning about space is echoed within in the writings of other central proponents of Actor-Network Theory. However, in order to more fully comprehend the spatial conceptions of Actor- Network Theory, we need to go a step deeper into the literature.

6.2.   Topological textures

Jonathan Murdoch is a recurrent referent in the literature on Actor-Network Theory. Murdoch was trained in sociology and was a Professor in Environmental Planning at the School of City and Regional Planning at Cardiff University (Murdoch 2006). Besides the initial core developers of the approach, Murdoch (1997; 1998; 2006) is perhaps the one who has written most extensively and most explicitly about the spatial conceptions of Actor-Network Theory, suggesting that the approach profoundly shifts our view on geography.

In writing about the conceptions of space within Actor-Network Theory, Murdoch adopts Latour's view of a fully relational understanding of space. As such, he reasserts that within the approach, '[t]here is no absolute space […] only specific space-time configurations' (Murdoch 2006: 74). The distinction between an "outside world" and an "inside world" is for Murdoch, similar to Latour, wholly inadequate in comprehending spatiality (Murdoch 1998; 2006). Notably however, there is for Murdoch a cautious side to his engagements with the approach, which is perhaps most noticeable in his early encounters with Actor-Network Theory (Murdoch 1997). For example, Murdoch (1997) does argue for a somewhat careful course in breaking down the distinction between nature and society. Similarly, he also underscores the apparent limitation in the epistemological presupposition of Actor-Network Theory that proposes, that actor-networks should merely be described; their activities demonstrated, rather than critically assessed and understood in relation to meta-narratives, as he asserts: 'To many social scientists their loss may seem too high a price to pay for an enhanced ability to describe the complex construction of inhuman/nonhuman/human societies and spaces' (Murdoch 1997: 750).

However, in contrast to the cautious character of Murdoch's (1997) initial involvements with the approach, his later encounters with Actor-Network Theory (Murdoch 1998; 2006) goes on to both elaborate and further develop the conceptual (spatial) inventory of the approach. As such, Murdoch (1998: 357) reaffirms Latour's rejection of Euclidean space and suggests that, 'the network perspective cannot readily co-exist with a notion of space as fixed and absolute in its co-ordinates'.

In Murdoch's (1998) later engagements with the approach, he proposed that Actor-Network Theory gives rise to an entirely new kind of geographical analysis, which have profound implications for the study of space. Here, Murdoch (1998) evokes topological thinking as the most fundamental spatial conception of Actor-Network Theory.

In expounding the spatial groundworks of Actor-Network Theory, Murdoch (1998; 2006) suggests that actor-networks should be perceived as emerging striations of material formations characterised as topological textures (as opposed to topographical surfaces), which in effect, produces and configures diverse spaces and times in the process. The geographical character of actor-networks should thereby be viewed as complex geometries (topologies) that folds space-time (Murdoch 1998). Furthermore, as elements (heterogeneous actors) come together to form actor-networks, there is no way to tell if the network is either technical, political, natural or social, it is, Murdoch (1998) suggests, rather the merging of all. To conceive social relations in isolation, then, is wholly inadequate within the approach. Social relations, Murdoch (1998; 2006) argues, is within Actor-Network Theory perceived as network effects and only made durable and resilient by materials, which allow actor-networks to endure and remain stable, and effectively travel as topological striations, *creating* spaces rather than residing *in* space. As such, Murdoch (1998: 360) stresses that, 'social order, power, scale, even hierarchy, are consolidated and preserved by material objects. Materials solidify social relations and allow these relations to endure through space and time'. Materials, Murdoch (1998; 2006) argues, thus become "semiotical transporters" of novel and diverse social, spatial and temporal relations.

In addition, the topological understanding of space is coupled with the epistemological presupposition that we put aside any absolute conception of space (and time), consequently abandoning geographical scale altogether in exchange for following and tracing the topologies of actor-networks. Here Murdoch (1998: 362) stresses: 'The main point is that there are continuous paths from the local to the global; providing we follow these paths no change in scale is required. […] ANT directs our attention to the means by which scale becomes defined within particular networks'.

