A STUDY OF MOBILITIES 'IN SITU'

- Understanding cycling as an embodied practice

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June 2015

Aalborg University Copenhagen

AALBORG UNIVERSITY
STUDENT REPORT

Aalborg University Copenhagen
A.C. Meyers Vænge 15
2450 København SV

Semester: Sustainable Cities 4th semester

Project title: A study of mobilities 'in situ' – Understanding cycling as an embodied performance

Project period: February 2nd 2015 – June 3rd 2015

Semester theme: Master Thesis

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Number of copies: 2

Number of pages: 82

Abstract:

Many cities are struggling to design infrastructure for growing number of cyclists. For some this is a response to an already occurring growth while for others this design is aimed at actively increasing cycling. In this worldwide endeavour, there is surprisingly little structural evidence for the actual behaviour of cyclists. This makes it difficult to design solutions that meet their needs. In continuation of the critique of traditional transport research launched by advocates of the 'mobilities turn' we argue that a better understanding of the motivations and needs of cyclists is a necessity in order to ensure a further promotion of cycling. This study aims to develop a better understanding of why cyclists interact with the design of the material environment, each other and other road users in the way they do. To do so, we apply the analytical framework of *Staging Mobilities* (Jensen, 2013) that identifies the physical settings, material spaces and design, the social interactions and the embodied performances as the dimensions that stage mobilities 'in situ'.

The research is designed as case studies of Amsterdam and Copenhagen, two of the leading cities in terms of urban cycling. The research takes point of departure in existing desire lines studies of cyclists in selected intersections in Amsterdam and Copenhagen. This is supplemented with observations as well as eleven ride-along interviews in order to study the embodied practice of cycling. The ride-along interviews are conducted with cyclists who have varying knowledge of the route of study in order to identify how it is perceived by different users. The study identifies three key factors which influence the behaviour of cyclists including the *car centric design* of the material environment, the *flexibility* of cyclists and the individual *perception of safety* of cyclists. Based on those key factors a diagram is suggested to explain why cyclists interact with the design, each other and other road users in the way they do. Doing case studies of Amsterdam and Copenhagen, two of the world's most bike-friendly cities, the culture of cycling is also found to be inherently different which highlights the embodiment of cycling. Accordingly, it is argued that future studies and initiatives to promote cycling need to acknowledge and take the embodiment of cycling into account.

Preface

This study is a thesis devised as part of the MSc in Sustainable Cities, at School of Architecture, Design and Planning, Faculty of Engineering and Science, Aalborg University Copenhagen (AAU-CPH). The project accounts for 30 ECTS points and was completed in the time between the 2nd of February 2015 to the 3rd of June 2015.

Acknowledgements
We would like to thank our supervisor Andrés Felipe Valderrama Pineda for his guidance and support through the beginning to the end of the project. Andrés has invested many hours supervision and has always contributed with great enthusiasm.

We also want to thank Marco te Brömmelstroet from the Urban Cycling Institute at the University of Amsterdam who made this project possible. We are thankful for the close cooperation in the development process of this study and for hosting us at the Urban Cycling Institute during our time in Amsterdam.

Furthermore we would like to give a special thanks to all the people who volunteered to take part in the ride-along interviews in Amsterdam and Copenhagen. We could not have achieved such an in-depth understanding without your comments and personal anecdotes.

Finally, we also owe a special thanks to Andreas' mother who has provided us with immeasurable help and support in the last week before hand-in.

Enjoy reading!

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1 Introduction

Cities are not a natural occurring phenomenon but human-created environments that among other things are shaped by massive public investments and strict legal rules defining how land and streets can be developed and used (Montgomery, 2013). The contemporary urban street is generally characterised by an infrastructural design that supports the flow of car traffic (Sheller and Urry, 2000; Norton 2008), however, in recent years the advantages of cycling as an alternative and sustainable mode of mobility have increasingly been recognised, which is reflected in a growing interest in the promotion of cycling (See for instance Amsterdam Municipality, 2012; Copenhagen Municipality, 2011). An increasing number of cities are now struggling to design infrastructure for the growing number of cyclists. For some this is a response to an already occurring growth while for others this design is aimed at actively increasing cycling. Still, in this worldwide effort there is surprisingly little structural evidence of the actual behaviour of cyclists. This poses the question of how we then can design expedient infrastructure for cyclists if we don't even know how they move or behave (te Brömmelstroet, n.d.). We argue that there is an urgent need to achieve a deeper understanding of the behaviour of cyclists in order to design solutions that correspond to their logic (Harders, 2014). Studies on cycling are currently booming including numerous studies that aims to evaluate policy interventions and infrastructural designs with the objective to identify standardised guidelines on how cycling can be promoted (See for instance Hull et al., 2014; Buch & Greibe, 2014). However, to what extent are such standardised guidelines actual meaningful? Consequently Amsterdam and Copenhagen are continuously claimed to be some of the best cities for cycling in the world with comparable levels of cycling (Walker, 2014; Ogden, 2014; Copenhagenize, 2013a; Fietsberaad, 2010). Still, cycling in Amsterdam and Copenhagen are also claimed to be inherently different (Copenhagen Municipality, 2014b; Fietsersbond, 2009; Fietsberaad, 2010). Therefore, the following research question arises:

Why do cyclists interact with the design of the material environment, each other and other road users in the way they do?

Our objective for doing this study is to contribute with new knowledge on cyclists' behaviour as we want to explore what motivates cyclists to behave in the way they do. In continuation of the critic of traditional transport research and its understanding of mobility as a mere rationalised and instrumental practice launched by advocates of the 'mobilities turn' (See for instance Urry et al., 2006; Spinney, 2009) we argue that mobility is an embodied practice (Cresswell, 2010; Jensen, 2013). The notion of embodiment refers to the very nature of human mobility. As described by Cresswell:

"Human mobility is practiced mobility that is enacted and experienced through the body. Sometimes we are tired and moving is painful. Sometimes we move with hope and a spring in our step. As we approach immigration at the airport the way our mobility feels depends on who we

are and what we can expect when we reach the front of the line. Driving a car is liberating, or nerve wracking, or, increasingly, guilt ridden. Whether we have chosen to be mobile or have been forced into it affects our experience of it. (…) In the end, it is at the level of the body that human mobility is produced, reproduced, and, occasionally, transformed." (Cresswell, 2010: 20).

Consequently we need to understand cycling as an embodied practice in order to explain the behaviour of cyclists. However, in order to gain this understanding and thus to explain the behaviour of cyclists we need to study mobile situations as this is where the behaviour of cyclists is unfolded. Jensen defines a mobile situation in the following way:

"The mobile situation is an assemblage of human subjects, physical design and material infrastructures of the built environment in which we find complex mobile situations with multiple social interactions taking place" (Jensen, 2013: 10).

Accordingly, our research question focuses on understanding the interactions of cyclists that take place within a material environment among cyclists and other road users, as it is these interactions that shape the behaviour of cyclists. In this the mobile body is the entry point to understanding the individual's engagement with the world as well as being the key to comprehending the way meaning and norms are created in embodied cultures of mobilities (Jensen, 2013). This is particularly relevant in studying mobile situations, in the following termed mobilities 'in situ', which we will do as we apply the analytical framework of *Staging Mobilities* (Jensen, 2013).

More specifically this study looks into the behaviour of cyclists in the cities of Amsterdam and Copenhagen, which are chosen because they have formulated ambitious visions regarding the promotion of cycling while experiencing increased capacity problems related to the growing number of cyclists. This is particularly the case at intersections as they are conflict points between different means of transportation making up the main hazard for cyclists (Parkin, 2012). In order to identify the mobilities of cyclists a number of studies mapping the desire lines of cyclists at selected intersections have been conducted in Amsterdam and Copenhagen (Copenhagenize, 2013b; Copenhagenize, 2013c; Imbert & te Brömmelstroet, 2014). While the existing studies have their focal point on *how* cyclists interact with the design, each other and other road users we aim to build on top of this as we want to examine *why* they are interacting in the way they do. Intersections will be at the focus in this study; however, each intersection and thus the behaviour of cyclists at each intersection must be understood in relation to the material environment and the city as a whole.

As mentioned studies on cycling are currently booming, however, most research has been addressing cycling in relation to health, environment, economy and safety (See for instance Parkin, 2012). Still, until now only a limited number of studies have been dedicated to the study of cycling as an embodied practice (Comeau, 2014; van Duppen et al., 2013; Brown, 2012; Jones, 2012; 2005; Jones and Burwood, 2011; Wood, 2010; Spinney, 2007; 2006). It is

striking that the existing studies are limited geographically as most studies have a UK (and to a minor extent a Dutch) perspective. Spinney, who has conducted several studies on cycling, calls for a stronger focus on sensory and embodied practices within cycling research:

"Much cycling research has been overly concerned with instrumental factors as entirely determining why and how people move around. However, considerations of sensory, kinaesthetic, political and symbolic factors needs to be more prominent in cycling research if more realistic understandings of people's mobility and their travel choices are to be unearthed."
(Spinney, 2009: 829).

To our knowledge we are the first to study cycling as an embodied practice in more than one city. With this study of cyclists in Amsterdam and Copenhagen we aim to contribute to the sensory and kinaesthetic branch within cycling research. Still, the aim of this study is not to come up with the definite conclusions on why cyclists interact with in the way they do but merely to point out correlations that determine the motivations of cyclists to do certain things in different mobile situations. Put in another way the aim is to draw attention to the embodiment of cycling and to explain what motivates the behaviour of cyclists.

1.1 Chapter outline

Following the introduction in which we have touched upon the embodiment of mobile practices and its implications for understanding the behaviour of cyclists we turn to the theoretical framework in **chapter 2**. We start out by introducing the 'mobilities turn' as we are critical of the way traditional planning research regards mobility solely as moment from A to B in that we argue that movement is closely related to culture, identity and social norms that form today's contemporary mobile society. Within the 'mobilities turn' we introduce the *Staging Mobilities* framework (Jensen, 2013) to describe how mobilities are staged 'from above' and 'from below' through three interrelated dimensions that shape mobilities 'in situ'; the physical settings, material spaces and design, the social interactions and the embodied performances. In examining the three dimensions we apply Jensen's metaphors the 'river' and the 'ballet' as it enables us to achieve a comprehensive understanding of mobilities 'in situ' from different analytical perspectives.

In **chapter 3** we outline the methodological framework of our research in order to describe how we propose to answer the research question. Initially, we present the research design, which is based on case studies of Amsterdam and Copenhagen, two of the leading cities in terms of urban cycling. Afterwards we describe how we base this study on a mixture of quantitative and qualitative methods to achieve a thorough understanding of mobilities 'in situ'. We present the empirical data including existing video material and desire lines studies conducted in intersections in Amsterdam and Copenhagen. This is supplemented by observations and eleven in-depth ride-along interviews in order to study the embodied practice of cycling.

Chapter 4 is the analysis of the study, which is divided into two parts. In the first part we will describe the routes studied in Amsterdam and Copenhagen. We take a birds-eye perspective as it enables us to study the 'river', which shapes the flows of cyclists as they move through the 'riverbed'. The analysis shows that cyclists in both Amsterdam and Copenhagen take numerous desire lines through the intersections on the routes. This emphasises the 'flexibility' that the bike offers. We also identify critical points of interaction which help us to identify and understand the interactions of cyclists in the 'ballet'. This is the focus in the second part of the analysis as we take an eye-level perspective on the 'ballet' to study the bodily interactions and situational dynamics of mobilities 'in situ'. We take point of departure in the three dimensions of the *Staging Mobilities* framework as we explore how the physical settings, material spaces and design, the social interactions and the embodied performances are all part of staging mobilities 'in situ'. We apply the ride-along interviews and our observations in order to understand the 'ballet' and the interactions that take place 'in situ'. In this part of the analysis we show how the interaction and the mobilities 'in situ' are staged through the physical settings, material spaces and design, the presence of others through social interactions and through the embodied performances of cyclists.

In **chapter 5** we discuss the findings identified in the analysis in order to explain why cyclists interact with the design, each other and other road users in the way they do. Firstly, we highlight how the contemporary car centric mobility system stages the interactions of cyclists. Secondly, we will discuss how the flexibility of the bike stages the interactions of cyclists as it facilitates and sets the boundaries for how cyclists can interact with the design of the material environment, each other and other road users. Thirdly, we will discuss how cyclists' individual perception of safety to a great extent also stages the interactions of cyclists. This being so we argue that cyclists adapt to the unwritten rules and the informal 'cycling codes' of Amsterdam and Copenhagen in order to feel safe. Stressing the importance of applying a holistic approach in mobility studies we emphasise that the three dimensions in interplay stage the mobilities of cyclist 'in situ' as we suggest a diagram that can explain why cyclists interact with the design, each other and other road users in the way they do. Finally we also point to how the key findings implicate future studies and the promotion of cycling.

2 Theoretical framework

In this chapter we present the theoretical framework of our study. Firstly, we will present the main ideas behind the 'mobilities turn' lead by the British sociologist John Urry. We include Urry to highlight the significance of linking sociology to movement in order to achieve a comprehensive understanding of the contemporary mobile society. Secondly, we will introduce the *Staging Mobilities* framework developed by the Danish sociologist Ole B. Jensen to describe how mobilities 'in situ' are staged 'from above' through the physical settings, material spaces and design and 'from below' through social interactions and embodied performances. We apply the *Staging Mobilities* framework as it allows us to study and shed light on the dynamics of 'mobilities in situ'. In addition to the three dimensions of the *Staging Mobilities* framework we introduce the metaphors of the 'river' and the 'ballet' as two analytical perspectives of mobilities 'in situ' that enables us to study the flows and interactions of cyclists, respectively. Finally, we will sum up the chapter recapitulating the main points and how we use the theoretical framework as a point of reference throughout the project.

2.1 'Mobilities turn'[1]

Traditionally the main focus within transport studies has been to plan and model the flows of traffic in order to move people from A to B in the fastest and most efficient way. In this approach mobility is understood as a mere rationalised and instrumental practice that takes place from point A to point B (Urry et al., 2006; Spinney, 2009). However, in recent years there has been a 'turn' to what is widely termed mobility studies, which is critical towards this understanding of mobility that neglects the meaning of movement that takes place between A and B.

"Transport studies have too often thought of time in transit as 'dead time' in which nothing happens – a problem that can be solved technically. Mobility studies have begun to take the actual fact of movement seriously." (Cresswell, 2010: 18)

'Mobilities turn' was first initiated by the publication of the book *Sociology beyond Societies: Mobilities for the Twenty-first Century* in 2000 by Urry in which he argues that mobility is linked to identity, culture and social norms and therefore should be dealt with and understood as much more than "dead time" (Urry, 2000; Urry et al., 2006; Jensen, 2013). Urry stresses how each mode of travel "*provides different experiences, performances and affordances."* (Urry et al. 2006: 15). Urry emphasises how one of the major obstacles for previous sociological studies has been that they "*regarded society as a uniform surface and failed to register the geographical intersections of region, city and place, with the social*

[1] *Mobilities turn* is also referred to as the *New Mobility Paradigm* (Sheller & Urry, 2006). Based on Cresswell's criticism (2010) of the notion of *New Mobility Paradigm* we are using the concept of *Mobilities turn* to describe the recent shift in transport and mobility studies.

categories of class, gender and ethnicity."(Urry, 2010: 348). Further Cresswell notes that the solid tradition within various areas of research created disciplinary boundaries that precluded a holistic understanding of mobilities (Cresswell, 2010). More importantly mobilities are not only related to means of travel but form the nucleus of today's mobile society.

"The concept of mobilities encompasses both the large-scale movements of people, objects, capital and information across the world, as well as the more local processes of daily transportation, movement through public space and the travel of material things within everyday life." (Urry et al, 2006: 1).

Accordingly mobilities deal with two societal levels. On the one hand mobilities deal with macro, transnational processes such as exchange of capital flows, global communication and political decisions. On the other hand mobilities deal with micro-scale movement and communications patterns that are performed on an everyday basis through different habits and practises. Both levels are interlinked and reinforced by the increasing urbanisation, globalisation and technologically development that constantly transform the way people, objects, information and capital are moving and exchanged. Combined the two levels constitute today's mobile society and the field of research for scholars working within the 'mobilities turn' (Urry et al., 2006). In our study we will focus specifically on the daily micro-scale movements in cities in relation to cycling. We are working within the 'mobilities turn' as we stress the need to link sociology and mobility in order to achieve an interdisciplinary and thorough understanding of contemporary cities.

2.2 Studying mobilities 'in situ'

We are inspired by this way of understanding mobility as we are critical of the traditional understanding of mobility and its simplistic and numerical way of understanding and planning traffic flows from A to B. Applying a traditional planning approach would not allow us to obtain an understanding of the unreflective and tacit performances as mobility is merely acknowledged as rationalised and instrumental. Bearing this in mind we will apply this new way of understanding mobility to focus on the problems and potentials related to cycling infrastructure and urban design as we will focus specifically on the movement and communications patterns that are embodied and performed on an everyday basis through different habits and practices. This enables us to study mobile situations, mobilities 'in situ' and thus to answer our research question that aims at obtaining a better understanding of the interactions of cyclists with the design, each other and other road users.

In order to study mobilities 'in situ' we introduce the *Staging Mobilities* framework conceived by Jensen (2013). The *Staging Mobilities* framework is inspired by the work of the Canadian sociologist Erving Goffman, who studied the micro mobilities of the mundane everyday activities and their importance to the social structure of the city (Jensen, 2013). According to Goffman human actions always carries meaning and significance as strange as they might

seem. Therefore Goffman focused his research on concrete everyday interaction between two or more people in specific settings as these situations serve as *"a window into much larger issues such as social norms, cultural productions, and identity formation"* (Jensen, 2010: 391). To use the terminology of Jensen studying mobile situations and interaction becomes a remedy to understand the notion of 'mobile sense making' (Jensen, 2013).

The *Staging Mobilities* framework will make up the core of our theoretical framework for three mains reasons. First, the work of Jensen is conceived in continuation of the thoughts and ideas put forward by advocates of the 'mobilities turn' as Jensen argues that we need to understand the contemporary city as an assemblage of circulating people, goods, information and signs in relational networks creating the `meaning of movement´ which calls for an interdisciplinary and comprehensive understanding of mobility (Jensen, 2013). Second, *Staging Mobilities* is predominantly focusing on cities and the urban context for mobilities (Jensen, 2013), which is also the very focus of this study. Third, the framework has been specifically developed to comprehend and make sense of mobile situations by foregrounding the social interactions and embodied practices in relation to the physical surroundings. This makes it well suited for our study of the interactions of cyclists with the design, each other and other road users as these take place in numerous mobile situations making up the mobilities 'in situ'.