This outline of topological thinking within Actor-Network Theory highlights a fundamental and common understanding of space within the approach (see for example Murdoch 1998; 2006; Latour 1996; 2009; Law & Mol 1994; 2001). However, as Murdoch (1998) explicates the spatial aspects of actor-networks, he proposes that two new kinds of spatial concepts arises, and introduces *spaces of prescription* and *spaces of negotiation*.

6.2.1.   Spaces of Prescription and Spaces of Negotiation

In general, these concepts are developed to emphasise that as actor-networks configures space, the impact of this configuration depends on the ability (convergence) of a network to become or remain stable (Murdoch 1998). Additionally, both spaces of prescription and spaces of negotiation refers to

the concept of *translation* – that is, the process in which different actors define, relate and represent each other in their interaction in networks (see chapter 3).

Spaces of prescription denotes the spatial characterisation of a network where translations between the actors have been effortlessly accomplished. As such, there is a mutual understanding of actors' (human and nonhuman) roles, which allow for a more effortless distribution of agency in the networks. Spaces of prescription, then, entails a high degree of convergence; a stable network (see for example Callon 1990). Here, Murdoch (1998: 362) argues, 'spaces will be strongly prescribed by a centre as norms circulate, imposing fairly rigid and predictable forms of behaviour'. Furthermore, these 'are likely to be spaces of relatively fixed co-ordinates and will tend to be marked out by formal and standardised sets of heterogeneous relations (and could, at times, be seen as Euclidean spaces)' (Murdoch 1998: 370).

Within spaces of prescription, the distribution of agency between actor-networks will often be (stable centres) characterised by standardisation and classification allowing for spaces of prescription to adeptly "act-at-a-distance" and govern (or rather prescribe) peripheral networks, affecting their internal space-time configurations (Murdoch 1998).

Spaces of negotiation on the other hand, stands in contrast to spaces of prescription. Spaces of negotiation are characterised by unstable networks, and a low degree of convergence. Actors in spaces of negotiation are characterised by weak, provisional and divergent links. Murdoch (1998) has regarded them as consisting of networks of variation and flux. Or as he has put it: '[Spaces of negotiation] will be spaces of fluidity, flux and variation as unstable actors or coalitions of actors come together to negotiate their memberships and affiliations (and could be seen as topological or rhizomatic spaces)' (Murdoch 1998: 370). Spaces of negotiation, then, characterise a network with unstable relations, rendering them susceptible to be governed (or prescribed), and therefore has to negotiate their relations with other networks with more effort.

In clarifying spaces of prescription and spaces of negotiation, Murdoch (1998) uses the example of a classification scheme that was developed to depict nurses' daily routines in a hospital ward in Iowa, in order to develop a standardised routine for nursing practises. Prior to the deployment of the scheme, the nurses at the hospital ward would have unstandardized and discrete interaction with patients, thereby characterising it as a space of negotiation. After the deployment of the scheme, it became a space of prescription (a highly standardised actor-network) which could be governed by the prescriptions of the scheme, informed by the hospital management (Murdoch 1998). However, to

finish the story, the scheme turned out to be impractical - specifying mundane practices of nurses, which eventually took away the discretion and autonomy of the individual nurses – and the scheme was changed (Murdoch 1998). In this instance, a space of negotiation (nurse practices) was then able to "negotiate" their internal space-time arrangements from the "prescriptive" spatial arrangement imposed by the hospital scheme.

However, I wish to suggest that there is a somewhat free-floating nature of how to characterise a network space as either one conception, and, as also Murdoch (1998) has noted, spaces of negotiation can encompass spaces of prescription within their internal networks, and conversely, spaces of prescription can encompass smaller networks of spaces of negotiation (the example of the hospital and nurse practices outlined above).

Murdoch's (1998) intention of proposing the concepts, spaces of prescription and spaces of negotiation, he argues, is mainly an analytical advancement for distinguishing between stable and unstable network topologies and the way in which they effect each other's internal space-times through the mobilisation of heterogeneous actors. The effects of interaction can then be traced through networks' topological striations, as spaces of prescription and spaces of negotiation merge or interact. As such, Murdoch (1998: 370) suggests: 'Tracing the topology of networks is therefore akin to tracing the topology of power for whoever succeeds in defining the order of priorities succeeds in determining the connections which give rise to the spatialities and temporalities that compose our world'. Intrinsically, then, for actors to be able to prescriptively "act-at-a-distance", is what effectually successes in connecting and altering diverse localities (Murdoch 1998).

6.2.2.   *Interpreting Spaces of Prescription and Spaces of Negotiation*
A purely relational conception of space is once more evoked as the only significant spatial conception within Actor-Network Theory. Absolute space, Murdoch (1998) argues, is an empty abstraction and cannot co-exist with Actor-Network Theory's spatial conceptions.

The rejection of an absolute conception of space is resonated within much of the literature on Actor-Network Theory. Similarly, the understanding of space (and time) as the effect of diverse actor-networks emergence, viewed as topological striations that unfolds and affects other actor-networks' internal space-time configurations, is echoed within the literature (see for example Law & Mol 1994; 2001). Furthermore, it is within this geographical designation of actor-networks as topological

striations that Murdoch (1998) proposes the concepts, spaces of prescription and spaces of negotiation.

It is tempting at first, to seek to explain these two concepts away as spatial metaphors (which is not entirely incorrect), but I fear that would be to miss an important argument about space-time configuration within a relational conception of space. For whereas the primary critique of spatial metaphors concerns their inability to view space as a materially conditioned product (Smith 1990; 1993; Katz & Smith 1993), this aspect is, however, reflected within spaces of prescription and spaces of negotiation. In both concepts, the target domain is topological space (or spaces) and the source domain is actor-networks. Although juxtaposing space with network formation, the designation of the concepts is to accentuate an aspect of relational space. In this sense, Murdoch (1998) captures an important aspect of space, namely its relational materiality, which is emphasised in the topological textures of actor-networks. In this way, spaces of prescription and spaces of negotiation denotes how stable actor-networks in spaces of prescription (for example hybrid-actors such as organisations, institutions and authorities) are able to intervene and prescribe activity ("act-at-a-distance") on less stable actor-networks in peripheral spaces of negotiation. For example, by the insertion of a new technology or in the form of a scheme. In this way, diverse and relational space-time configurations are altered in the interaction between multiple actor-network topologies. The concepts are therefore not entirely metaphorical, but rely on a (material) relational understanding of space rather than an absolute or a relative conception.

However, although materiality is emphasised in both concepts and plays a central role in conceiving the configurations of network topologies' internal space-time arrangements, they fail to consider the historical, political and spatial contexts that preconditions network topologies' very existence. As an example, Corpataux and Crevoisier (2016: 611) have been especially forthright in pointing towards this problem of Actor-Network Theory, stressing that the spatial conceptualisations of the approach 'in no way take account of territory. The network which is being built is conceptualized […] without any concrete geographical dimension and independently of any spatial and historical context'.

In addition, and perhaps on a more general level, also other concerns about the approach have been uttered. For example, Nick Lee and Steve Brown (1994) have criticised Actor-Network Theory's relentless focus on network formations, suggesting that the approach is innately centred around a focus of functionalistic managerialism of the micro-politics of actor-networks. Furthermore, they suggested that it is paradoxical that in rejecting all grand narratives, it almost appear as if Actor-

Network Theory itself has become one and argued: 'In presenting this striation as a narrative, if not factual, inevitably – as the only game in town – ANT is a form of *monadology*. In a field of monadic wills to power, the production of such dominant systems is all that can possibly occur' (Brown & Lee 1994: 785). Moreover, Lee and Brown (1994) underscored what they considered an epistemological drawback of the approach, in that the relentless concern with describing network topologies - demonstrating their functions and formations - will lead to the loss of grasping "Otherness" – a world that is outside of networks - arguing that 'something always remains unmapped' (Brown & Lee 1994: 785).

The criticism expressed by Brown and Lee (1994) has however been taken up by other main proponents of the approach, which eventually led Annemarie Mol and John Law (2001) to develop a new set of spatial concepts. As such, we need yet again to go a step deeper into the spatial conceptions of Actor-Network Theory.