2.3 Staging mobility

The main point of the *Staging Mobilities* framework is that mobilities do not just happen or simply take place but that mobilities are staged 'in situ'. Thus the urban landscape of mobility infrastructure is designed and regulated by planners, engineers, architects and politicians. Jensen uses the term 'staged from above' to describe how the physical settings, material spaces and design constitute a system that affects how one moves which is out of one's control (Jensen, 2013). At the same time each trip is a reflection of who we are and how we relate to the build environment and other cyclists and road users. This makes our daily trip an embodied practice, often influenced by other humans and always within a material and physical setting (Jensen, 2013). Jensen uses the term 'staged from below' to highlight these social interactions and embodied performances (Jensen, 2013). This idea of the *Staging Mobilities* framework can be explained with the example of any bike trip. A bike trip takes place within a material environment of streets with or without cycle tracks, intersections with or without traffic lights, maybe through a park or across a main square. The point is that a cyclist during the bike trip encounters different designs of the material environment that potentially impacts the ride. Furthermore the bike trip is performed among other cyclists and road users resulting in countless interactions, for instance through the negotiations with pedestrians at a zebra crossing or the 'fight' for the best spot at an intersection with other cyclists. Finally the bike trip is also about deploying knowledge that is hardwired in the body as part of the embodied performance of the cycling practice. This can be reflected during the bike ride as cyclists may deliberately speed up approaching an intersection because they

know they can make it across. Alternatively the cyclists may also slow down if they know they cannot make the green light at the approaching intersection. In figure 1 Jensen (2013) illustrates how mobility is staged 'from above' and 'from below' and thus how the staging of mobilities influences the mobilities 'in situ':

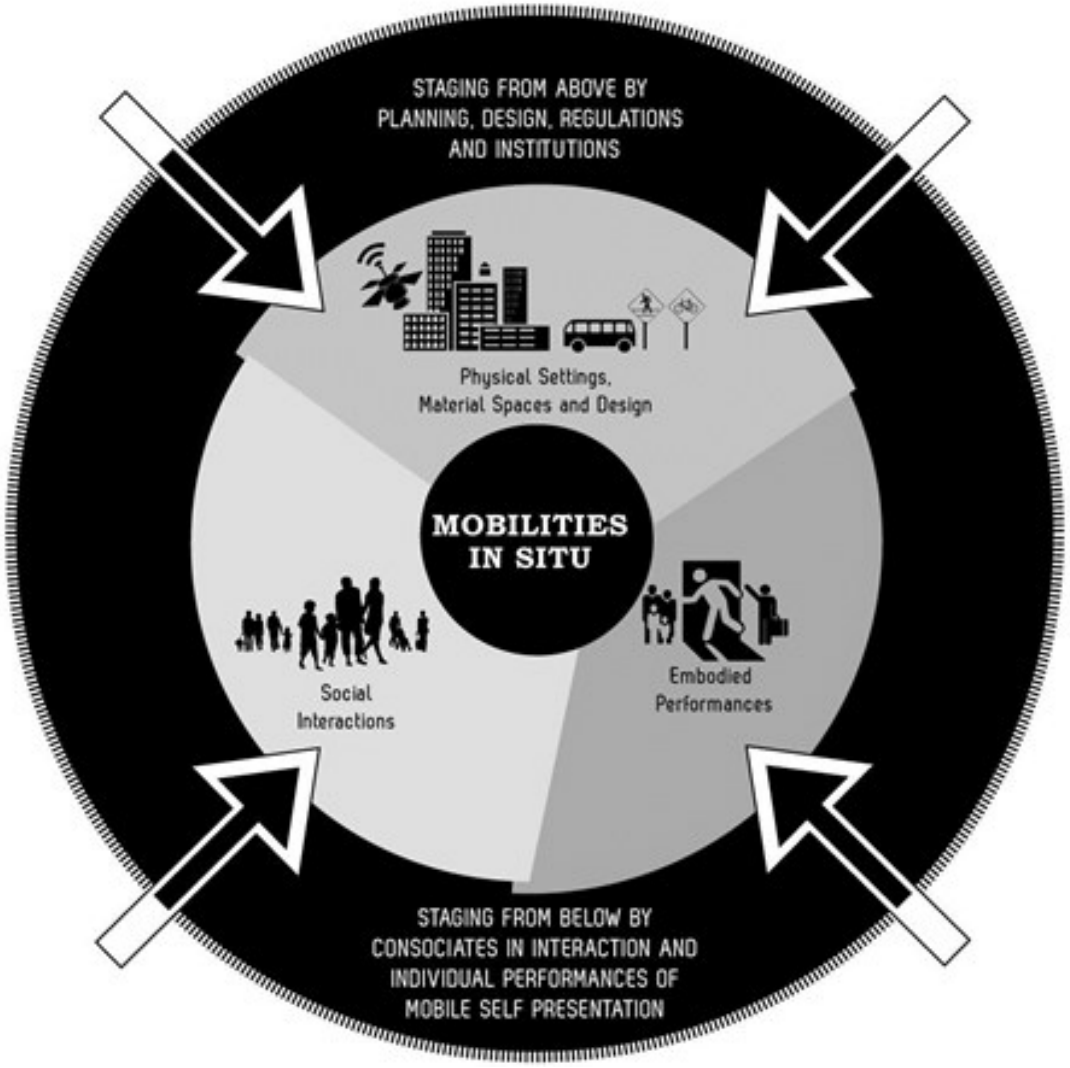


Figure 1: The staging mobilities model (Jensen, 2013)

According to Jensen we must understand mobility as being staged and that mobilities 'in situ' must be understood in the light of a staging process. This reflects the inspiration from Goffman who used the terms 'front stage' and 'back stage' to describe the everyday interactions between humans (Jensen, 2013). The staging process is multiple and has some elements that are staged from above and others from below. To present the term of 'staging from above' Jensen proposes the metaphor of 'scenography' as in the sense that the material environment are composing the 'scenes' where mobility takes place like the manuscript for a play. Further Jensen proposes the metaphor of 'choreography' to explain the embodied acts of self-choreography that individuals perform in mobilities 'in situ' (Jensen, 2013).

Moreover Jensen introduces the metaphors of the 'river' and the 'ballet' to describe two different perspectives to study mobilities 'in situ' (Jensen, 2013). The notion of the river refers to a birds-eye perspective on mobility where the observer is 'looking down' at the mobile situations from above, which enables more abstract and generalised understandings and interpretations (Jensen, 2013). Taking this birds-eye perspective on mobility the infrastructural design and physical layout can be compared with a 'riverbed', which is *"shaping the flows of people as water in a 'river'".* (Jensen, 2014: 50). An analysis from this perspective can translate abstract movement patterns into homogenize streams of traffic flows and thereby help identifying and understanding collective stream of various transport modes (Jensen, 2014). This may be explained with an example of an unauthorized parked truck on the cycle path that affects the flow of cyclists like a stone in a river. On the other hand, the notion of the 'ballet' refers to an eye-level perspective that foregrounds the bodily interactions and situational dynamics of mobilities 'in situ'. Hence the eye-level perspective enables to see "*the gestures, gazes, and embodied negotiations and interactions that take place ever so swiftly as people move"* (Jensen, 2013: 146). For instance certain patterns and types of moving (techniques) can be identified studying mobilities 'in situ' from the perspective of the 'ballet' (Jensen, 2013).

The staging mobilities model is thought of as an analytical tool developed to examine and analyse everyday mobile choices and situations. Thus the dialectical relationship between elements from 'above' and 'below' is made for operational reasons as "*the model is not to be understood as an ontological postulate but rather as a methodological devise and an analytical heuristic"* (Jensen, 2014:15). To operationalise the *Staging Mobilities* framework Jensen also introduces a number of metaphors as he stresses the need of urban analysts to get a new vocabulary and concepts in order to be able to conceptualise and theorise mobilities (Jensen, 2013). We have focused our introduction on the parts of the *Staging Mobilities* framework that are thought of specifically to explain the mobilities 'in situ' consequently leaving out metaphors and concepts as an all-embracing introduction of the work of Jensen is beyond the scope of this study. In the following we will describe this in more detail as we will apply the understanding of mobilities 'in situ' in order to study cyclists' interaction with the design, each other and other road users. To do so we will elaborate on the three dimensions of staging mobilities model; the concept of the physical setting, material space and design staging mobilities 'from above' and the concepts of social interactions and embodied performances staging mobilities 'from below'.

2.3.1 Physical settings, material spaces and design

The first dimension in the staging mobilities model is the design of the physical settings and material spaces of the urban landscape in which mobilities obviously take place. Regardless of the mode of transport we utilise, be it the bike, public transport, the car or our own feet, we inevitably move through a landscape of roads, signs and traffic lights, which is organised through a set of traffic rules designed to enable the mobility of people from A to B. Thus the

physical settings and material spaces are staging mobilities 'from above' through the design and regulation purposed by planners, engineers, architects and politicians embracing for instance the preparation of physical plans and design manuals for planning. The physical settings and material spaces cannot solely be understood as a static background but dynamic as they are man-made and having a considerably impact on mobility. To put emphasis on this Jensen uses the term 'mobile biotope', which he defines as a fully human-created environment for mobilities and living where the mobile practices not only sustain the liveability of the sites and places but are also the outcomes of these environments (Jensen, 2013).

To explain how the material environment affects mobilities Jensen introduces the concepts of 'sociopetal' and 'sociofugal' spaces. 'Sociopetal' spaces are sites and places that seem to 'draw' people and activities in (Jensen, 2013). This could for instance be shared space thoroughfares or public squares that support an urban environment, which attracts people for shopping or people to stay in the public space. Conversely, 'sociofugal' spaces seem to 'push' people and activities away (Jensen, 2013). This could for instance be a main road that supports the flow of the car traffic, which may be reflected in a distinct physical separation of the different modes of transport. The characterisation of a space as being either a 'mobile sociopetal' or as a 'mobile sociofugal' may neither be good nor bad and effectively spaces can perform both as a 'mobile sociopetal' as well as a 'mobile sociofugal' depending on the function of the spaces at different times and the actual situation (Jensen, 2013).

According to Jensen an important dimension of the physical settings is its semiotic properties as all material environments form distinctive semiotic landscape and sites. Semiotic refers to how we relate to signs and symbols, which plays a vital role because the material environment is 'read' as a semiotic system in order to make sense of a mobile situation (Jensen, 2013). The semiotic dimension of mobilities studies both relates to 'staging from above' dimension i.e. through the installation of traffic lights and way finding systems as well as to the 'staging from below' dimension i.e. through the gestures of people and bodily postures signalling mobile intentions on the street (Jensen, 2013). Because of that we will elaborate on this (see 2.3.3) in which we explain the embodied performances of mobility as we broaden the concept of semiotics introducing Jensen's notion of 'mobile body semiotics'.

The implications of the material environment can be summed up using the notion of 'mobility affordance' which refers to how the specific relation between the moving body and the material environment opens up or narrows down particular modes of mobilities travelling with different speeds and along specific trajectories (Jensen, 2013). For example a pedestrianised area is obviously restricting the affordance of cars while affording other modes of mobility such as pedestrians and cyclists. Still, not only the material environment but also the social interactions taking place stage mobilities 'in situ'. Accordingly we elaborate on this in the next paragraph as we introduce the dimension of social interactions to the *Staging Mobilities* framework.

2.3.2 The social interactions of mobility

The *Staging Mobilities* framework foregrounds the social interactions as they are crucial to understand mobilities 'in situ'. Hence travelling from one point to another rarely means travelling without meeting anyone else, which might be the reason why walking through the city during late night or early morning "*carries its own strange magic."* (Jensen, 2013: 81). In mundane everyday life we face several social encounters and interactions with other people for example at home, on our way to work, in the supermarket or the cinema etc. (Jensen, 2013).

Jensen introduces a number of concepts that are related to the dimension of the social interactions in order to comprehend mobilities 'in situ'. The first is the concept of 'mobile with' that is thought of to articulate the mobile dynamics that take place in daily social encounters. A 'mobile with' is to be understood as *"a group of two (...) co-presently moving together"* (Jensen, 2013: 81) The timeframe can range between a driving holiday with the family, to a jog with a friend or sitting next to another passenger in the bus. Obviously, most 'mobile withs', such as standing in line to enter the train or waiting for a green light with other cyclists or pedestrians, rarely lead to deep interactions as they appear quickly and are dissolved equally swiftly. The notion of 'temporary congregations' is used to characterise these situations where we are 'mobile with' as we meet and move alongside for a brief period of time (Jensen, 2010). Needless to say, the amount of such 'temporary congregations' is experienced more regularly in urban and dense settings were the concentration of people is higher. In these short social encounters communication is often performed in a non-verbal way, and Jensen describes how both the 'mobile with' and the 'temporary congregations" are typically linked to a process of 'negotiation in motion' (Jensen, 2013). The idea of 'negotiation in motion' is that what seems like random interactions between mobile bodies are in fact a process of negotiations that take place while in motion (Jensen, 2013). The notion of 'negotiation in motion' is useful to draw focus on the social interactions and thus to point to the fact that social interactions are made in a mobile space of norms, value and power (Jensen, 2013). Thus the social interactions are essential as the way we interact with the material environment and the way we make sense of it ultimately produces identity and culture (Jensen, 2013). We will elaborate on this in the next paragraph as we will introduce the embodied performances of mobility.

2.3.3 The embodied performances of mobility

`Mobilities in situ´ are not just made up by the social interactions of humans in material spaces but also by embodied practices. Thus the mobile embodiments are significant to the relations between humans in material spaces (Jensen, 2013). In the words of Jensen: *"Looking at the embodied movements of humans we are not only studying moving animals, so to speak, but also the creation of cultural significance and social practices"* (Jensen, 2013:94). This implies that in the practice of mobility there is a *"complex relationship between the moving, sensing body and the material and built environment of infrastructures and mobility modes"*,

which we need to explore and understand in order to explain *"what norms, meanings and everyday-life cultures are being produced and re-produced in this process."* (Jensen, 2013:92). In this Jensen emphasises that when practices become embodied they are also performed unreflectively. This can be the case in mobile situations as well as in others daily practices like the daily routine of brushing our teeth. However, in mobile situations the embodied practices may result in a clash between the reflexive and rationally designed material spaces staged 'from above' and the embodied and affective tacit acts of human mobility staged 'from below' (Jensen, 2013). An example of this is the so-called 'elephant path' (Imbert & te Brömmelstroet, 2014) where a significant number of cyclists choose to go along a particular trajectory for whatever reason that was not indented as a trajectory for cyclists when the material environment was designed (picture 1).

Picture 1: Elephant path (designaplause, 2011)

As mentioned earlier the semiotic dimension of the material environment is an important part of understanding the processes of *Staging Mobilities*. However, acknowledging the embodied performances of mobilities not only material installations but also the body itself becomes a sign, which Jensen describes introducing the term of 'mobile body semiotics' (Jensen, 2013). In the case of cycling cyclists become human signs when they use their arms for instance to indicate a change of direction. Contrary to a material sign, however, body signs are different not only because they are moving but also because there is less control of the sign, which potentially makes them easier for the 'reader' to misunderstand (Jensen, 2013). This may especially be the case if the 'culture of mobility' is unfamiliar. Thus the embodied performances of mobility afford particular normative and social interactions that merge into specific 'cultures of mobilities', which are linked to the traffic regulation but they are also embedded in the body as tacit mobility cultures. Each mode of mobility involves a set of practices that appear as distinct 'codes', a 'cycling code' for instance that is an expression of local norms and customs, which one has to master for practical reasons. Jensen articulates it as *"cycling knowledge"* that has *"to be accumulated"* (Jensen, 2013). In the cases of Amsterdam and Copenhagen cycling as a mode of mobility is for many people an everyday-life mobilities practice, which produces a different socio-cultural meaning to the embodiment of cycling (Jensen, 2013). Jensen exemplifies this on the basis of Denmark as a whole:

"In Denmark most children will be given a bike (of sorts) shortly after they learn to walk. Even though there are many adult Danes that do not cycle at all, it seems fair to claim that there is an almost universal taken for granted understanding of bikes and their potential for mobility that is grounded in the early years of childhood. As the child grows older the bike represents the main expression of self-determined mobility and thus symbolizes freedom of movement as an important cultural signifier. One could argue that on this background the bike becomes almost

invisible to most Danes. Not in the sense of it being inconspicuous in the everyday streetscape – the bike is predominantly visible as part of Danish mobility culture. But in the sense of becoming as familiar a mobility technology as say knife and fork is to everyday life's eating practices." (Jensen, 2007: 2).

Similarly to the situation in Denmark cycling in Amsterdam and the Netherlands in general can be described in the same way. Adding to the quote children in both Denmark and the Netherlands cycling are also taught in primary school. In other words cycling has become part of the culture and everyday practices of inhabitants in Amsterdam and Copenhagen, which have resulted in a distinct 'culture of mobility' in both cities (Carstensen & Ebert, 2012).

2.4 Summary

In this chapter we have introduced the main ideas behind the 'mobilities turn' to highlight the significance of linking sociology to movement in order to achieve a comprehensive understanding of the contemporary mobile society. Following this we have introduced the *Staging Mobilities* framework, which make up the core of our theoretical framework as it allows us to study and shed light on the dynamics of mobilities 'in situ' The main point of the *Staging Mobilities* framework is that mobilities are 'staged from above' through design and regulation of the material environment by planners and politicians as well as 'staged from below' through the social interactions and embodied practices of people performing mobilities. In addition we have introduced the metaphors of the 'river' and the 'ballet' as two analytical perspectives of mobilities 'in situ' that enables us to study the flows and interactions of cyclists, respectively. Consequently we will apply a birds-eye perspective in the first part of the analysis in order to map the 'river' of cyclist along the routes of study in Amsterdam and Copenhagen. The aim of this is to transform the seemingly abstract movement patterns of cyclists into homogenize flows of cyclists, which can help us to identify and understand the interactions of cyclists. Accordingly we will apply an eye-level perspective in the second part of the analysis to explore the bodily interactions and situational dynamics of the 'ballet'. To do so we have introduced a range of various theoretical notions within the *Staging Mobilities* framework. Firstly within the dimension of material environment we have presented the notions of 'mobile affordance', 'mobile semiotics' and 'sociopetal' and 'sociofugal' spaces. Secondly within the dimension of social interaction we have outlined the notions of 'negotiation in motion' and 'mobile with'. Thirdly, within the embodied performances we have introduced the notions of 'mobile body semiotics, 'cycle code' and 'mobility culture'. All these theoretical notions will be applied throughout the study to help us examine and articulate the dynamics and complexities related to cycling 'in situ'. Combining the analytical perspectives of the 'river' and the 'ballet' allows us to create a deeper and more comprehensive understanding of mobilities 'in situ' as it enables the examination of *"how people move, why they do so, how this may feel and affect their understanding of self and other."* (Jensen, 2014: 25). In the next chapter we will elaborate in detail how we want to answer the research question as we introduce the methodological framework of this study.

3 Methodology

In this chapter we outline the methodological framework of our research in order to describe how we propose to answer the research question. Firstly, we present the research design, which is structured as case studies of Amsterdam and Copenhagen, two of the leading cities in terms of urban cycling. We describe three main reasons for studying cycling in Amsterdam and Copenhagen and argue why these cities can be characterised as 'critical cases'. Secondly, we introduce how our study will employ a mixture of quantitative and qualitative methods to study the 'river' and the 'ballet'. We apply video recordings, desire lines studies, observations and ride-along interviews to gather the data needed to achieve a thorough understanding of mobilities 'in situ'. As we introduce these research methods, we also reflect on the strengths and shortcomings of each method. Thirdly, we describe how we chose to conduct the ride-along interviews and how we have processed the data. Furthermore, we argue for the selection of participants and for the routes of study in Amsterdam and Copenhagen. We continue by reflecting on the research process and how the interviews turned out. Finally, we summarise our methodological approach through an illustration of our research design.