6.3. From network topologies to fluid spaces and fire spaces

Annemarie Mol and John Law are both main proponents of Actor-Network Theory and has since the early 1990s been productive in developing the spatial terminology of the approach (Mol 1999; Law 1997; 2002; Law & Mol 1994; 2001; De Laet & Mol 2000). Mol is professor of philosophy and anthropology, currently positioned at the University of Amsterdam. Law is professor of sociology at The Open University. Both Law and Mol have in their respective research fields, together and separately, written extensively on studies of science, technology and society (STS). However, in this section I will focus on their contributions to the study of space.

Much of Law's and Mol's writings on space resound the spatial conceptions of Latour and Murdoch outlined in the previous subchapters. This subchapter will therefore not be focused around elucidating Law's and Mol's general considerations of space within an Actor-Network Theory perspective - the view of space as topological striations and wholly relational. However, partly as a response to the critique of the functional managerialism of Actor-Network Theory uttered by Brown and Lee (1994), Law and Mol (2001) have proposed some rather peculiar concepts of space, namely: *fluid spaces* and *fire spaces*. In the following, I will attempt to expound these concepts, starting with fluid spaces. However, this task is easier said than done since much of their writing pertains a certain language that is not easily deciphered. To underscore this "conceptual language barrier", I will in the following take

the liberty to paraphrase a bit, for subsequently attempt to communicate what I take to be the conceptions more overt designations.

Fire spaces: 'we might simply say that fire is a metaphor for thinking about the dependence of that which cannot be made present – that which is absent – on that which is indeed present' (Law & Mol 2001: 8).

'[What is present,] depends upon that which is absent (so it is present) but (in an additional twist) at the same time depends upon making it absent' (Law & Mol 2001: 10).

Fluid spaces: 'In a fluid space it's not possible to determine identities nice and neatly, once and for all. Or to distinguish inside from outside, this place from somewhere else. Similarity and difference aren't like identity and non-identity. They come, as it were, in varying shades and colours. They go together' (Law & Mol 1994: 660).

6.3.1. Fluid Spaces

I take it, as also Murdoch (1998) has noted, that fluid spaces to some degree resembles the notion of spaces of negotiation, although the two concepts cannot be conflated. Fluid spaces, then, was rather a response to the rigidities that a network topology entails for the study of space (Law and Mol 1994; 2001)

Whereas space within Actor-Network Theory is seen as the product of diverse network topologies intersecting - the effect of two or more topologies meeting and affecting each other's internal space-time configurations - this notion gives little way for the space (or spaces) that surrounds these intersections (Law & Mol 1994; 2001). As such, Law and Mol (1994) suggest that network topologies pertain a certain rigidity, and that in order to understand what allows such network topologies to successfully emerge and create new space-times, is the lenience given to them by fluid spaces (or fluid topologies). Fluid spaces, then, designate a conception of a sort of surrounding space (or spaces) that is somewhat indifferent to the alterations that diverse actor-networks inflict when they intersect, but at the same time allows these actor-networks to change themselves internally (Law & Mol 1994; 2001).

In this sense, a fluid space stands in contrast to network spaces. For if one component in a network-space changes, the whole space-time configuration of that network changes. In a fluid space, there are no fixed relations between objects (actors), no fixed space-time configurations (Law & Mol 1994;

2001). Rather, fluid spaces are spaces of constant variance and alteration and allows for constant interchange of the actors that resides within them without changing its overall spatial (or fluid) character. Or as Law and Mol (1994: 662-663) has put it, 'in a fluid elements inform each other. But the way they do so may continuously alter. The bonds within fluid spaces aren't stable'. In this sense, the space-time configuration in a fluid space is somewhat indeterminable.

Fluid space, then, allows for transformations, but no transformation will lead to any abrupt change in its overall spatial configuration (Law & Mol 1994; 2001). Because of the indefinable character of objects in fluid spaces, individual elements that reside in a fluid space might therefore be superfluous, and if removed from this space, it does not necessarily affect space-time, since space-time within fluid spaces are itself conceived as a liquid (topological) texture. Fluid space, then, is defined as a non-dominating space that allows for a continuous transformation of actor-networks in a flowing manner. As such, Law and Mol (1994: 659) asserts that, 'there are social objects which exist in, draw upon and recursively form fluid spaces that are defined by liquid continuity'.

The fluid metaphor, then, designates a space of continuous alteration, a space in constant motion but material in its content nonetheless. Fluid space, Law and Mol (2001) argues, then, gives a place (so to speak) for the "Otherness", which Brown and Lee (1994) stressed as fundamentally missing within Actor-Network Theory, as those "Ohers" might be present in the network, although their presence might appear undetected. 'The study of fluids, then, will be a study of the relations, repulsions and attractions which form a flow' (Law and Mol 1994: 664).

6.3.2.   Fire Spaces

Whereas fluid space gives way to a conception that seeks to emphasise that some elements in space are present and gradually moves (flows), and that their presence is somewhat inconsequential for actor-networks' internal spatial formations, fire space is a way to emphasise that in order for an actor-network to indeed be present, it relies on the fact that something else has to be made absent (Law & Mol 2001).

Fire space (or fire topology) Law and Mol (2001) argues, is a way to conceptualise that actor-networks' ability to move and simultaneously hold their shapes constant depends on the fact that they need to move through a space that allows for such movement – a space were other objects (actor-networks) are absent. Conceptualised in this way, Law and Mol (2001) suggest, that a fire space is a

space that allows an object to move as a result of the relation between other objects being present or absent. Or as Law and Mol (2001: 8) have put it: 'Topologically, then, our argument is that in fire space a shape achieves constancy in a relation between presence and absence: the constancy of object presence depends on simultaneous absence or alterity. A flicker, an oscillation, an impossibility that is also a necessity'. In this regard, Law and Mol (2001) evoke the example of an airplane that moves as a flickering star through the air. In keeping its shape and its constancy, a plane needs to be able to control the absence of certain "outside" conditions, such as turbulence.

The presence and the shape of objects in a fire space is then made staple and constant, as a result of being able to produce sudden discontinuities of multiple other spaces, effectively making them absent by abruptly transforming them in the presence of the object (actor-network). Some objects then, Law and Mol (2001: 11) suggest, 'achieve their stability by virtue of the simultaneous absence and presence of a range of other materials, situations. They achieve their stability in the continued enactment of discontinuities (which are also continuities) with those Other materials and contexts'.

6.3.3. *Metaphors and yet more Metaphors*

The reintroduction of fluid spaces and the development of fire spaces was partly intended as a response to Lee's and Brown's (1994) critique of the alleged functionalistic managerialism that accompanies Actor-Network Theory and its shortcomings in considering "Otherness", suggesting that there is always something that remains unmapped; something outside networks. Responding to this critique, Law and Mol (2001) sought to expand the spatial vocabulary of the approach to incorporate such aspects, which led to the development fire spaces and the reintroduction of fluid space (initially developed by Law & Mol 1994).

It seems obvious to assert, as also Law and Mol (2001) have emphasised themselves, that fire spaces and fluid spaces are indeed metaphors and do not designate that spaces are either burning or under water. However, considering them as spatial metaphors, there is, I want to suggest, however cautiously, a rather strange character about them that evokes the notion of an almost Euclidean order of space. I will attempt to accentuate this argument in the following.

In both concepts, space is juxtaposed with network formation. Diverse spaces (and times) are generated as actor-networks emerge, abbreviate, disperse and intersect – such is the general notion of a relational conception of space within Actor-Network Theory. The target domain of the fluid

metaphor is the sometimes transient connectivity and (dis)continuity of diverse actor-network formations. The fluid metaphor evokes the image of gradual connectivity and incremental (dis)continuity; some objects (actors) may gradually disappear from the network while others may appear. Their agency may be superfluous, rendering their spatial effects indeterminable, and somewhat indifferent – as if they flow in a liquid. The source domain of the fluid metaphor, is Actor-Network Theory's distinctive understanding of a solely relational space. In that sense, it is space conceptualised as the effect of network formation that allows for the dynamisms the fluid metaphor entails.