3.1 Research design: Case study

The importance of a comprehensive research design for doing social research has been highlighted numerous times (See for instance Bryman, 2008; de Vaus 2001; Yin 2003). According to de Vaus: *"the function of a research design is to ensure that the evidence obtained enables us to answer the initial question as unambiguously as possible."* (2001: 9) In our study we have chosen case studies as our research design in order to structure our study and to answer our research question. The characteristics of a case study are that it is a detailed and extensive investigation of a single place, community or phenomenon (Bryman, 2008). The case study design has a long history within sociology and social research and it is concerned with examining the nature and complexity of a specific setting. Unlike other research designs Yin highlights that a general textbook for case studies has yet to be developed (Yin, 2003). However, the case study design can be distinguished between *single* and *multiple* case studies. According to Yin (2003) the multiple case studies should be preferred as more than one case provides the researcher with a stronger foundation that enables the researcher to compare or contrast the results from the cases. Yin (2003) distinguishes between two types of design for case studies, the *holistic* design and the *embedded* design. In this study we apply the holistic design as our main aim is to explore the distinctive dynamics of each city through a 'two-case' case study. This would not have been possible with embedded cases as these include predefined units of analysis which could have masked and precluded the distinctive features of Amsterdam and Copenhagen.

Flyvbjerg (2011) stresses the significance of in-depth case studies as he highlights that all experts and scholars have based their intimate knowledge on several concrete cases within their field of expertise. Accordingly science needs thorough and context-dependent case studies to exemplify results and to obtain intimate knowledge. Flyvbjerg argues that there is

no evidence of predictable context-independent research within social science (Flyvbjerg, 2011). Consequently, universal theories should therefore not be a definitive criterion for social science as it is within for example natural science.

"*Predictive theories and universals cannot be found in the study of human affairs. Concrete case knowledge is therefore more valuable than the vain search for predictive theories and universals."* (Flyvbjerg, 2011: 304).

Based on the consideration of Yin and Flyvbjerg we want to do a "two-case" case study of Amsterdam and Copenhagen. We have made this choice as the aim of this study is to elucidate and understand the unique and complex dynamics related to cycling in each city. However, we still aim to compare, contrast and discuss the results from Amsterdam and Copenhagen as we argue that our cases can be characterised as critical cases. The next section will explain the selection of the chosen cases, Amsterdam and Copenhagen.

3.1.1 Selection of cases

The first reason for choosing Amsterdam and Copenhagen as our cases is that both have ambitious visions for promoting cycling. At the same time, they are two of the world's most cycle-friendly cities which are somewhat comparable on a number of statistical parameters. In table 1 we have summarised a number of facts on cycling in the municipalities of Amsterdam and Copenhagen respectively.

	Amsterdam	**Copenhagen**
Population	790,044	549,050
Area (km^2)	219	74
Density inhabitants pr. km^2	3,506	7,372
Investments in cycling av. 2007-2012 million (DKK)	131	87
Investments per inhabitant av. 2007-2012 (DKK)	171	165
Cycle tracks (km)	513	346
Cycle track (km)/area (km^2)	2	5
Bike ownership per inhabitant	0.83	1.10
Car ownership per inhabitant	0.28	0.23

Table 1: Data from 2012 on Amsterdam & Copenhagen (Copenhagen Municpality, 2012)

The main differences between the municipalities of Amsterdam and Copenhagen are their populations and geographical distribution. The Municipality of Amsterdam has a larger population and covers an area almost three times the size of the Municipality of Copenhagen. However, this is mainly due to the fact that the Municipality of Amsterdam administrates suburban areas around the centre whereas in Copenhagen most suburban areas are independent municipalities for which reason they are not included in the numbers for the

Municipality of Copenhagen. Apart from the administrative differences between Amsterdam and Copenhagen the amount spent on investment in cycling, km of cycle track and the bike/car ownership ratio are quite similar. In addition, the modal shares of the Municipalities of Amsterdam and Copenhagen are alike with the most noticeable difference in the use of public transportation (table 2).

Modal share, all trips (2012)		
Transport mean	**Amsterdam**	**Copenhagen**
Walking	23%	25%
Public transportation	22%	17%
Car	26%	29%
Bicycle	29%	29%

Table 2: Modal share, all trips. Amsterdam & Copenhagen (Copenhagen Municipality, 2012)

Still, there are infrastructural differences in Amsterdam and Copenhagen. As noted in the Bicycle Account for Copenhagen:

"*In Amsterdam, bicycle traffic runs largely along minor roads and in 30 km/h zones, which are spread out through the city. (…) In Copenhagen, cycling is much more concentrated and takes place mainly on cycle tracks on roads with extensive car traffic of 40-50 km/h."*
(Copenhagen Municipality, 2014b: 11).

Furthermore, the city of Amsterdam has an extensive network of trams compared to Copenhagen which at the moment has none. The differences between Amsterdam and Copenhagen imply that we will not be able to collect identical data from the cities as the results are embedded in the unique dynamics of each city. We are aware of the distinct characteristics of Amsterdam and Copenhagen as we acknowledge that no cities are identical.

The second reason for choosing Amsterdam and Copenhagen is that desire lines studies of cyclists (See chapter on empirical data) have been carried out solely in these two cities. In Amsterdam the University of Amsterdam and the consultancy firm Copenhagenize have conducted desire lines studies at nine intersections, while in Copenhagen Copenhagenize has conducted desire lines studies at seven intersections. The aim of the desire lines studies is to map how cyclists navigate and interact with the design, each other and other road users at the selected intersections (Imbert & te Brömmelstroet, 2014). The desire lines studies provide our research with a baseline of understanding the daily flow of the cyclists and identifying critical points of interaction. This available and exclusive data is an essential reason for us choosing the cases of Amsterdam and Copenhagen.

The third reason for choosing Amsterdam and Copenhagen is the widespread use of the bicycle in both the Netherlands and Denmark. Compared to most other countries the bike in the Netherlands and Denmark is mainly used for practical and utilitarian purposes. According

to Jensen the bike in Denmark has become naturalised (Jensen, 2013). Bearing this in mind we are studying two cities where the bicycle is a natural and embedded part of daily life for most inhabitants.

We work with the cities of Amsterdam and Copenhagen and characterise them as 'critical cases'. Flyvbjerg highlights how a critical case can be applied to: "*obtain information that permits logical deductions of the type: If this is (not) valid for this case, then it applies to all (no) cases."* (Flyvbjerg, 2011: 307). We will apply this idea to our cases, Amsterdam and Copenhagen, as they are two of the world's best cities for cycling. Based on this statement we argue that issues related to cycling in Amsterdam and Copenhagen are likely to be the case in other cities where the level of infrastructure and the investments in cycling are considerably lower. In the following section we will describe the research methods we will apply in our study.

3.2 Research methods

In traditional transport planning quantitative based methods like travel countings and models simulating flows of traffic are the primary methods used to map and forecast the mobility of people travelling from A to B. Such journey models and similar methods are applicable in studies that for instance aim to map how cyclists bike from A to B, however, such methods are inadequate to explain the meaning of movement that takes place between A and B and thus why cyclists a bike in the way they are. In line with Flyvbjerg scholars within the 'mobilities turn' are arguing for less generalising and more geographical and socially grounded studies on mobilities (Spinney, 2009). Following the ideas of the 'mobilities turn' of linking mobility and sociology does not only demand the development of new theories but also the application of new methods (Fincham et al., 2010). Correspondingly we argue that we need to work with methods that enable us to obtain a more comprehensive understanding of mobility. As a result we will be applying both quantitative and qualitative research methods. According to Bryman (2008) the use of both increases the confidence in the findings as the different methods equally reinforce each other. According to Flyvbjerg research should be "*problem-driven and not methodology-driven*" (2011: 313). Further Jensen stresses that "*combining qualitative and quantitative methods is a must and should not need to be defended as either provocative or novel."* (Jensen, 2014: 35). Elaborating on this Jensen argues that the way we plan infrastructure in cities should be acknowledge as a complex and circulating network of which we need a deeper understanding through an interdisciplinary approach. We believe that triangulation and an interdisciplinary approach is essential to uncover *why* cyclists interact in the way they do.

3.3 Empirical data

Accordingly, this study is based on various empirical data sets procured using both quantitative and qualitative research methods. Our study combines video recordings that have been used to map the desire lines of cyclists at selected intersections in Amsterdam and

Copenhagen with observations and so-called ride-along interviews. The video recordings provide us with the actual picture (at the time of the recordings) and they can thus help us to understand the desire lines of cyclists that have been mapped in the desire lines studies. On the other hand the desire lines serve the purpose of illustrating the seemingly abstract movement patterns of cyclists into homogenized flows of cyclists. The observations add to the existing empirical data as they provide us with an understanding of what is actually going on. Doing observations the number of cyclists in the desire lines studies become real people and the observations also enable us to identify critical points of interaction along the studied routes. The ride-along interviews supplement the observations as they give us the possibility to get insights from the cyclists themselves about how and why they are interacting with the design, each other and other road users in the way they do. We will describe the empirical data in more detail in the following sections; although emphasis is on describing the empirical data we have gathered for this study.

3.3.1 Video recordings

Videos have been recorded at the intersections that have been selected for the desire lines studies in Amsterdam and Copenhagen and they have been used as data input to identify the desire lines of the cyclists. Thus the video recordings are valuable to prove the actual behaviour of cyclists as they can provide quantitative data on the number of cyclists, routes etc. In addition, the video recordings also hold information on how cyclists behave and how they interact with the design, each other and other road users at the selected intersections. For our study we have had access to the video recordings of the studies in Amsterdam but not to those in Copenhagen.

3.3.2 Desire lines

Based on the video recordings of the selected intersections in Amsterdam and Copenhagen the paths of the cyclists have been analysed using the "Desire Lines Analysis Tool" created and developed by Copenhagenize Design Co in 2012. To map the paths of cyclists, the videos have been observed and every time more than one cyclist takes a unique path across the intersection, this path is given an indicator. Then, the number of cyclists taking that specific path is counted. The "Desire Lines Analysis Tool" is a useful way to access the quantitative data obtained from the video recordings as it can provide a structured overview of the actual behaviour of cyclists in the selected intersections. The desire lines studies in Amsterdam have all been conducted for one hour either during the morning or afternoon rush hour contrary to the desire line studies in Copenhagen, which were conducted over a twelve hour period. It is worth noting that the traffic flows may look different as many cyclists will be biking in the opposite direction at another time of the day, for example commuters. We apply the data from one hour of the morning rush in Copenhagen.

3.3.3 Observations

In addition to the video recordings and the mapped desire lines we have done a number of observations of what Kusenbach terms *"`naturally´ occurring social settings, conduct and event*s" (Kusenbach, 2003:458). We choose to perform what Bryman refers to as the *"complete observer"* (Bryman, 2008) where we as researchers do not interact directly with people. This was important for us as we wanted to go to Amsterdam ourselves to study and capture the 'natural' interaction between cyclists, the other road users and the physical settings. The observations in Amsterdam and Copenhagen were carried out during morning and afternoon rush hour traffic in March and April 2015.

Specifically, we have chosen to do the observations for three reasons. Firstly, the observations serve to supplement the video recordings in Amsterdam, and in Copenhagen even as a replacement, since the video recordings used for the mapping of the desire lines were not available. Also the observations are essential because the desire lines studies were completed in 2013 and 2014 and therefore we have needed to make sure that there have not been any major changes in the flows of cyclists through the intersections. Secondly, the observations have been important as they have given us the chance to sense the atmosphere at the intersection, which is not possible to do through the video recordings alone. Thirdly, our observations also enable us to explore and understand the surrounding settings and infrastructure around the intersections which cannot be observed from the static video recordings. This is significant, as intersections are always part of a bigger infrastructural setting and cannot be perceived as isolated from the rest of the city.

With this in mind we are still aware of the fact that the observations alone reveal limited if any information about how the cyclists perceive and interpret the environment. As Kusenbach (2003) emphasises any observer's view that lacks an understanding of the setting remains superficial and thus reveals more about the observer's own standpoint than anything else. In order to overcome this we have chosen to supplement our observations with a number of interviews with cyclists as they are well suited to provide us with insights and a better understanding of the behaviour of cyclists.

3.3.4 Qualitative interviews

In continuation of our ethnographic approach and to supplement the desire lines and observations we choose to do qualitative interviews with cyclists in Amsterdam and Copenhagen. The main argument for doing interviews is that it enables us to focus on and achieve detailed insights into the interviewees' points of view (Bryman, 2008). This will help us to obtain a richer understanding of *why* cyclists bike the way they do and thereby enable us to answer our research question. In this study we want to bring out what the interviewee sees as relevant and important through detailed answers within our frame of study. The in-depth interviews conducted where structured as a mixture between *unstructured* and *semi-structured* interviews (Bryman, 2008). Inspired by the unstructured interview form, the

interviewee was asked to 'think out loud' and talk about whatever came to mind. At the same time, with inspiration from the semi-structured interview form, we also made an interview guide with a list of questions related to the theoretical framework. With this mixed interview approach the opinion of the interviewee was in focus but we also made sure to include questions on the theoretical framework of this study, too. The interview guide was developed after the first two interviews and additional questions on for example 'bike culture', 'unregulated crossings' and 'the weather' were added to the interview guide. The interview guide contained the same questions in Amsterdam and Copenhagen (Appendix 1). The questions were formulated with point of departure in Silverman's (2013) general advice on how to conduct qualitative interviews.

Initially we also considered preparing a survey in which we would ask cyclists questions about their cycling experience at the selected intersections just as we considered traditional ways of conducting the interviews including focus group interviews with cyclists and short interviews with cyclists at the selected intersections. However, common to all of the mentioned research methods is that they all fail to provide insights into the lived experience of mobilities 'in situ' as the participants are taken out of the place and practice they are asked to talk about. The implication of this is for instance that the participants will tend to focus on their immediate reflections and memories, which potentially prompt a one-sided picture of the cyclists' experience of the intersections. Kusenbach (2003) stresses that ethnographic interviews can provide unique insights into the informants' subjective interpretation of others and the social interaction, however, she also points out two shortcomings of the interview method in relation to its ability to reconstruct the informants' lived experience of a certain place. Firstly, it is not possible to access all aspects of the lived experience in an interview because the participants overlook issues that do not figure prominently in their awareness. Secondly, traditional interviews are primarily static encounters in which the participants are taken out of their routine experiences and practices in their `natural´ environment (Kusenbach, 2003).

3.3.5 Go-along interviews

Yet, the shortcomings of conducting interviews are in relation to their ability to capture the `the lived experience´ in the `natural environment´ rather than in relation to more general shortcomings of interviews as a research method. As a result of this Kusenbach (2003) suggests coping with the shortcomings by applying a go-along interview method in which:

"...fieldworkers accompany individual informants on their 'natural' outings, and – through asking questions, listening and observing – actively explore their subjects' stream of experiences and practices as they move through, and interact with, their physical and social environment" (Kusenbach, 2003: 463).

As we are researching the behaviour of cyclists we have chosen to do ride-along interviews (on bikes), although walk-along (on foot) and other modes of go-along are possible, too

(Kusenbach, 2003). We believe go-along interviews are beneficial for our research as they give us the possibility to obtain in-depth knowledge of the cyclist's experience including how the infrastructural design, the interactions and the embodied practice of cycling influence the behaviour of cyclists. Hence, what generally makes the go-along technique unique is that it gives the researcher the possibility to observe their participants' spatial practices 'in situ' while accessing their experiences and interpretations at the same time (Kusenbach, 2003).

In this study we have a special focus on intersections; however, we also argue that the preferences of the cyclists using an intersection cannot be fully disclosed only by focusing on the intersection itself. Thus, an intersection is only one element in the journey of a cyclist, which is embedded in a larger infrastructure system. Consequently, the behaviour of cyclists at any intersection must be understood in relation to how the infrastructural design and the surrounding urban environment may influence the behaviour of cyclists. Usually research tends to focus on a limited number of locations (Kusenbach, 2003), however, this approach also enables us to take into account the significance and meaning of less prominent places by which the selected intersections are linked together.

3.3.6 Ride-along interviews

Following the 'mobilities turn' and hence the growing number of studies exploring the significance of what is between A and B has also resulted in new innovative methods to collect empirical data (See, for instance Büscher & Urry, 2010; Fincham et al. 2010). In studies of cycling ride-along interviews have been applied as a research method in previous studies (Rambøll, 2015; Comeau, 2014; Hull et al., 2014; van Duppen et al., 2013; Brown, 2012; Jones, 2012; Jones and Burwood, 2011; Jones, 2005; Pooley et al., 2011; Wood, 2010; Spinney, 2007; Spinney, 2006). However, the studies are all relatively new and thus the ride-along interview as a research method is still being developed. Hence, there are no structured guidelines on how to conduct ride-along interviews, unlike traditional static interviews, which are widely described in books dedicated to the art of conducting interviews (See for instance Bryman, 2008).

Consequently, we have had to do our own charting of the studies that have applied ride-along interviews in order to be able to identify the approach on how to conduct the ride-along interviews that would be most suitable for our study. This has been done by completing a structured literature review on studies that have applied ride-along interviews. Altogether, the literature review has given us valuable insights to the different ways ride-along interviews have been conducted previously. In order to design the ride-along interviews for our study we have critically accessed the previous studies and in the following we will briefly point to some of the issues that the researcher should be aware of when conducting ride-along interviews focusing on the main differences between the previous studies applying the ride-along method. The issues include considerations on how the ride-along interviews should be

conducted and as a result of this what the role of the researcher is. The purpose of this is to elucidate the process we have been through designing the ride-along method for this study.
Doing ride-along interviews require an initial decision by the researcher as to whether the interview should be conducted during the ride or not. To conduct the interviews during the ride gives the researcher the possibility to ask immediate questions about interesting situations and aspects along the route making them most suitable in studies in which the senses and feelings of the cyclists are of particular interest. Sheller points to the challenges of collecting empirical data on the move, although she emphasises the importance of conducting the interviews in the space of study:

"Everyday activities are so embedded in space that to carry out data collection, for example interview in another unrelated space, can limit the potential of the data – it removes the immediate relationship between the interviewee and the emotional and social space that is being discussed" (Sheller in Wood, 2010:5).

However, conducting ride-along interviews on the move obviously pose considerable logistical and practical problems, which can make it necessary to adjust the data collection to the chosen route and prevailing traffic conditions for instance by supplementing with in-depth interviews both before and after the ride (Pooley et al., 2011). Spinney (2011) has described the problems of conducting the interviews during the ride in relation to his own study of cyclists in London (See Spinney, 2007):

"Whilst useful in certain contexts, in metropolitan locations a ride-along is often either unsafe or risks precluding the very practice it seeks to investigate, and therefore another way of accessing the experiences of mobile participants was required." (Spinney, 2011:166).

The problems have been discussed and assessed in detail in Brown et al. (2008), Brown & Spinney (2010) and Spinney (2011), which are papers dedicated to the discussion of the methodological challenges of conducting ride-along interviews and how these can be addressed using video ethnography. The argument is that the employment of video is a way for the researcher to evoke some of the context and detail of the cycling practice, enabling a sense of 'feeling there', while at the same time the researcher is able to talk about practices 'as they happen' during playback of the video with participants (Spinney, 2011). Garrett stresses that film can be a remedy to provide data on at least two levels of consciousness - tangible and intangible (2010). Garrett further elaborates how "*video can also capture small gestures, expressions and moments which remind us of something intangible, something that may have slipped from memory otherwise."* (Garrett, 2010: 526). This is especially useful as we are studying cycling as an embodied and tacit practice. Additionally after conducting the ride-along interviews, the video material has served as a tool to recall the bike trips similar to what Bryman calls an *'aide-mémoire'*, where the images become components of the ethnographer's field notes (Bryman, 2008: 424).