The fire metaphor, on the other hand, is perhaps better be viewed as an inverted spatial metaphor. The target domain is in fact space, while the source domain is the sometimes rigid and stable formations of certain actor-networks or hybrid-actors (as the example of airplanes mentioned above). The general application of the concept is to designate that, as in the case of an absolute Euclidean space, in order for something to be present something has to be absent. If we put this in a relative conception of space - that of motion and process – then in order for an object to move (be present elsewhere) will depend on the absence of something else, or making that something absent. Two material objects cannot occupy the same location in an absolute conception of space. In this light, I take the fire metaphor to be a rather pretentious way to reinvent the notion of absolute space (or real space) without conforming to its three-dimensional Euclidean perception, but instead reinventing it in terms that corresponds to Actor-Network Theory's distinctive thought system. Sometimes, as Andrew Sayer (1995: 102) similarly has underscored, some metaphors, it seems, are 'fanciful rather than the best available representation'.

6.4.   A topological world of fluxes, fluids and fires

Although some of the concepts proposed by the main proponents of Actor-Network Theory have somewhat awkward labels, there might be more problematical implications than just fanciful representations of space.

Kirsten Simonsen (2004) for example, has in a short commentary expressed concerns over the import of spatial metaphors within Actor-Network Theory and assemblage thinking more generally, and their application for concrete (critical) analysis. Here, Simonsen (2004) directed attention towards the implication that the spatial metaphors newly in vogue – networks, flows and fluids – creates, perhaps unintendedly, a dogmatic new theoretical orthodoxy to the study of social life, which 'favour a focus

on process, connectivity and mobility at the expense of an alleged former focus on boundedness, hierarchy, and form' (Simonsen 2004: 1333). The consequence being, Simonsen (2004) argues, a naturalisation of spatial processes – with examples as ''ice flows', 'waves of a river', and 'weather systems'.' (Simonsen 2004: 1337) - to the extent that metaphors become self-referential and a stand in for spatial form that does not reflect social content, eventually raising such metaphors to universal organisational principles. Thus, the metaphorical applications employed within Actor-Network Theory are not only theoretically awkward, but could also carry political implications (Simonsen 2004).

On a similar note, Erik Jönsson (2016), analysing a case study of a golf resort in Scotland, has questioned the view of space as exclusively constituted by relational topologies (Jönsson 2016). Jönsson (2016) addressed this view because it pertains a one-dimensionality to spatial analysis that might prove insufficient in coping with those multifaceted power relations that persists in reshaping landscapes. In this regard, Jönsson (2016) evoked that it is essential to combine different conceptualisations, and emphasised that perhaps a better vantage point for understanding landscapes and their often power-permeated features, is to combine the logics of relational (topological) conceptions of space with territorial (topographic) conceptions and perceive them as inescapably intertwined. As such, Jönsson (2016: 6-7) underscored the importance of keeping spatial conceptions in dialectical tension and insists: 'Topology (as any concept would) remains incapable of singlehandedly capturing something as complicated as the cumulative, power-permeated production of space'.

Taking these reflections of the implications of Actor-Network Theory into consideration, combined with the analysis of the spatial conceptions proposed by the main proponents of Actor-Network Theory, allows for the research questions of the thesis to be answered. As such, the following chapter will present a conclusion and a consideration of what the import of Actor-Network Theory to geography entails for the study of space.

Chapter 7. The Import of Actor-Network Theory to Geography

'[If] the white male, the working class and economies are for ever vanquished in favor of a Heraclitean world with everything in flux. The only thing that prevents this stance from falling forward in time from Heraclitus' dilemma to Dante's Inferno in which subjects are condemned to pursue eternally shifting and ultimately unattainable positionalities – no vestige of an origin, no prospect of a destination – is the ground guaranteed by a fecundity of spatial metaphors'

(Smith 1990: 177).

Throughout the present work, it should have become evident that some of the central figures and main proponents of Actor-Network Theory have been occupied with contemplating the nature of space. As such, a great deal of new-fangled concepts have been proposed as the proponents of Actor-Network Theory have sought to confront more conventional understandings of space, and develop a spatial vocabulary that matches its distinctive thought system. These concepts includes fluid spaces and fire spaces (Law & Mol 2001), spaces of prescription and spaces of negotiation (Murdoch 1998), and the spatial representation of actor-networks as spherical formations (Latour 2010). Sometimes these concepts have been enthusiastically applauded, other times they have come into question (Bosco 2014). However, when held in conjunction and systematically analysed, they designate a shared understanding of space within Actor-Network Theory and outlines a more general program for the study of space within the approach. Such an analysis have been provided throughout the present work and enables us to answer the research questions of which the thesis is concerned:

1. What kind of spatial conceptualizations signify Actor-Network Theory?
2. How can the spatial conceptualizations within Actor-Network Theory be positioned in relation to realist conceptions of space?
3. What are the possible theoretical and political implications and limitations of the spatial conceptualisations developed by central proponents of Actor-Network Theory?