3.3.7 The role of the researcher

Applying the video in our research, we had to consider our role as researchers. This mainly concerned the camera angle and thus also how we as researchers would influence the behaviour of the participants (Garrett, 2010). We considered two main alternatives; either to attach the video camera to the handlebar on one of our bikes to film the participants from behind, or to attach the camera to the handlebar or helmet of the participants. The first would give us a view of the participant during the ride including where the participant was looking and how he/she was interacting with the surroundings and the other cyclists and road users. The latter would give us the view of the ride from the participants' point of view. The first option would potentially imply a strong influence on the behaviour of the participant during the ride as we would have to ride closely behind in order to do the video recording, which would obviously not make the ride a 'naturally occurring' social occasion (Kusenbach, 2003). On the other hand the second option would make it possible for us to apply the ride-along method without the presence of us as researchers (Jones, 2012). However, regardless of which approach is used, the presence of the researcher can never be evened out completely (Garrett, 2010). Therefore when doing ride-along interviews it is more important to be aware of the role one has as researcher and how it affects the results rather than to try to eliminate the role of the researcher.

3.3.8 Conducting ride-along interviews

As in most research the choices we have made have both been methodological as well as practical. The assessment of the advantages and disadvantages of the ride-along methods applied in the previous studies and the preconditions we have had for this study determined how we decided to conduct the ride-along interviews. The main interview framework has been adopted from Brown (2012) as we decided to divide the ride-along interviews into the following three main stages:

1) **The introductory stage** is mainly included to greet the participant and to briefly inform him/her about what is going to happen through the interview. The aim of this stage has been to establish a good rapport with the participant as we ask opening questions related to the bike experience of the participant.
   (Length app. 5 min.)

2) **The ride-along stage** follows as we emphasise that the participants should try to bike normally as if they were biking alone. The aim of the bike ride has been to get the participants to think about their cycling habits that for most people are tacit and unreflective. We follow at a safe distance filming the ride. We film the participants with a Go Pro camera attached to the handlebar of one of our bikes. This gives us a view of the participants, which is important for our study because it gives us the best insights into the behaviour of the participants during the ride. Hence, this approach is the best premise to ask questions about what the participants are doing and their motivations

for doing it. We are aware that our presence will influence the behaviour of the interviewee. Even though the situation is "constructed" we still think that the ride can provide us with valuable and valid insights into why cyclists interact with the design, other cyclists and road users the way they do. (Length app. 10 min.)

3) **The follow-up stage** is conducted immediately after the ride as we offer the participant a drink at a nearby café. The video of the ride is used as the starting point for this interview as we ask the participants to think out loud and describe what they are experiencing, thinking and aware of along the way. If the participant is struggling to describe the ride we ask questions from the interview guide. The aim of the interview is to get the participant to describe the ride while watching the video and using it to recall certain situations from the ride. The video can be paused along the way which will give the participant enough time to elaborate on particular situations and likewise allow us to ask supplementary questions. In addition we had pictures from the routes which we could show the participants to illustrate specific situations. (Length app. 40-60 minutes)

We have decided to conduct the ride-along interviews during rush hour as this is the time with most traffic and potential conflicts. This is also the main reason why we have chosen to conduct follow-up interviews instead of during the actual ride. An actual ride-along interview on the move in Amsterdam and Copenhagen would most likely lead to an incoherent interview, as we as well as the participant would have to take notice of other traffic users and be interrupted by overtaking cyclists. This would have affected the quality and depth of the answers and alternatively require a supplementary interview after the ride. However, having no experience doing ride-along interviews we tested the method in Copenhagen before going to Amsterdam in order to evaluate the approach.

3.3.9 Processing the interviews

For the purpose of efficiency and the time constraints of this study, the interviews have not been fully transcribed. Instead, we have filled in a table for each interview including a detailed description of what is being said and concurrently highlighting quotes. In this way we have been able to organise and analyse the empirical data at the same time. Subsequently, we have coded the data and divided the main points into six different themes:

1. The material environment
2. Social interaction
3. The embodiment of cycling
4. Familiarity
5. Safety
6. Nature of cyclists

We have selected the themes partly based on the theory and partly due to the answers of our participants. One example of the detailed transcription will be put in the appendix (Appendix 2) together with all the audio files of the interviews.

3.4 Selection of participants

Having decided on how we would practically conduct the ride-along interviews we had to find participants in Amsterdam and Copenhagen. Previous studies applying the ride-along method in urban areas focus mainly on commuters or people who are familiar with the route of study (van Duppen et al., 2013; Jones, 2012; Jones & Burwood, 2011; Wood, 2010; Spinney, 2007). Studying cycling in Amsterdam and Copenhagen we will obviously have a focus on urban cycling, however, unlike the previous studies we do not want to study solely commuters and other cyclists that are familiar with the route but also to study cyclists that are less familiar with the route of study. We have multiple reasons for taking this approach. Firstly, the cyclists in both Amsterdam and Copenhagen are not all commuters, even less are all cyclists familiar with all areas of their city. This means that cyclists will sometimes find themselves in situations in which they are not or only less familiar with the physical design of the infrastructure, which we assume potentially impacts the behaviour of the cyclists and thus how they interact with the design, each other and other road users. Secondly, and perhaps more importantly, it is crucial to get a better understanding of the needs and motivations of cyclists that are less familiar with the physical design of the infrastructure in order to succeed in further promotion of cycling in Amsterdam and Copenhagen. Choosing this broader perspective will give us valuable knowledge on understanding the everyday traffic flow combined with knowledge on how the route (or part of it) is experienced for the first time. We believe that intersections should be designed for daily commuters, but at the same time make sense for cyclists who do not bike the route of study every day.

This approach differs from most of the previous studies applying the ride-along method and it is also contradictory to the importance of conducting what Kusenbach (2003) refers to as 'natural' go-alongs meaning go-alongs that follow the familiar environments and track outings of the participants. Kusenbach stresses that such 'contrived' or experimental go-alongs may *"produce appealing data, but not of the kind that would greatly enhance our understanding of the subjects' authentic practices and interpretations"*(Kusenbach, 2003: 464). Selecting the participants we were aware of this, however, since we study in Copenhagen we had different preconditions for finding the participants, especially finding the participants for the ride-along interviews in Amsterdam was a challenge. Because of that we considered either to do planned ride-along interviews and so to try to find participants, preferably familiar with the route of study, or to do spontaneous ride-along interviews where we would approach cyclists going along (a part of) the selected route of study. Again, this was indeed a question of balancing the advantages and disadvantages of each approach as the planned ride-along interviews would give us more in-depth answers whereas with the spontaneous ride-along interviews we would be able to ensure that the participants would be familiar with the route of study. In the end we choose to go for the planned interviews to have more time to ask

questions, although this would potentially imply that all cyclists would not be familiar with the route.

In the beginning this was a practical shortcoming of our research we had to accept; however, in fact we think it proved to enrich the findings of our research. Thus our experience doing the ride-along interviews for this study is that it is rather those participants who are less familiar with the route that proved to be more reflective about the trip, which provided us with different but valuable perspectives. This is why when we came to do the ride-along interviews in Copenhagen we selected both some participants who were familiar with the route and some who were not. In a study that attempts assessing the bike infrastructure in different cities in the Netherlands including Amsterdam and the UK a similar approach is applied as the researcher, who is an experienced cyclist is accompanied by an infrequent cyclist on rides in the cities of study to give a different perspective on the perceived quality of the physical infrastructure and the mental/ stress factors associated with the ride (Hull et al., 2014). The study shows that acknowledging and identifying the different perceptions of experienced and inexperienced cyclists, or be it a cyclist familiar or less familiar with the physical environment, can provide valuable insights and more importantly be necessary to design the physical infrastructure so that less experienced cyclists are motivated to cycle. For the same reason we have chosen to conduct interviews with people from other countries in both Copenhagen and Amsterdam. This choice was deliberate to get external insights on the 'mobility culture' and the embodiment of cycling in Amsterdam and Copenhagen.

For the reasons mentioned above we have prioritised to get a selection of participants in both Amsterdam in different age groups, sex and knowledge of route of study. In Amsterdam the participants were found through our personal network of friends and acquaintances that know people in Amsterdam. In Copenhagen we applied the same approach and in addition we also distributed flyers at the Ingerslevgade / Dybbølsbro intersection, which resulted in the arrangement of one of our interviews in Copenhagen. Consequently, we have chosen not to prioritise socio-demographic factors, as this has not been possible within the time constraints that were set up for this study. This means that this study does not say anything about the connection of for instance education, work and family background on the behaviour of cyclists. We are aware of this limitation and urge other scholars to engage with this issue in future studies. The tables presenting the eleven participants with whom we conducted ride-along interviews are put in Appendix 3 and Appendix 4. The names used in the study are not the real names of the participants

3.5 Selection of the route of study in Amsterdam

Living in Copenhagen the selection of the route of study in Amsterdam proved to be rather difficult as we did not have the possibility to do on-street observations before going to Amsterdam. Hence, before arriving in Amsterdam we were limited to assess the desire lines and to the observations based on the videos that have been recorded to map the desire lines

of the selected intersections. However, this only provided us with limited insights into the intersections themselves and no insights into the streets connecting the different intersections. We tried to get additional insights about the intersections and the streets connecting them using Google Street View, however, this also proved to be inadequate as the pictures could not give us an understanding of the flow and dynamics of the cyclists and the traffic in general. In order to arrange the interviews we had to be able to give potential interviewees more detailed information about where the interviews would take place. As a result, we made the choice to settle on a route in the area of De Pijp before going to Amsterdam. The choice of the De Pijp was also done for practical reasons since many of the desire lines studies were conducted here.

Being in Amsterdam we did observations the first two days in order to find a suitable route for our research. Important parameters for the route were that it included at least two intersections in which desire lines studies have been conducted and that it featured different infrastructural designs. In addition, we prioritised that the route should make up a direct route for cyclists travelling from the start to the end point of the route without too much zigzagging. Based on our observations the first day we choose a route from the University of Amsterdam to the Museumsplein which included the intersections at Weesperplein, Frederiksplein, Stadhouderskade/ Ferdinand Bolstraat and Stadhouderskade / Museumsbrug. The main reasons for this was that it made up a logical route for cyclists going from the University of Amsterdam towards the Museumsplein and because it includes four of the intersections in which desire lines studies have been conducted. However, before doing the first interview we realised that the physical design along the route only had limited points of interaction and also that it would be too long. Consequently, we ended up choosing the selected route of study as its length is more suitable and it also has design features that have more potential for interactions between cyclists and other road users. In addition, the selected route has more similarities with the route of study in Copenhagen.

3.6 Selection of the route of study in Copenhagen

Living in Copenhagen the selection of the route of study in Copenhagen was easier than in Amsterdam since we could do on-street observations when needed. Just like in Amsterdam the important parameters for the route were that it included at least two intersections in which desire lines studies had been conducted and that it featured different infrastructural designs. Again, we also prioritised that the route should make up a direct route for cyclists travelling from the start to the end point of the route. With point of departure at the intersections, in which desire lines studies had been conducted we considered different potential routes of study primarily based on our knowledge of the city. For instance, we considered a route through the Nordre Fasanvej / Godthåbsvej intersection as this is the first and most detailed desire lines study in Copenhagen. However, doing observations at the intersection we realised that the physical design and the relative low amount of traffic at this intersection only left a low potential for interaction. We also considered a route through the

Værnedamsvej / Vesterbrogade intersection, however, doing observations here we realised that the flow of cyclists differentiated significantly from those in the desire lines study, which made it inapplicable for our study. Considering a number of other routes of study, we ended up choosing the selected route of study as it includes three intersections at which desire lines studies have been conducted. At the same time, the route has different infrastructural designs including a section without car traffic while still having potential for many interactions between cyclists and other road users. Furthermore the Copenhagen Municipality in the 2015 budget has allocated 2,3m DKK to improve the conditions for cyclists and pedestrians at Axel Heides Plads (Copenhagen Municipality, 2014a).

3.7 Reflections and limitations on the data collection process

The ride-along interviews were conducted between 26th of March and 21st of April 2015. As planned all the interviews were carried out during either morning or afternoon rush hour traffic. Luckily, we experienced no technical problems with the GoPro, no defective bikes or cancelled interviews in Amsterdam or Copenhagen. During the ride-along interviews we divided different roles and tasks. The one with the GoPro camera had to focus on staying right behind the participant while the other stayed further behind to get a better overview of the ride and observe the interactions along the way. This was also done in order not to impact bike ride of participants. Still, as we expected several participants described how our presence influenced their behaviour on the bike ride. As expressed by Kamilla: *"On this bike ride I was thinking a lot about what I am actually looking at while cycling. I guess I was doing that because of the filming."* (Kamilla, CPH). The way we for instance influenced Kamilla was our intention with filming the ride-along interview since we wanted the participants to reflect on the way they are cycling as it is something that they would not normally do. The ability to "think out loud" differed from one participant to the other. This was probably due to the individual personality of the interviewee or in Amsterdam a language barrier. However, the interview guide and the pictures from the observations that were put into play in all interviews helped to ensure a dynamic interview.

During our observations, we took field notes in Amsterdam (Appendix 5). These have helped us to recall our experience of coming to Amsterdam as external observers. Being used to cycling in Copenhagen and then coming to Amsterdam to do research on cycling was interesting and eventful. We questioned a lot of the bike infrastructure that was illogical for us e.g. misplaced right of way signage and various designs for left turning. To get insights on the thoughts and logic of the infrastructural design we got the opportunity to set up a meeting with two urban planners from Amsterdam Municipality. This meeting gave us the chance to ask questions about the infrastructural design and thus achieve a broader understanding of the setting of Amsterdam.

3.8 Summary

In this chapter we have introduced the methodological framework of this study and argued how we are going to answer the research question. Through a mixture of research methods, we want to examine the 'river' and the 'ballet' in Amsterdam and Copenhagen. Based on the combination of quantitative and qualitative methods we aim to achieve a thorough and comprehensive understanding of why cyclists interact with the design of the material environment, each other and other road users in the way they to. This is presented in the figure below 2 that illustrates the research design of this study.

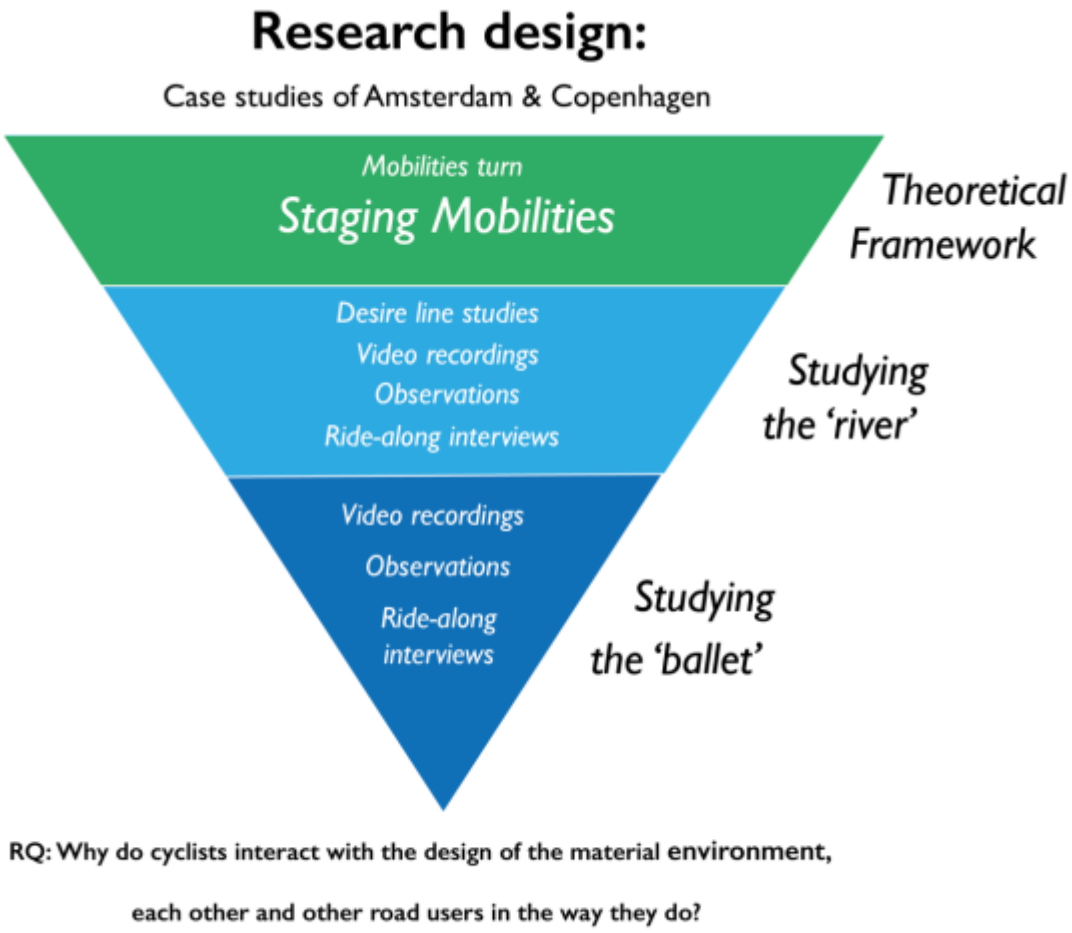


Figure 2: Research design (own illustration)

4 Analysis

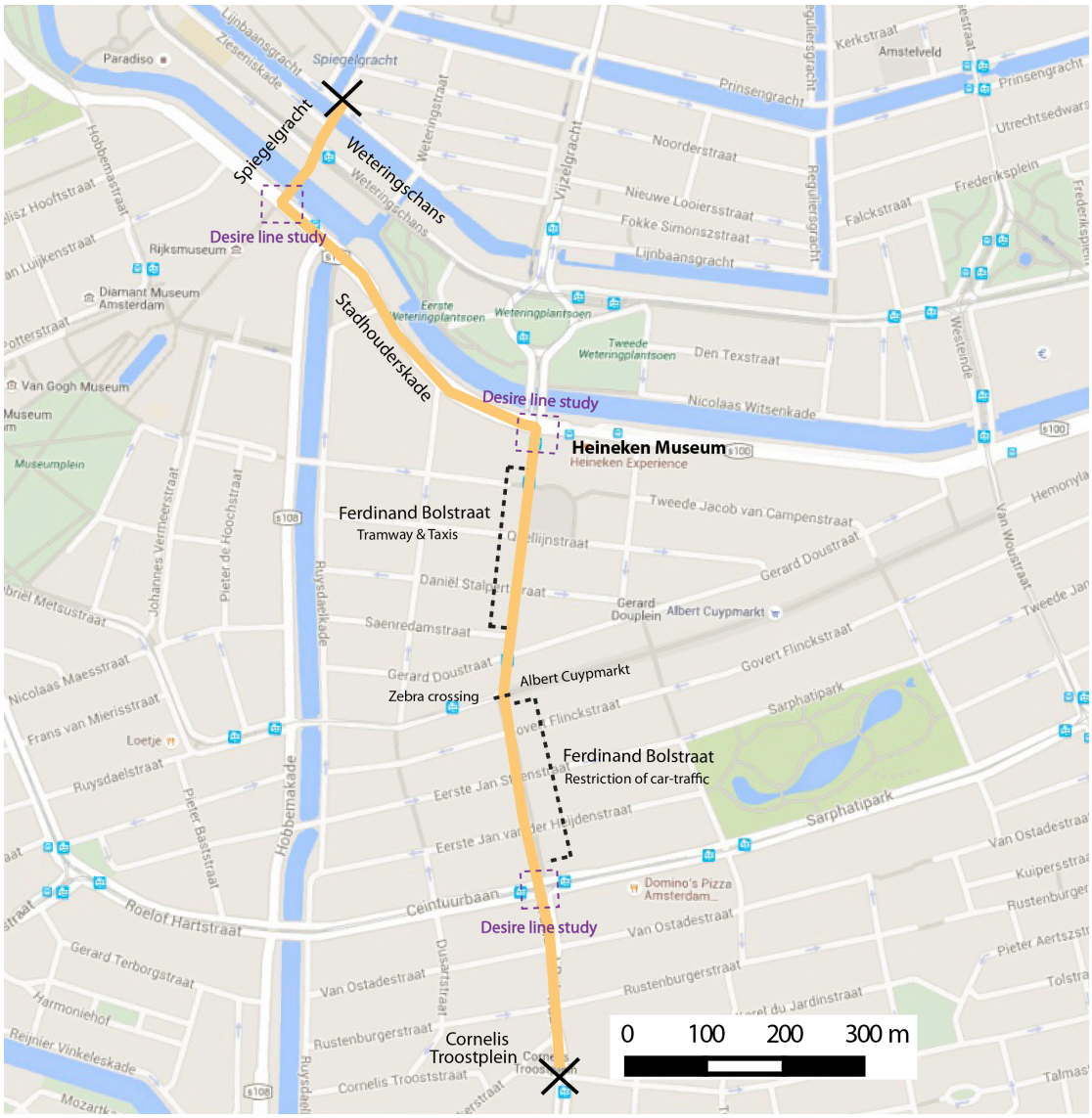
In this chapter we will present the findings of our study. To do this we have divided the chapter into two main parts. In the first part of the analysis we will describe the preselected routes of study in Amsterdam and Copenhagen as we will apply a birds-eye perspective to map the 'river', which is what shapes the flows of cyclists as they move through the 'riverbed'. The purpose of this is to describe the routes of study but more importantly, it can help us to transform the seemingly abstract movement patterns of cyclists into homogenized flows of cyclists and to identify critical points of interaction, which are important to examine in order to understand the interactions of cyclists 'in situ'. In the second part of the analysis we apply an eye-level perspective to explore the bodily interactions and situational dynamics of the 'ballet'. To do this we apply the *Staging Mobilities* framework to explore how the material environment, the social interactions and the embodied performances stage the interactions of cyclists 'in situ'.

4.1 Part 1 - the 'river': Mapping mobilities

The descriptions of the 'river' of cyclists along the routes of study in Amsterdam and Copenhagen are based on the desire lines studies of the intersections that are located along the routes, and in Amsterdam also on the video recordings on which the desire lines studies are based. Moreover, the descriptions are based on our own observations from the routes and the conducted ride-along interviews. The aim is to transform the seemingly abstract movement patterns of cyclists into homogenized flows of cyclists and to identify critical points of interaction. It is important to examine these points in order to understand the interactions of cyclists 'in situ' because the interactions of cyclists are most extensive here. We are aware that interactions with the material environment, other cyclists and road users not only take place at these specific points as cyclists constantly interact along the entire route. Still, we argue that the number of interactions is particularly intensified at these critical points of interaction, and that studying them can help us to identify and understand the interactions of cyclists of the 'ballet'. The maps of the routes, figures and the photographs shown are to help the reader visualize the described routes.

4.1.1 Examining the 'river' - Amsterdam

In Amsterdam the route of study (See map 1) is described chronologically from north to south. The descriptions are based on the existing desire lines studies (Imbert & te Brömmelstroet, 2014), which we have supplemented with our own observations from the route and the ride-along interviews.



Map 1: The route of study in Amsterdam (QGIS illustration)

Spiegelgracht / Weteringschans intersection

In Amsterdam the selected route of study starts just before the Spiegelgracht / Weteringschans intersection on Spiegelgracht heading south of the city. The Spiegelgracht is a busy route for cyclists as it links the city centre with the south of Amsterdam. Weteringschans is part of one of the busiest cycle routes around the city centre (Amsterdam Municipality, 2012). The Weteringschans also has a tramway. The Spiegelgracht / Weteringschans intersection has no traffic lights. A significant number of cyclists use the intersection mainly heading straight across from all four approach roads. This makes the intersection a critical point of interaction and potentially demanding for cyclists (Picture 2). On the other hand car traffic in the intersection is limited.

Picture 2: Christian (AMS) riding through the Spiegelgracht / Weteringschans intersection

Museumsbrug / Stadhouderskade intersection

Just across the Museumsbrug the route includes a left turn (a right turn respectively) in the Museumsbrug / Stadhouderskade (Picture 3) that is regulated by traffic lights, which has been part of the desire lines study. This intersection is located southwest of the city and connects the museums district to the city centre for cyclists and pedestrians. Car traffic is restricted through the Rijksmuseum passage to the south. Stadhouderskade is part of the inner ring for car traffic.

Picture 3: Museumsbrug / Stadhouderskade intersection (te Brömmelstroet, 2014a - screenshot)

In the intersection, a total of 3,038 cyclists have been counted during the morning rush hour on February 19th 2014 including a total of 19 various routes (Figure 3). Doing observations of the intersection we found that the desire lines mapped reflect the current flows of cyclists.

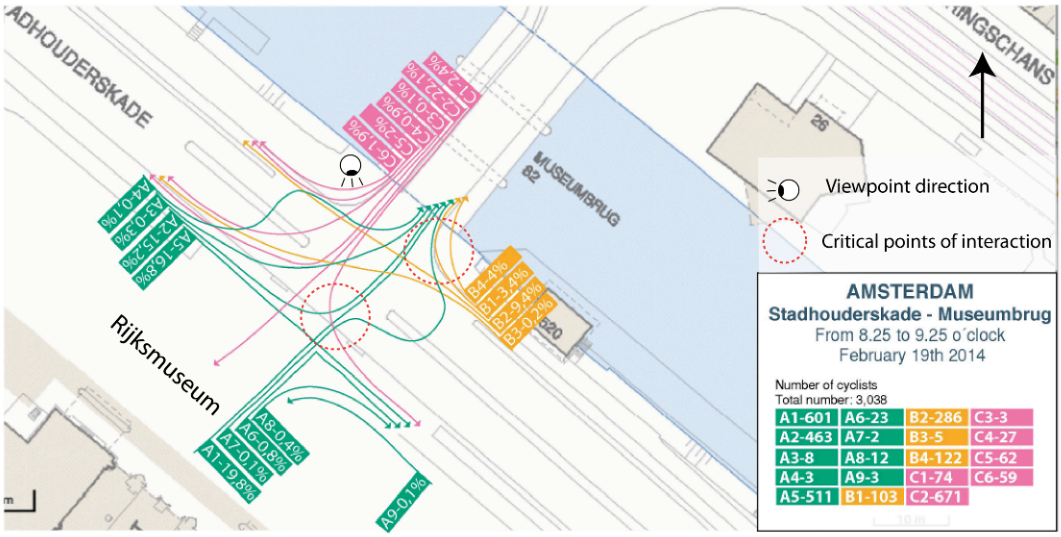


Figure 3: Desire lines of Stadhouderskade / Museumsbrug (Imbert & te Brömmelstroet, 2014)

The main flow of cyclists are going straight across Stadhouderskade as 42 % (C1, A1, A7) go straight through the intersection while 26.4 % (B2, B3, A5) are going straight along Stadhouderskade. 15.6 % (A2, A3 A4) of the cyclists are turning left onto Museumsbrug coming from Stadhouderskade while 2.4 % (C1) are doing the left turn of our route of study. The design of the intersection and the flows of cyclists make the part of the intersection closest to the Rijksmuseum passage a critical point of interaction as cyclists have to manage possible bikes overtaking from behind, oncoming bikes from the Rijksmuseum passage and Stadhouderskade as well as pedestrians passing the zebra crossing (Picture 4).

Picture 4: Critical point of interaction at the Museumsbrug

B1 and B4 represent the right turn of our route of study, which account for 7.3 % of all cyclists going through the intersection. We noticed several cyclists jumping the red light turning right and as the B4 desire line also goes onto the pavement this is another critical point of interaction at this intersection. In accordance Geert describes how he most likely would have continued doing the right turn if the light had been red because he describes it as *"a free right hand turn"* (Geert, AMS), which would not bother anyone.

Stadhouderskade

The route continues along Stadhouderskade where the infrastructure for cyclists is predominantly designed as a cycle track (Picture 5, left) at the intersections of Museumsbrug / Stadhouderskade, Stadhouderskade / Hobbemakade and Stadhouderskade / Ferdinand Bolstraat. The other part of Stadhouderskade is designed as a cycle paths (Picture 5, right), which are placed in between moving cars on the left and the pavement on the right. The following intersection is the Stadhouderskade / Ferdinand Bolstraat that is regulated by traffic lights and where the desire lines of cyclists have been mapped.

Picture 5: Geert on a cycle track divided by a kerb (left) and Christian on a cycle path divided by a line (right)

Stadhouderskade / Ferdinand Bolstraat intersection

At the Stadhouderskade / Ferdinand Bolstraat intersection (Picture 6) the route makes a right turn (a left turn respectively) where desire lines studies have also been conducted. This intersection is one of the main corridors for cyclists going to and from the south of Amsterdam and the city centre. The Heineken Experience Museum is located just east of this intersection, which means that coaches are often dropping off museum guest close by and crowds of pedestrians are also part of the traffic flows of the intersection. Car traffic is restricted through Ferdinand Bolstraat southbound as a tram stop is located just south of the intersection on Ferdinand Bolstraat.

Picture 6: Stadhouderskade / Ferdinand Bolstraat intersection (te Brömmelstroet, 2014b – screenshot)

In the intersection a total of 2,192 cyclists have been counted during an afternoon rush hour in February 2014 including a total of 29 various routes (Figure 4). Doing observations of the intersection we found that the desire lines mapped reflect the current flows of cyclists.

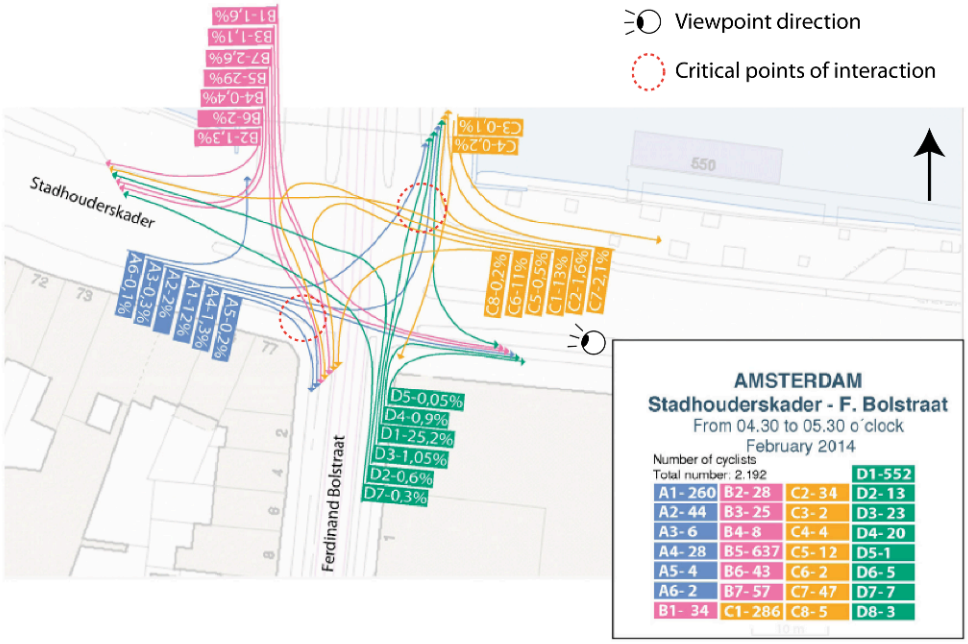


Figure 4: Desire lines of Stadhouderskade / Ferdinand Bolstraat (Imbert & te Brömmelstroet, 2014)

The north-south connection on Ferdinand Bolstraat has the main flows of cyclists as 55.25 % (D3, D1, B5) go straight through the intersection. The east-west connection on Stadhouderskade has some 25 % (A1, C1) of the total number of cyclists biking through the intersection. The use of the right turn and the left turn of our route is very insignificant. A4

and A5 represent the right turn of our route of study, which only account for 1,3 % and 0.2 % respectively. The right turn is very similar to that described above in the Museumsbrug / Stadhouderskade intersection as here we also noticed several cyclists jumping the red light. This includes Eva who took the desire line A5 across the pavement (Picture 7).

Picture 7: Eva turning right onto Ferdinand Bolstraat

The left turn is used even less as less than 1 % of cyclists take this route (D2, D7). Through our observations we found that the design of the intersection makes this left turn confusing and unclear, for instance there is no traffic light installed to guide the cyclists in order for them to complete the left turn across Ferdinand Bolstraat. Accordingly both Geert and Karen had problems figuring out how to do the left turn while Richard even decided to continue straight on to avoid it. We identify this left turn as a critical point of interaction because of the ambiguous design (Picture 8).

Picture 8: Karen turning left onto Stadhouderskade

Ferdinand Bolstraat

The route turns onto Ferdinand Bolstraat, which is a main route for cyclist going to and from the south of Amsterdam and the city centre. Car traffic is limited as the thoroughfare of cars is restricted. The first part of Ferdinand Bolstraat is designed with a cycle path next to the tram rail and taxis on the left and the pavement on the right (Picture 9, left). At Albert Cuypstraat car traffic and the trams are directed onto Albert Cuypstraat while the route continues on a cycle track as it crosses a zebra crossing. Through our observations we noticed how the zebra crossing is a critical point of interaction as main flows of cyclists and pedestrians intersect here (Picture 9, middle). The zebra crossing is located next to the Albert Cuyp Market, which

implies that many pedestrians use the crossing during the opening hours of the market. On the next part of Ferdinand Bolstraat the route continues on a two-way cycle path in a pedestrianised zone where trams and cars are temporarily restricted due to construction of the north-south metro line (Picture 9, right). The following intersection is the Ferdinand Bolstraat / Ceintuurbaan which is regulated by traffic lights and where the desire lines of cyclists have also been mapped.

Picture 9: The first part of Ferdinand Bolstraat (left), The zebra crossing on Ferdinand Bolstraat (middle), Eva on the two-way cycle path on Ferdinand Bolstraat (Right)

Ceintuurbaan / Ferdinand Bolstraat intersection

This intersection (Picture 10) is located in the southern part of Amsterdam in the De Pijp area. As mentioned above Ferdinand Bolstraat serves as one of the arterial corridors for north-south bike traffic whereas Ceintuurbaan is a main road crossing the De Pijp in an east-west direction. Cars and trams are restricted from entering Ferdinand Bolstraat in a northern direction due to the construction of the metro.

Picture 10: The Ceintuurbaan / Ferdinand Bolstraat intersection (te Brömmelstroet, 2014c – screenshot)

At the intersection, a total of 2,279 cyclists have been counted during the morning rush hour on February 18th 2014 including a total of 18 various routes (Figure 5). Doing observations of the intersection we found that the desire lines mapped reflect the current flows of cyclists.

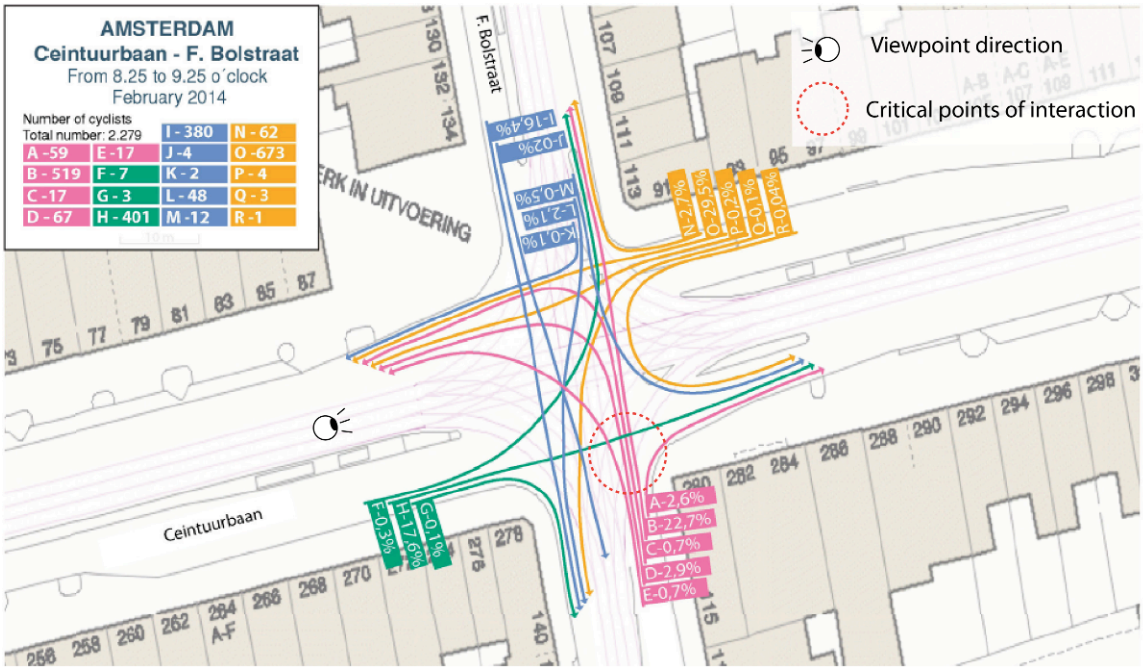


Figure 5: Desire lines of Ceintuurbaan / Ferdinand Bolstraat (Imbert & te Brömmelstroet, 2014)

The east-west direction on Ceintuurbaan represents the main flows of cyclists as 47.3 % (H, P, O) go straight through the intersection. Still, the north-south direction also represents a considerable flow of cyclists as 41.4 % (B, I, L) go straight through the intersection. This means that the remaining cyclists (11.3 %) turn either right or left but no specific turn has a noticeable higher amount of cyclists than others. We noticed through our observations how cyclists travelling from the south on Ferdinand Bolstraat are conflicting with car traffic turning right as the street is designed with a cycle path and a bike box in front of the stop line for cars (Picture 11, left). We observed several dangerous situations with right-turning cars and cyclists going straight. This was also due to an illogical traffic signal that gives pedestrians a head start on about ten seconds whereas cyclists and cars went at the same time. We identify this as a critical point of interaction.