Several spatial conceptualisations have been proposed as the main proponents of Actor-Network Theory have sought to challenge conventional conceptions of space and the spatial, all with varying analytical or representational designations. However, the common denominator for all the examined proponents is a fundamental rejection of any absolute conception of space. Instead, they insist on viewing space (or spaces) as exclusively relational, and as an effect of actor-network formation that

generates novel and diverse space-time configurations. Space, in this regard, is internalised within matter and process. In this sense, they insist on abandoning any territorial, topographic and hierarchical notions of space, for instead to view space as emerging topological striations of diverse and multiple actor-network formations that continuously intersect and interact, effectually altering each other's internal space-time configurations.

Although the concepts examined here – fluid spaces and fire spaces, spaces of prescription and spaces of negotiation and the spatial representation of actor-networks as spherical formations – have different analytical or representational variations, they are all developed to underscore the distinctive relational conception of space as the effect of actor-network formation. Bearing this in mind, enables us to position the signifying spatial conceptions of Actor-Network Theory within the realist frameworks of the tripartite division of absolute, relative and relational space, and the triad of spatial practice (perceived), representations of space (conceived) and representational spaces (lived).

In conclusion, the examined proponents of Actor-Network Theory's spatial conceptions can be confidently positioned within the relational conception of space. Any idea of an absolute world that can envelop all discrete objects and phenomena is fundamentally rejected – there is no "outside" only "insides". A similar rejection is found regarding the relative conception of space, since this perception entails the possibility to apprehend space as absolute, however, imbued with time. Yet, within the relative conception of space, there is an emphasis on the dependence of frame of reference (by whom space is being relativized). This aspect of relativity is a fundamental ontological supposition within Actor-Network Theory and has been taken even further by the proponents of the approach, to the extent that any idea of universality or meta-theory is ultimately a local expression; reduced to the product of a "mind-in-a-vat" attempting to gaze at an "outside world". What the proponents of the approach argues is instead to view space as a purely relational phenomenon - as an effect rather than an intermediate. Space, they argue, should be viewed as the effect of the many connections between heterogeneous (human and non-human) actors forming networks. The overall spatial conception of Actor-Network Theory, then, is entirely relational.

However, if we attempt to position the examined proponents' conceptions of space within the triad of space - spatial practice, representations of space and spaces of representation – some noticeable similarities between Lefebvre's (1991 [1974]) *The Production of Space* and the proponents of Actor-Network Theory become apparent.

First, to view space exclusively as a medium is entirely inadequate. Second, they share an emphasis on a materially conditioned social world. Third, diverse representations of space should be understood in relation to practices. Fourth, they share an interest in how material objects semiotically inform (or enact) both representations of space and spaces of representation.

In relation to these similarities, then, the notion of actor-networks could in fact be a way to articulate and analytically ascertain the sometimes volatile interconnections between spatial practices, representations of space, and representational spaces. For example, actor-networks is foremost a concept that was designed to denote the numerous connections and diverse relations between heterogeneous actors (human and nonhuman). If we read this in the terms of Lefebvre (1991 [1974]), actor-networks become a way to express the mutually formative relationship between spatial practices (the conceived) and representational spaces (the lived). As for representations of space (the conceived), any representation is fundamentally regarded a relative expression, but as they are enrolled (discursively or semiotically) into diverse network formations, they may be used to direct and transform spatial practices and representational spaces. Especially, the concepts, spaces of prescription and spaces of negotiation, analysed in the previous chapter, appear to capture this interrelationship.