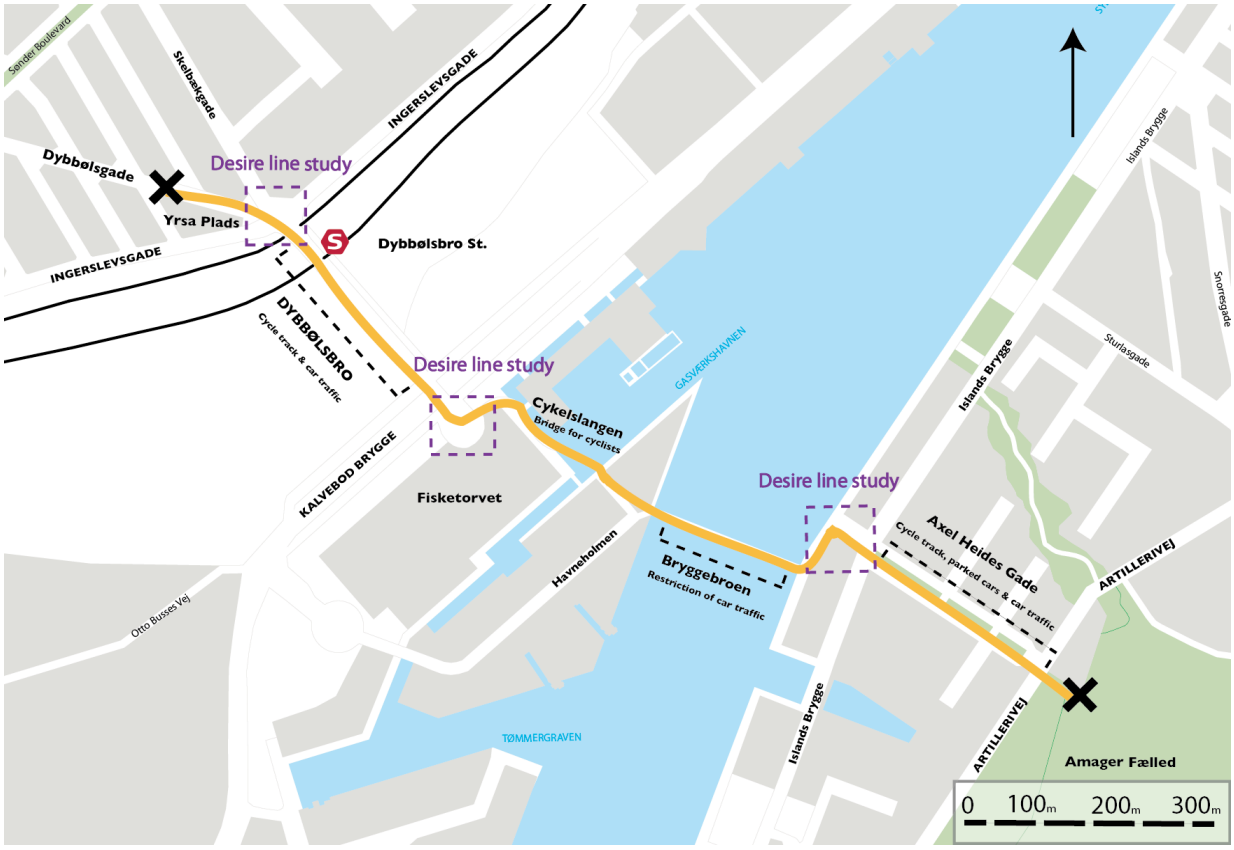
Picture 11: Cyclists clashing with right turning traffic on Ferdinand Bolstraat (left), Wiske riding on Ferdinand Bolstraat in the rain (right)

Ferdinand Bolstraat

After crossing the Ferdinand Bolstraat / Ceintuurbaan intersection the route continues straight on Ferdinand Bolstraat on cycle paths with trams and car-traffic on the left side and parked cars on the right (Picture 11, right). The route ends a few hundred meters down Ferdinand Bolstraat at Cornelis Troostplein.

4.1.2 Mapping mobilies: Copenhagen

In Copenhagen the route of study (See map 2) is described chronologically from north to south. The descriptions are based on the existing desire lines studies (Copenhagenize, 2013b; Copenhagenize, 2013c), which we have supplemented with descriptions based on our own observations and the ride-along interviews.



Map 2: The route of study in Copenhagen (Own illustration)

Dybbølsgade and Yrsa Plads

In Copenhagen the selected route of study begins at the corner of Dybbølsgade / Sommerstedgade in the area of Vesterbro southwest of the city centre. The route continues southeast on Dybbølsgade which is a quiet street with parked cars on both side and a main flow of cyclists (Picture 12, left). Dybbølsgade discharges into Yrsa Plads (Picture 12, right), which is a small square next to the Ingerslevgade / Dybbølsbro intersection. This link is restricted for cars while the cycle tracks were established in October 2013 to connect Dybbølsgade with Dybbølsbro for cyclists.


Picture 12: Oliver on Dybbølsgade (left), and going through Yrsa Plads (Right)

Ingerslevgade / Skelbæk intersection

This intersection (Picture 13) is located in the area of Vesterbro southeast of the city centre. Skelbækgade across Dybbølsbro links to one of the main arterial routes for cars into the city centre and Ingerslevgade is a main route from the city centre towards the west of the city. The intersection is also a main route for cyclists going between Vesterbro and the area of Islands Brygge. At this intersection the route merges with Skelbækgade just before the intersection, while in the opposite direction the route includes a left turn. Just east of the intersection is the S-train station Dybbølsbro, which explains the desire lines V, T, X at the south-eastern corner of the intersection (Figure 6).

Picture 13: The Ingerslevgade / Skelbækgade intersection

At the intersection a total of 1,155 cyclists have been counted during a morning rush hour between 8am - 9am in October 2013 including a total of 20 various routes (Figure 6). Doing

observations of the intersection we found that the desire lines mapped do not wholly reflect the current flows of cyclists, which we elaborate below.

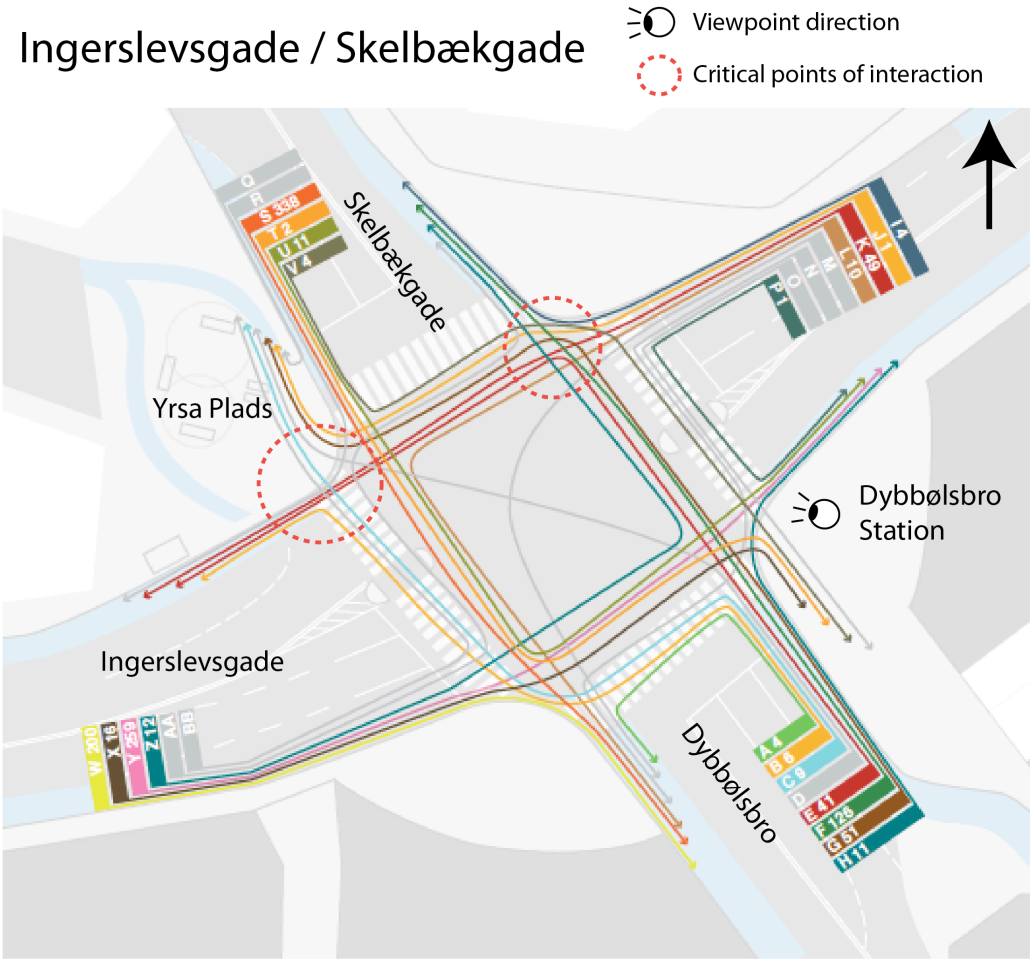


Figure 2: Desire lines of Ingerslevgade / Skelbækgade, (Copenhagenize, 2013c)

The north-south connection along Skelbækgade and Dybbølsbro represents the main flows of cyclists as 40.2 % (F, S) go straight through the intersection compared to the 26.6 % (Y, K) that are going straight in an east-west direction on Ingerslevgade. This means that a considerable number of cyclists (33.2 %) turn either right or left at this intersection. According to the desire lines 8 % (G, E) of the counted cyclists have been mapped to take the left turn coming from Dybbølsbro onto Ingerslevslev (E) or the cycle track on Yrsa Plads onto Dybbølsgade (G). However, based on our own observations we have found that the number of cyclists turning left today is considerable higher. Thus we found that at least half of the cyclists today coming from Dybbølsbro make a left turn. The reasons for this may be that the desire lines were mapped in October 2013, which is the same month that the cycle track on

Yrsa Plads opened[2]. The corner of Ingerslevgade and Skelbækgade for cyclist doing the left turn coming from Dybbølsgade (G, E) we identify as a critical point of interaction because of lack of space for the left-turning cyclists as they have no other option than to obstruct cyclists going straight or to wait in the zebra crossing (Picture 14, left. The issue is aggravated by the long green light on Dybbølsbro for cars and cyclists, which means that the number of cyclists waiting to go left is accumulated and intensified. Another critical point of interaction is when the cyclists complete the left turn crossing the intersection as most cyclists go onto the cycle track on Yrsa Plads. Cyclists take a number of different desire lines that have not been mapped in the desire lines study, which result in numerous interactions between cyclists and to a lesser extent between cyclists and pedestrians (Picture 14, right). Also, neither Kamilla nor Suzie followed the cycle track on Yrsa Plads during the ride-along interviews conducted for this study.

Picture 14: Left-turning cyclists waiting for the green light (left), Suzie and other cyclists going on the pavement through Yrsa Plads (right)

Dybbølsbro

After the intersection the route of study continues across Dybbølsbro on cycle tracks. Heading south moving cars are on the left, while heading north there is a sidewalk on the right of the cycle track (see picture 15). The following intersection is the Dybbølsbro / Kalvebod Brygge intersection, which is divided into two separate intersections (Picture 15, right). In the second part of the intersection closest to the shopping mall Fisketorvet and the connecting roundabout, the desire lines of cyclists have been mapped.

[2] It is common that new infrastructure has lower utilisation at first. For instance, this has been the case for Bryggebroen that is also part of the route of study, which has had a steady increase of cyclists (from 3,400 to 14,400) since it opened in 2006 (Copenhagen Municipality, 2015).

Picture 15: Jonas on Dybbølsbro (left), Cyclists on Dybbølsbro / Kalvebod Brygge intersection (right)

Fisketorvet intersection

The second part of the intersection before the route enters the roundabout at the shopping mall Fisketorvet is regulated by traffic lights. Traffic is restricted in the east-west direction on Kalvebod Brygge, however, car traffic is still significant. Besides being the main entrance to the shopping mall Fisketorvet this roundabout also serves as the connection to the Cycle Snake and Bryggebroen.

Picture 16: Fisketorvet intersection

A total of 993 cyclists have been counted during a one hour morning rush hour in October 2013 including a total of 15 various routes (Figure 7). The desire lines study was conducted before the opening of the Cycle Snake in June 2014. Based on our observations we assess that the study still highlights the main movement patterns, which we elaborate below.

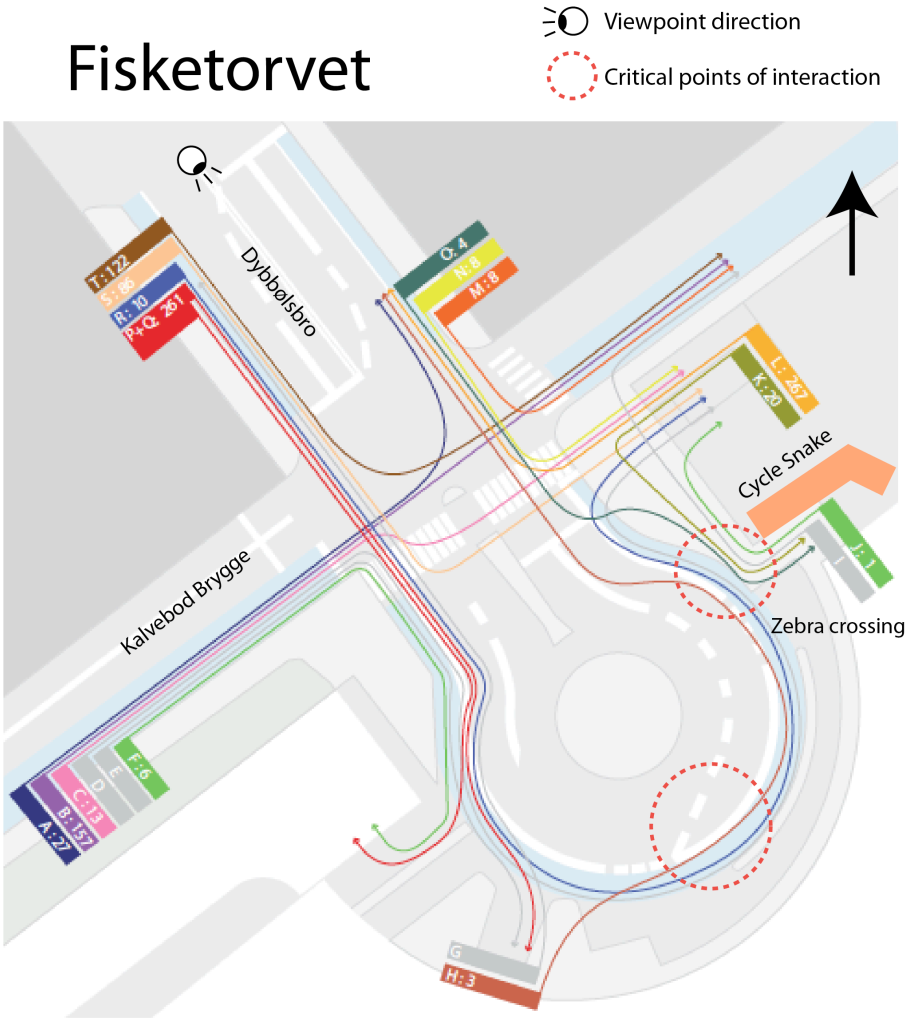
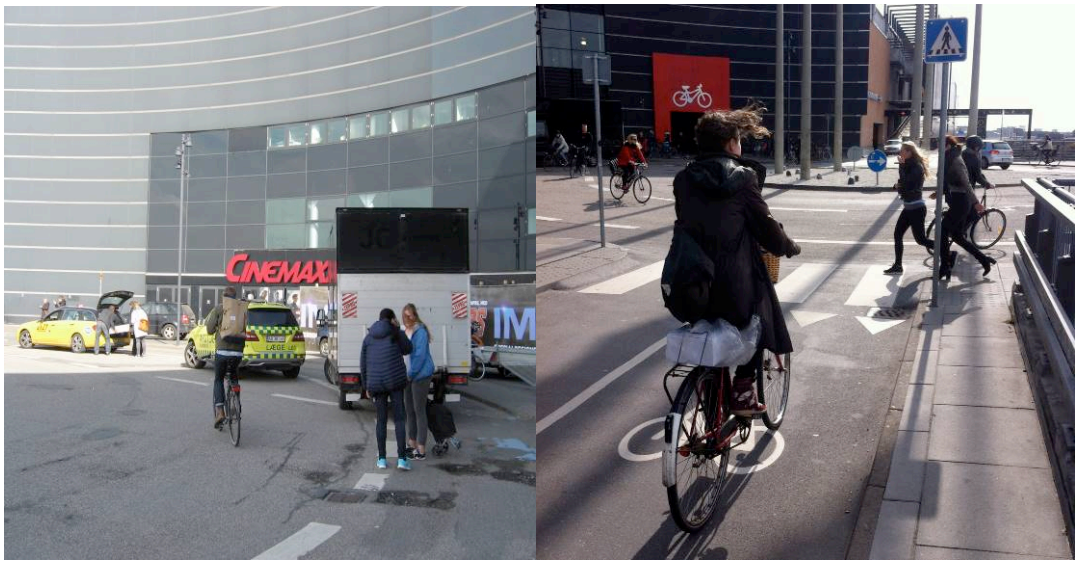


Figure 7: Desire lines of Fisketorvet (Copenhagenize, 2013c)

The north-south connection across Dybbølsbro represents the main flows of cyclists as 53.2 % (P+Q, L) go straight through the intersection compared to the 15.9 % (B) that go straight in an west-east direction on Kalvebod Brygge. Although the desire lines have been mapped before the opening of the Cycle Snake we find that the study still highlights the main movement patterns at the roundabout. The one exception is the flow of cyclists coming from Dybbølsbro turning left (S) towards the staircase, which in 2013 was the main connection for cyclists going to Bryggebroen. On the basis of our observations we argue that the number of left-turning cyclists (S) is lower today as the entrance to the Cycle Snake has been moved further east and additional cyclists are thereby more likely to go through the roundabout. Still, a small number of cyclists take the shortcut directly to the entrance of the Cycle Snake. Based on our observations we identify two critical points of interaction. The first one is identified along the cycle path in front of Fisketorvet as this is often used for taxis to pick up passengers and for trucks to unload goods, which is also emphasised by Suzie as she explains that she often has to go on the street (Picture 17, left). This means that cyclists are forced to use the road or manoeuvre between the parked vehicles. The second critical point of interaction is the zebra

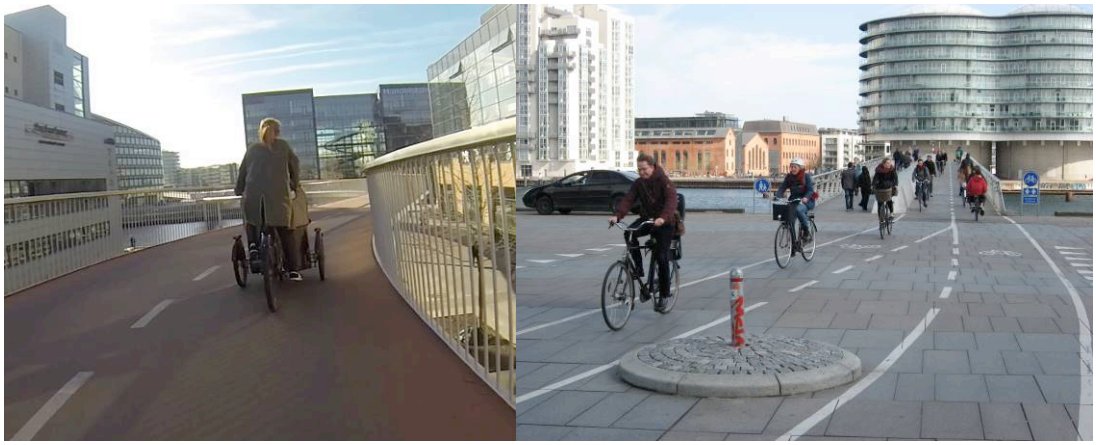
crossing on the cycle track that connects to the Cycle Snake (Picture 17, right). Especially in the afternoon rush hour main flows of cyclists to and from the Cycle Snake and pedestrians to and from Fisketorvet intersect in the zebra crossing.