However, the similarities between Actor-Network Theory and Lefebvre tend to stop there. Firstly, for Lefebvre (1991 [1974]: 7), semiotics, 'is an incomplete body of knowledge which is expanding without any sense of its own limitations'. Secondly, Lefebvre's proposition of the triad of space was intended to construct a single unitary theory (itself a meta-theory), where the perceived, conceived and the lived can be analysed dialectically in order to comprehend the production of space in its entirety, its historicity. This stands in stark contrast to the epistemological presupposition within Actor-Network Theory that insists on the abandonment of any kind of meta-theory, instead suggesting to follow and trace actor-networks as they unfold as topological striations through fluid spaces or fire spaces, effectually generating diverse and internal space-time configurations.

For Lefebvre, such a program would unquestionably be wholly inadequate in comprehending the production of space and its historicity. Or as Lefebvre (1991 [1974]: 48) has urged, 'the history of space cannot be limited to the study of the special moments constituted by the formation, establishment, decline and dissolution of a given code. It must deal also with the global aspect – with modes of production as generalities covering specific societies with their particular histories and institutions'.

Correspondingly, as it has been underscored by several of those commentators that have come to question the spatial conceptions of Actor-Network Theory, it is perhaps this persistent refusal to deal with historical and spatial context that constitutes the most acute weakness of the approach (see for example Corpataux & Crevoisier 2016). However, this aspect seems to be rooted in a much deeper epistemological presupposition of the main proponents of the approach, which I wish to suggest, is displayed in their distinctive relational conception of space.

Whereas Harvey (2006), for example, has been hesitant in providing an ontological answer to whether space is either absolute, relative or relational, but instead stresses the importance of keeping the three conceptions in dialectical tension and appropriate them with respect to human practices, the main proponents of Actor-Network Theory do provide an ontological answer; the nature of space is wholly relational. However, in doing so, Actor-Network Theorists denies a spatial vocabulary (such as the notions of scale, territory and topography) that might be best suited to apprehend the power-infused procedures, which in practice sometimes takes the form of contested land for example as disputes over territories or topographies in varying scales (from the local to the global). Dismissing these concepts is not only theoretically problematic but have acute political implications, for as Smith (1990: 173) reminds us: 'Geographical scale is political precisely because it is the technology according to which events and people are, quite literally, 'contained in space''.

This aspect brings us to answering the third research question of which the thesis is concerned. As I have attempted to demonstrate throughout the analysis, the spatial concepts developed by the examined proponents of Actor-Network Theory are intrinsically metaphorical. In this sense, they juxtapose space with network formation in order to underscore the internal spatial relations between heterogeneous actors, for in a second move to undercut any absolute or relative conception of space. Any idea of fixity or boundedness is replaced with an abstract set of topologies such as fluid spaces and fire spaces. Hence, upholding a one-dimensionality for spatial analyses that, on the one hand, is adept for dealing with the dynamic, fluctuating and complex socio-spatial relations between heterogeneous actors, but on the other, is incapable of dealing with the historical, political and spatial contexts that are crucial for comprehending the immensity of the production of space.

Arguably, the notion of relational space is perhaps the most important spatial conception in the tripartite division of absolute, relative and relational space (although I will, similar to Harvey (2006), be reluctant towards implying a hierarchy among the three conceptions). In this sense, the notion of actor-networks and the spatial conceptions developed within the approach might be helpful in

conceptualising the connections between the material and the immaterial within a relational conception of space. However, deprived of considerations of wider spatial, social and historical contexts, the import of Actor-Network Theory to geography seems to entail both limitations and implications and comprises serious constraints on our view on geography.

As such, while the proponents of Actor-Network Theory insist on abandoning any absolute or relative conception of space in favour for a world of fluidity, flow and flux, infused with an excessive use of ambiguous metaphors, I will in contrast argue for the importance of keeping both the tripartite division of absolute, relative and relational space, along with the triad of spatial practice, representations of space and representational spaces in dialectical tension. For although it is true, that within purely absolute and relative conceptions of space is an overarching danger of geographical determinism, which only seems to be overcome by a relational conception, fully dismissing these conceptions runs the risk of constraining geography to an assortment of fashionable metaphors, consequently discouraging contextual political, historical, social and spatial insight. If absolute space is indeed the technology to contain people and events in space, it is essential to insist on a spatial vocabulary appropriate for the task, and critically engage in the causes and effects of such a technology.

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