Picture 17: The cycle track in being blocked in front of Fisketorvet (left), the zebra crossing at the Cycle Snake (right)

The Cycle Snake and Bryggebroen

The Cycle Snake and Bryggebroen are the main parts of a new link for cyclists between Vesterbro and Islands Brygge across the harbour. The Cycle Snake is only for cyclists, which is designed as a two-directional cycle track (Picture 18, left). Between the Cycle Snake and Bryggebroen the route crosses Havneholmen on which the cyclists have the right of way (Picture 18, right). This we identify as a critical point of interaction and so was the other end of Bryggebroen where the bridge connects to the quay as the paths of cyclists and pedestrians are crossing each other. The route continues along Axel Heides Plads which is a square where the desire lines of cyclists have been mapped.



Picture 18: Ditte on the Cycle Snake (left), Cyclists crossing Havneholmen (right)

Axel Heides Plads

Axel Heides Plads is a square used by cyclists and pedestrians to enter and leave Bryggebroen and leads them further on to either Islands Brygge or through Amager Fælled. Cars are restricted from the square, which has a row of stones in the middle that steer and separate the different streams of cyclists (Picture 19, left). The narrow space in between the stones is reserved for pedestrians (Picture 19, middle). The area between Bryggebroen and Axel Heides Plads on the harbour front is not very bike-friendly as it consists of cobblestones and two narrow paved lanes (Picture 19, right).

Picture 1: A cyclist on Axel Heides Plads (left), area reserved for pedestrians (middle) & the waterfront with cobblestones

A total of 919 cyclists have been counted during the morning rush hour from 8am – 9am on the 3rd of July 2013 including a total of 11 various routes (Figure 8). Doing observations at the intersection we found that the desire lines mapped reflect the current flows of cyclists.

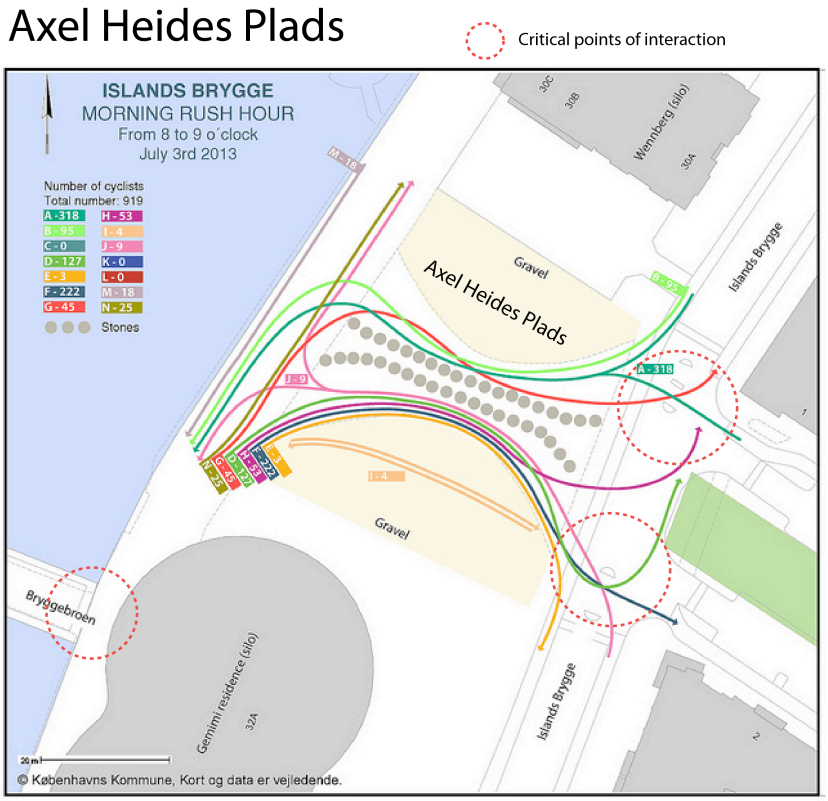


Figure 8: Desire lines of Axel Heides Plads (Copenhagenize, 2013b)

There is one major flow of cyclists on the square since the majority of cyclists 59 % (A, F) bike from Bryggebroen to Axel Heides Gade and vice versa. Only 4.7 % (M, N) of cyclists coming from Bryggebroen continue along the waterfront. It is worth noting that this desire lines study was conducted before the Cycle Snake opened and also during the public summer holiday in July which means that the number of cyclist is most likely higher today. Through our observations, we saw a lot of cyclists and pedestrians interacting on Axel Heides Gade. We especially identified the two narrow paved lanes on the quay as a critical point of interaction since most cyclists want to go there for comfort reasons.

Axel Heides Gade / Islands Brygge intersection

Following Axel Heides Plads the route intersects with Islands Brygge before continuing onto Axel Heides Gade. It is designed as a three-way intersection for cars as car traffic is restricted on Axel Heides Plads. For cyclists, two cycle tracks guide the cyclists onto Axel Heides Plads as they have to go over the kerbs of the street and the cycle track on Islands Brygge.

The desire lines of cyclists in this intersection are included for cyclists going to and from Axel Heides Plads. The desire lines show that 24.2 % of the total cyclists continue straight onto Axel Heides Gade while a considerable 19.6 % turn left onto Islands Brygge. Data is unclear for cyclists going in the other direction although through our observations we found that the flows of cyclists going in the other direction are similar. At the Axel Heides Gade / Islands Brygge intersection we found that cyclists coming from Axel Heides Plads enter a critical point of interaction at the intersection as they have to interact with potential car traffic crossing Islands Brygge where there are no traffic lights or zebra crossing to guide them (Picture 20, left). The islands on the middle of the street offer cyclists and pedestrians the opportunity to cross Islands Brygge in two 'separate' parts. The same applies to cyclists coming from Axel Heides Gade going in the other direction as they even have to interact with cars turning right onto Islands Brygge (Picture 20, middle). Continuing on Axel Heides Gade the route follows a cycle track with parked cars on the left and the sidewalk on the right (Picture 20, right.)

Picture 20: Crossing Islands Brygge (left), cyclists need to be aware of right-turning traffic (middle), Ditte on Axel Heides Gade (right).

Axel Heides Gade / Artillerivej intersection

The last intersection on the route is the Axel Heides Gade / Artillerivej intersection. This intersection is also designed as a three-way intersection for cars, as car traffic is restricted on Amager Fælled (Picture 21, left). For cyclists a newly paved cycle track has been opened on Amager Fælled connecting the area of Islands Brygge with the area of Ørestaden. The cycle track connects with Artillerivej at the Axel Heides Gade / Artillerivej intersection making it possible for cyclists to go straight from Axel Heides Gade onto the cycle track on Amager Fælled, crossing the kerbs of the road and the cycle track on Artillerivej (Picture 21, middle). Artillerivej has a considerable amount of car traffic. There is a speed limit of 40 km/h for motorised vehicles on Artillerivej; however, most cars seem to drive faster since there are no bumps or other traffic calming schemes that make the cars reduce their speed. There is a zebra crossing for pedestrians crossing Artillerivej but no traffic lights to regulate the traffic flows (Picture 21, right).

Picture 21: Cars are restricted on Amager Fælled (left), cyclist crossing Artillerivej onto Amager Fælled (middle) and cyclist using the zebra crossing on Artillerivej (right).

Based on our observations we identify that the main flow of cyclists are going straight from Axel Heides Plads and vice versa. Coming from Axel Heides Gade the crossing is difficult due to the number of cars on Artillerivej but apart from that it is straightforward. This is a critical point of interaction also due to the right-turning cars on Axel Heides Gade that intersect with the cyclists crossing Artillerivej. In the other direction the crossing for cyclists are less straightforward as they have to go in a right curve to continue onto Axel Heides Gade. Accordingly we observed numerous desire lines of cyclists which are also reflected in the ride-along interviews. Suzie choose to go straight across so she in fact ended up on the wrong cycle track on the left side of Axel Heides Gade (Picture 22, left), Kamilla choose the direct way through the intersection to get to the cycle track on the right side of Axel Heides Gade (Picture 22, middle) while Jonas choose to dismount his bike and go via the zebra crossing to get across (Picture 22, right). Consequently we also identified this as a critical point of interaction.

Picture 22: Suzie going straight through the ending up on the wrong side (left), Kamilla taking the direct way (middle) and Jonas on the way to the zebra crossing (right).

4.1.3 The 'riverbeds' of Amsterdam and Copenhagen

To summarise, we have described and mapped the studied routes in Amsterdam and Copenhagen through a birds-eye perspective to understand the 'river'. On the selected routes, the 'riverbed' varies between various designs and material environments. Although the design of the material environment is inherently different in Amsterdam and Copenhagen both routes hold similar features. On both routes cyclists for instance experience and go through parts with and without cycle tracks, parts with trams (in Amsterdam) and car traffic, parts with restrictions for car traffic and parts with parked cars on the side. In order to navigate through both routes our participants have to perform right and left turns, intersect zebra crossings and cross intersections with or without traffic lights. Based on our observations we have identified a number of critical points of interaction where the interactions of cyclists with the design, each other and other road users are most extensive. In Amsterdam the three intersections where desire lines studies have been conducted, a total of 66 desire lines have been mapped while in Copenhagen it is 46 desire lines. The vast number of distinct desire lines reflects the flexibility of cyclists and indicates that the present design of these intersections does not always accommodate the kind of movement cyclists want to practise.

4.2 Mapping mobilities - summary

In the first part of the analysis we have described the preselected routes of study in Amsterdam and Copenhagen as we have applied a birds-eye perspective to map the 'river' of cyclist along the routes of study. We have used the desire lines studies, our own on-street observations and the ride-along interviews to describe the routes of study but more importantly it has helped us to transform the seemingly abstract movement patterns of cyclists into homogenized flows of cyclists. We have found that cyclists take numerous desire lines, which emphasise the *flexibility* of cyclists as a total of 112 desire lines have been mapped at the intersections in Amsterdam and Copenhagen. Moreover, we have indentified critical points of interaction that are generated through the existing design of the material environment. These are particularly important to examine in order to understand the interactions of cyclists 'in situ', which will be the focus on the second part of the analysis.

4.3 Part 2 – the 'ballet: Mobilities of cycling

In this part of the analysis we apply an eye-level perspective to explore the bodily interactions and situational dynamics of the 'ballet'. We take point of departure in the three dimensions of the *Staging Mobilities* framework as we explore how the material environment, the social interactions and the embodied performances stage the interactions of cyclists 'in situ'. Firstly, we will examine how the material environment stages the interactions of cyclists as it affords and limits certain trajectories of cyclists along the routes of study. Secondly, we will explore how social interactions stage the interactions of cyclists, as cyclists apply a number of negotiation techniques to make their way through the city, which they perform while in motion. Thirdly, we will examine how the embodied performances of cyclists stage the interactions of cyclists in Amsterdam and Copenhagen and how this makes the experience of cycling different in Amsterdam and Copenhagen.

4.3.1 Interactions with the design of the material environment

In this section we present how our participants interact with the material environment. The theoretical notions of 'mobility affordance', 'mobile semiotics' and 'sociopetal' and 'sociofugal' spaces will be applied to examine and articulate the interactions with the material environment.

The design of the material environment

We have selected the particular routes of study because they make up a direct link for cyclists travelling between the start and end point of the routes. Conducting the ride-along interviews, however, we experienced that the routes of study despite being direct were not in all situations perceived as the most logical by the participants. As described in the first part of the analysis Richard (AMS) preferred to continue along Ferdinand Bolstraat onto Weteringschans at the Stadhouderskade / Ferdinand Bolstraat intersection rather than to take the left turn onto Stadhouderskade. Without knowing the alternative route Karen also explains how she would have avoided the left turn if possible.

Accordingly this is also reflected in our observations of that particular intersection as well as in the desire lines study, which show that less than one percent of the cyclists biking towards the city centre on Ferdinand Bolstraat choose to turn left onto Stadhouderskade. This is likely to be explained by the fact that the design of the material environment does not afford cyclists to do a left turn. Jensen uses the term of 'mobility affordance' to describe how the relation between the cyclists and the material environment promotes particular modes of mobilities while limiting others. For this specific location, Geert (AMS) explains how he personally prefers to continue straight through the intersection going to the end point of the route of study because there is no obvious way to do the left turn. At the same time Geert (AMS) describes Stadhouderskade as an unattractive street for cyclists due to its heavy car traffic and that this together with an unclear left turn adds up to making him prefer to go straight rather than to do the left turn. In the same way Suzie (CPH) explains how she dislikes the

roundabout at Fisketorvet: As referred to in the first part she often has to go on the street at Fisketorvet: *"As a cyclist you basically get fucked. The taxis really don't care (…) There is a cycle path but it is filled with taxis."* (Suzie, CPH). Elaborating on this, the problem is that the roundabout has too many functions and that the taxi drivers and delivery vans park on the cycle path, which makes the route less attractive for her as a cyclist. On the other hand Bryggebroen and the Cycle Snake are examples of material environments where most of the participants in this study enjoy to bike. For instance, Kamilla (CPH) describes how she likes to get wind in her hair and to see the city from a different perspective.

Although the notions of 'sociopetal' and 'sociofugal' spaces that describe how places are thought of to explain how material environments on a general level 'draw in' or 'push away' people and activities, we argue that this is to a certain extent also the case for cyclists. Consequently, we have found that cyclists are 'pushed away' from certain streets and trajectories because the infrastructural design works as a 'sociofugal' space as it does not afford cycling. This is not just related to how they interact with the design of the material environment itself; the level of regulation also has implications on cyclists.

Cyclists and the level of regulation

We have found that the level of regulation has a major influence on the behaviour of cyclists and thus how they interact with the design, each other and other road users. On the basis of the interviews this becomes particular evident when looking at the behaviour of our participants at intersections with traffic lights compared to those without. All of our participants describe how they pay more attention to the semiotic dimension of the material environment in intersections with traffic lights rather than cyclists and other road users. However, the extent to which our participants related and adapted their behaviour to the traffic lights and other regulatory measures differs. As an example, Wiske (AMS) describes that when she waits at a red light she sometimes uses the traffic lights for pedestrians going the same way as her to make her way through an intersection. She describes how this is a strategic of "*how you can safely take a red light*" (Wiske, AMS). In general, she is aware of the regulatory measures like right of way symbols as she uses them to make her way through the city. Geert (AMS) describes the opposite: "*I don't relate to that [the right of way signs and other markings on the road] so much anymore. I prefer my own judgement with my eyes.".* In this he explains how he is more focused on what other cyclists intend to do rather than focusing on the 'mobile semiotic' dimension of the material environment. On the other hand, it is a clear example of the embodiment of cycling and it influences the behaviour of cyclists. Still, there are some general differences in the behavioural patterns of cyclists at intersections with traffic lights compared to those without. For instance Christian (AMS) explains how he is *"very aware"* approaching the Spiegelgracht / Weteringschans intersection due to the fact that it has no traffic lights and a high number of trams, cars and bikes. Geert (AMS) elaborates as he describes how he behaves more actively in intersections without traffic lights. Adding to this Jonas (CPH) explains how he needs to *"read"* the traffic in unregulated intersections in order

to figure out when it is safe for him to cross. Put another way: "*The difference [between intersections with and without traffic lights] would be that I have to use my brain."* (Oliver, CPH). Hence, intersections without traffic lights generally seem to raise the awareness compared to those with traffic lights.

4.3.2 Social interaction – the presence of 'others'

In this section we will describe the social interactions that take place between our participants and other road users. The theoretical notions of 'negotiation in motion', 'mobile with' and 'mobile body semiotics' will be applied to articulate and describe the distinctive way that cyclists interact with each other and other road user. In this section we present five main ways of social interaction which our participants use to navigate through the 'ballet' that takes place between cyclists and other traffic users.

Negotiation in motion'

Most of our participants explain how they had a hard time describing how they communicate with other cyclists and other road users. This shows that the practice of cycling becomes embodied as it is performed unreflectively. However, based on the interviews we identify three main 'negotiation in motion' techniques that cyclists apply to communicate with each other and other road users. These encompass *body language* including eye contact and hand signalling as well as *speed* and *the bell*.

Body language

Several participants mentioned how they make use of *body language* to communicate with, especially, cyclists and pedestrians. Jonas (CPH) explains how he usually yields for pedestrians, however, if he sees a gap he tries to "*read*" the body language of the pedestrians as well as the cyclists in order to go through without stopping. Suzie highlights it as one of the main advantages of cycling that you are able to 'read' the body language of other traffic users:

"The thing is with cycling that you can see much better by peoples' body language whether they are going to go or not. Also with kids you can tell if they are scared or when they are clearly trying to get killed." (Suzie, CPH).

In line with 'reading' people, other participants express how they "*assess*" (Ditte, CPH), "*calculate*" (Geert, AMS) or "*mediate"* (Karen, AMS) between other traffic users, themselves and the material environment. Karen (AMS) mentions how it is about balancing space and time, too. As an example Ditte (CPH) explains how she would perform the left turn on Havneholmen: *"Then I try to assess how fast they [oncoming cyclists] are going, how fast I am going myself and then find a gap that fits without them having to slow down too much."* (Ditte, CPH – own translation). Similar to Ditte (CPH), Kamilla (CPH) describes how it takes "*coordination"* to cross Artillerivej without being in the way of others. The situations are examples of how cyclists 'negotiate' and 'coordinate in motion' to get safely through the city without disturbing the flow of other traffic users.

As part of the body language, our participants mention eye contact as a particular way of communicating. Christian (AMS) describes "*eye contact as key"* to identify what other cyclists are going to do such as slowing down or not. Wiske (AMS) explains how she uses eye contact to communicate with other cyclists and occasionally bend the traffic rules: *"Sometimes you do have the right of way but you can let someone else go by making eye contact."* (Wiske, AMS). Eva describes how eye contact is easier if you are both on a bike whereas eye contact with a person inside a car is much harder (Eva, AMS). Suzie (CPH) agrees and elaborates: *"with a car because it is bigger it is more difficult to know if it is turning left whereas with a cyclist you can really kind of tell."* The descriptions highlight how particularly cyclists use eye contact as a techniques to 'negotiate' their way through the city.

Many of our participants also describe how hand signalling is an essential way for cyclists to interact with other cyclists and traffic users. Most participants explain that they use hand signalling to indicate which direction they are going. However, they also express that they only use hand signalling in certain situations. Jonas (CPH) describes how he uses his arms to signal in situations where others may be in doubt of what he is going to do. Coming from Islands Brygge and entering Bryggebroen on her right Kamilla (CPH) elaborates on how she tries to make it a "*habit here, as it is an odd intersection.".* She also describes how she gets annoyed with other cyclists when they do not use hand signalling. Likewise, Jonas (CPH) describes how he can get irritated when cyclists do not signal when they are going left on Artillerivej coming from Axel Heides Gade.

"When there is a large group of cyclists that needs to cross, a lot of them don't indicate that they are going left so there is a possible crash with the people going straight, and I am going straight so I need to be pretty sure that people do not suddenly go left." (Jonas, CPH - own translation).

The examples of Kamilla (CPH) and Jonas (CPH) highlight how there are issues related to the 'mobile body semiotics', where the body of the cyclist becomes a mobile sign indicating direction. The personal judgement of when or not it is necessary for cyclists to use hand signals can be interpreted differently from one cyclist to another cyclist or traffic user which can lead to situations where one of the parties get annoyed.

Speed

Many participants mention *speed* as a way of interacting with other traffic users. Christian (AMS) describes that there exists an informal rule in Amsterdam that people on the move seem to have the right of way over people who have stopped no matter what the signs may say. Both Wiske (AMS) and Geert (AMS) explain how cyclists in Amsterdam sometimes keep their speed and pace when for instance they approach a zebra crossing with a waiting pedestrian. Geert elaborates how *"it is a bit of the arrogance of cyclists in Amsterdam. That if you look like you are driving on and therefore you [pedestrian] better stop. It's the way it often goes."* (Geert, AMS). Still, Geert and Wiske also describe that they would have slowed down if there were many pedestrians or if an old lady or a family with children were about to cross.

Correspondingly, Jonas (CPH) explains that his speed and willingness to give space depend on the situation and that he is more cautious when a little girl is cycling next to her father compared to a young guy on a race bike. The examples from Geert, Wiske and Jonas illustrate the *flexibility* of cycling and that cyclists adjust their behaviour to the other part of the 'mobile with'.

Using the bell

The participants also mention the *bell* as a way to communicate with other cyclists and traffic users. Using the car as a metaphor Geert (AMS) describes how he uses the bell as a warning signal in a dangerous situation similar to honking the horn in a car. Ditte (CPH) and Wiske (AMS) both explain how they use the bell if two cyclists are biking next to each other and they want to overtake. However, Wiske elaborates that using the bell is not something she enjoys: "*I do not use it [the bell] really often because I think it is a bit aggressive to use it (…) Even when I ring my bell I try do it really quietly"* (Wiske, CPH). Wiske along with Geert (AMS) and Carmen (AMS) all say that they use their bell if they can tell through body language that the other traffic user is unaware or not paying attention. The bell thereby becomes a mean to establishing contact to the "mobile with" and enables the opportunity to 'negotiate in motion'.

4.3.3 The embodiment of cycling

In this section we will examine the embodiment of cycling in Amsterdam and Copenhagen, respectively. The theoretical notion of 'mobility culture' will be applied to articulate the embodied performances and the informal 'cycle codes' of each city. We will elaborate on the differences through our participants' descriptions.

The embodiment of cycling in Amsterdam

Staying in Amsterdam for two weeks doing fieldwork for this study we found cycling in Amsterdam rather chaotic and unstructured at first glance. Accordingly, Karen (AMS) who is relatively new to cycling in Amsterdam describes that one always has to be on guard, alert and aware of what is happening cycling around in Amsterdam. Richard (AMS) who has more than 30 years of cycling experience in Amsterdam characterises the centre of Amsterdam as *"a jungle for cyclists"* and as *"anarchy"*. Using the same metaphor Geert (AMS) describes cycling in Amsterdam as: "*anarchy – it is a bit jungle-ish, but in that it has some kind of structure and some kind of safety. If you are used to it then I think it is pretty safe."* In this Geert summarises the core of how we would characterise cycling in Amsterdam after two weeks of observing and cycling ourselves. Hence, what for us seemed rather chaotic and unstructured at first actually has some kind of structure. Wiske elaborates on this as she articulates that cycling in Amsterdam has its own dynamics:

"When you practice it (cycling in Amsterdam) every day and you are with people that practice it every day as well then you really have a kind of a language (...) your own rules without really communicating or you actually are communicating but in a non-verbal way." (Wiske, AMS)

This clearly exemplifies the embodiment of cycling in Amsterdam. Thus, the non-verbal communication is part of the embodied performance of cycling that constitutes the informal 'cycling code' in Amsterdam. This is for instance illustrated in the relationship between cyclists and pedestrians. According to the traffic regulations in the Netherlands pedestrians have the right of way at zebra crossings, however, in many situations cyclists choose to disregard this rule. Since cyclists are travelling at a higher speed, pedestrians in most cases choose to wait for the cyclists at the zebra crossing until the way is clear. Alternatively, eye contact is established in order to negotiate who is going first (Wiske, AMS). In addition, Eva (AMS) describes that she would most likely not wait for pedestrians, as it is something that cyclists in Amsterdam generally do not do. She explains that the reason for this is that it is harder for the cyclists to stop, especially if it is a large group of cyclists approaching the zebra crossing at the same time, although she would normally wait for a large crowd of pedestrians.
Another example of the embodiment of cycling in Amsterdam is the jumping of red lights. Christian (AMS) points to the fact that turning right through a red light is quite common. Accordingly as described in the first part we observed many cyclists jumping the red light turning right and Wiske (AMS) even stresses that it is even legal to go through a red light on a right turn. Moreover, Eva (AMS) chooses to go on the sidewalk in order to do the right turn because *"everyone is doing that in Amsterdam"*. Still, it is not all cyclists in Amsterdam who jump red lights and also those who do it only choose to do so in certain situations. Wiske explains that she usually stops and wait for a red light at bigger crossing but that she looks out and go through a red light in smaller intersection "*because that's what most people do here, I think*" (Wiske, AMS). Based on our observations and interviews with the participants in Amsterdam it seems that cyclists regularly jump the red light turning right and sometimes also go straight and left when conditions allows it.

According to Comeau (2014) we would characterise cycling in Amsterdam as organised disorder. Accordingly cycling in Amsterdam is organised because it, obviously, follows the traffic rules to a high degree. However, at the same time cycling in Amsterdam is also permeated by a certain degree of disorder, which is reflected in the self-interpretation of the traffic rules as described above. This is sustained by the majority of cyclists in Amsterdam and can thus be said to have become a norm and part of the unwritten and informal 'cycle code' that contributes to shaping the 'mobility culture' of Amsterdam.

The embodiment of cycling in Copenhagen

Having many years of experience cycling in Copenhagen we find the practice of cycling in Copenhagen inherently different to that of Amsterdam. This being so, none of the participants in Copenhagen went through a red light on the route and they all told us that it is something that they rarely do. Talking about traffic rules in general Ditte (CPH) elaborates: *"You have rules to follow them, because otherwise you shouldn't have them. (...) if I have the opportunity to go to an intersection to cross the road I will do it."* Jonas (CPH) describes how he always uses the cycle track on Yrsa Plads even though he is aware that it is not the fastest way through the

square. Moreover, he explains how he is tempted to go straight through the intersection at Artillerivej, yet, he always chooses to go round as he wants to cycle according to the rules and for safety reasons. Ditte (CPH) explains that she can even get annoyed at people in Copenhagen that do not follow the traffic rules and have a hard time controlling their bikes for example tourists. Similarly, Jonas can also get annoyed at cyclists who are breaking the rules and for example going the wrong way on Dybbølsbro.

"I think that there are many people like me, who care about their rights and who are obliged to give way to another. (…) Every time you do something that people are not anticipating there is a larger risk of getting into trouble." (Jonas, CPH - own translation).

Regardless of the seemingly conformist behaviour of cyclists in Copenhagen it is also important to stress that cyclists in Copenhagen also disregard traffic rules. For instance, Jonas stresses that he would sometimes jump a red light turning right. Similarly Ditte (CPH) explains that she sometimes chooses to ride against the traffic on a one-way street. Having cycled in Copenhagen for many years we have also observed and experienced many cyclists who break the traffic rules every day. However, the statements from the participants above highlights how our participants in Copenhagen are generally more aware of following the traffic rules even though it is not always the fastest or easiest way to go from one destination to another compared to our participants in Amsterdam. Oliver (CPH), who used to commute by bike in London, describes how the cyclists in Copenhagen in general behave "*very thoughtfully*" and "*considered*" compared to the cyclists in London. Likewise, in a special edition of the magazine of the Fietsersbond, the Dutch Cyclist's Union, this is also one of the main differences identified between cycling in Amsterdam and Copenhagen.

"The Danes are disciplined cyclists. Hardly anyone drives against traffic, they hardly ever jump a red light, (…) and when Danes brake, they stick their hand in the air to warn cyclists behind them." (Fietsersbond, 2009: 8)

On this basis we believe that cycling in Copenhagen generally can be characterised as a rather structured and disciplined system. Accordingly as described by our participants we argue that most cyclists generally follow the traffic rules and that cycling in Copenhagen overall is more structured and disciplined. In Copenhagen the infrastructural design on most roads separate the different means of mobility which leads to a more structured and organized system where rule bending and jumping red lights only is practiced by a small minority of cyclists.

4.3.4 The mobilities of cycling in Amsterdam and Copenhagen

In the second part of the analysis we have applied an eye-level perspective to explore the bodily interactions and situational dynamics of the 'ballet'. We have taken our point of departure in the three dimensions of *Staging Mobilities* framework as we have explored how the design of the material environment, the social interactions and the embodied performances stage the interactions of cyclists 'in situ'. In doing so we have initially found that

the design of the material environment is staging the interactions of cyclists as it affords and limits certain trajectories of cyclists along the routes of study. This is exemplified through 'sociopetal' and 'sociofugal' spaces that either attracted or 'pushed' cyclists away. In addition the level of regulation is also staging the interactions of cyclists as cyclists interact differently in intersections with or without traffic lights. We have also found that social interactions and the presence of the 'mobile with' stage the interactions of cyclists as cyclists apply a number of 'negotiation in motion' techniques to make their way through the city. In relation to this we have identified how cyclists become 'mobile body semiotics' as they temporarily guide other cyclist through unfamiliar intersections. Finally we have found that the embodied performances shape and sustain informal 'cycle codes' which stages the interactions of cyclists differently in Amsterdam and Copenhagen. These informal 'cycle codes' are parts of unique 'mobility cultures' which make the experience of cycling different in Amsterdam and Copenhagen.

4.4 Summary

In the first part of the analysis we have applied a birds-eye perspective to map the 'river' of cyclists along the routes of study. Based on this we have found that the existing design of the material environment create critical points of interaction, which are important to examine in order to understand the interactions of cyclists 'in situ'. Moreover we have found that cyclists take numerous desire lines, which emphasise the *flexibility* of cyclists. In the second part of the analysis we have applied an eye-level perspective to explore the bodily interactions and situational dynamics of the 'ballet'. Based on this we have found that the design of the material environment, the social interactions and the embodied performances are staging the interactions of cyclists. In the next chapter we want to discuss the implications of our findings in order to explain *why* cyclists interact with the design, each other and other road users in the way they do.

5 Discussion

In applying the *Staging Mobilities* framework to our empirical data in the analysis we have shown how the material environment, the social interactions and the embodied performances stage cycling 'in situ'. We will now discuss the implications hereof in order to identify why cyclists interact with the design of the material environment, each other and other road users in the way they do. To do so we will firstly discuss how the contemporary car-centric design of the material environment stages the interactions of cyclists. Secondly, we will discuss how the flexibility of the bike stages the interactions of cyclists as it facilitates and sets the boundaries of how cyclists can interact with the design of the material environment, each other and other road users. Thirdly, we will discuss how cyclists' individual perception of safety to a great extent also stages the interactions of cyclists which are manifested in different 'riding styles'. This being so we argue that cyclists also adapt to the unwritten rules and the informal 'cycling codes' of Amsterdam and Copenhagen in order to feel safe. Finally, we suggest a diagram that can explain why cyclists interact with the design, each other and other road users in the way they do as we also point to how the key findings implicate future studies and the promotion of cycling.

5.1 The implication of the material environment

Based on our findings we have identified how the design of the material environment stages the interactions of cyclists. We will now expand on this as we will discuss how the interactions of cyclists must be understood in relation to the material environment which can be characterised as a car-centric. The purpose is to illustrate how the material environment of the contemporary city is staging mobilities 'from above' through a car-centric mobility system which is generally ill-suited to accommodate the mobilities of cyclists.

5.1.1 The urban street

The city and with it the urban street is a fully human-created environment, a 'mobile biotope'. Thus its design at any point of time reflects the contemporary ideas about what the function of the urban street should be. The urban street used to be for everyone, a shared space of people stopping and of people on the move, in which traffic lights, painted lanes and zebra crossings were unheard of. The first legal traffic code was only introduced in 1903 and the regulation and the design of the urban streets as we know them today were only implemented due to the mass appearance of cars at the beginning of the twentieth century (Montgomery, 2013). Historically the street has served as more than solely an infrastructure for moving objects:

"The traditional street served many functions beyond that of passage. It was market, workroom and meeting hall (…) the public street can be a significant focus for site design. The street is a true community space" (Lynch and Hack, 1984:202-203 in Jensen, 2013: 54).

Based on the book *Fighting traffic* by Norton (2008) Montgomery describes how the street was transformed at the beginning of the twentieth century as advocates of the car succeed in a cultural revolution that has changed our idea of what the street is for, namely as a place that is designed to accommodate the flow of car traffic rather than as a place for human interaction (Montgomery, 2013). Accordingly Latham and Wood (2015) recognise "*how existing infrastructural configurations are built around certain taken-for-granted notions of how a given infrastructure will be used and who will be using it."* (Latham and Wood 2015:301). In other words, the standard design of the urban street as we know it today stages mobility around a presupposed utilisation of the infrastructure that sets the limits of how the urban space can be exploited.

This is an important acknowledgement as we have shown how the design of the material environment and the level of regulation in Amsterdam and Copenhagen stage the interactions of cyclists with the design, each other and other road users. Unlike other means of mobility like trams, metros and cars cyclists have not required a new infrastructural system, instead they have "*recolonised"* the existing streets (Latham and Wood, 2015:303). Today these are still above all designed to accommodate the mobility of cars, which is ill-suited to or is in conflict with the kind of movement that cyclists are trying to practise (Latham and Wood, 2015). This notion is based on a study in London; however, despite being some of the world's best cities for cycling our study shows how the notion is applicable for Amsterdam and Copenhagen as well. Hence, Jonas (CPH) expresses how he would like to see more restrictions on car traffic in Copenhagen as he articulates how the cars are currently *"dominating".* He explains:

"Many things are organized so that it is possible to use a car. For instance if a delivery van comes. He wouldn't think of parking on the road, would he? No, he parks on the cycle track so as not to be in the way of the cars. Being in the cyclists' way doesn't matter, and this annoys me rather." (Jonas, CPH – own translation).

This description highlights how everyday mobility in many ways is staged by the material environment of Amsterdam and Copenhagen which is often designed for the cars at the expenses of cyclists. The fact that the car is being prioritised is particularly evident at intersections in cases where wider cycle paths or tracks are narrowed or merge with the lane for right-turning cars (Picture 23). Another example is where zebra crossings are in place to help pedestrians cross the street while cyclists are often not given the right of way. This is for instance the case on the studied route in Copenhagen on Artillerivej where the main flow of cyclists crossing Artillerivej are then faced with a difficult crossing of a busy street.

Picture 23: Conditions for cyclists at intersections in Amsterdam (left) and Copenhagen (right)

The examples show how the design of the material environments of Amsterdam and Copenhagen, despite the political focus and the investments in bike infrastructure, in many situations are still staging mobilities around the same allocation of street space that prioritises cars rather than cyclists. In a study of mobile interactions at the square of Nytorv in Aalborg, Jensen concludes that cyclists is the mode of mobility that is in the most vulnerable position (Jensen, 2010), which the example of the zebra crossing at Artillerivej also highlights. This is noteworthy as we look at Amsterdam and Copenhagen, which are hailed as some of the best cities for cyclists in the world. Given the fact that the design of the Stadhouderskade / Ferdinand Bolstraat performs as a 'sociofugal' space for cyclists as it discourages our participants from doing the left turn onto Stadhouderskade emphasises that a lot still needs to be done in Amsterdam and Copenhagen to improve conditions for cyclists. However, even so it is also important to emphasise that the infrastructure for cycling in Amsterdam and Copenhagen is generally good and in any case better than in cities like Toronto and London as stated by Christian (AMS) and Oliver (CPH). Here the design of the material environment to a much higher extent performs as 'sociofugal' spaces for cyclists, which is also reflected in cycling levels, which are considerably lower.

5.1.2 Cycling in cities built for cars

The behaviour of cyclists in Amsterdam and Copenhagen is often claimed to be bad and is from time to time the subject of the public debate. In accordance with this Christian (AMS) describes the phenomenon it in the following way:

"Sometimes I think to myself: here is a city, which has put so much effort into trying to make it easy to bike around and then people just sort of don't even want to take advantage for all that effort that has been put in to make all that good bike infrastructure." (Christian, AMS).

Needless to say, the behaviour of cyclists in both cities is from time to time in conflict with traffic rules just as some car drivers from time to time exceed the speed limit. Still, it is also important to state that the majority of cyclists in most cases in fact comply with the traffic rules, although this can easily be overlooked, as it is more likely to be the cyclists who disregard the rules who stay in one's memory rather than the majority who stick to the traffic rules. In any case, we argue that the public debate regarding the behaviour of cyclists should be seen in the light of the existing design of the material environment.

Geert (AMS) explains how the cyclists in Amsterdam are generally characterised as being *"rude" and "arrogant"*, however, this may reflect the fact that the behaviour of cyclists does not fit with the existing design of the material environment. As an example of this cyclists in Copenhagen explain how they from time to time get confused about what they are supposed to do i.e. how they are supposed to go through intersections and how they need to position themselves accordingly (Cyklistforbundet, 2015). Accordingly, some of our participants mention how they at times get confused about what they are supposed to do when they are biking. Along the routes studied this is evident at the left turn at the Stadhouderakade / Ferdinand Bolstraat intersection (Richard and Geert, AMS) and at the link to Dybbølsgade on Yrsa Plads (Kamilla and Suzie, CPH).

Picture 24: Kamilla riding on the pavement on Yrsa Plads unintentionally

Being unfamiliar with the new link across Yrsa Plads Kamilla (CPH) describes how she is focus on finding the right way without annoying the other cyclists. As shown in picture 24 she is focusing on this for what reason she overlooks the sign and the cycle track further ahead. Geert (AMS) describes how the markings on the route can be confusing, which makes him focus on the intentions of the other cyclists and other road users instead. In the examples of Kamilla and Suzie they both found themselves biking on the pavement against their own will because they were confused about where they were supposed to go. This illustrates that the cyclists' disregard of the traffic rules is not always deliberate but is because of the infrastructural design.

At other times, the disregard of the traffic rules is done deliberately for instance when cyclists jump a red light. Eva (AMS) describes how she prefers to have traffic lights in bigger and busy intersections for safety reasons contrary to intersections with less traffic where she prefers

not to have traffic lights. In the interview, Eva (AMS) rhetorically states: *"Why am I stopping here?"* when she explains why she sometimes jumps the red light. In smaller intersections with less traffic she explains that she would rather remove the traffic lights and have the trust in people that they can look out for themselves: *"Maybe too much regulation is just not helping."* (Eva, AMS). As highlighted in the analysis Wiske (AMS) from time to time jumps the red light in smaller intersections as well and similarly most of our participants say that they also prefer not to have traffic lights in intersections where it is safe to cross.

This is also reflected in the route choice of cyclists as most of our participants explain how they try to optimise their route without making it considerably longer. In this study the participants were told to follow a predefined route, however, as Eva (AMS) describes riding on the Stadhouderskade: "*...if I was alone and needed to take this route, I would turn right one street earlier just to skip the traffic light.*" (Eva, AMS). Eva explains that turning right earlier would provide a less busy and more convenient route without possibly having to stop for a red light. The left turn in the Stadhouderskade / Ferdinand Bolstraat, which Richard avoids is another example. This demonstrates how cyclists with advantage can choose other routes in order to "skip" or avoid particular intersections that work as a 'sociofugal' space for cyclists to stay on the move. That cyclists tend to do this is also the finding in a previous study on commuter cyclists in the Dutch city of Utrecht (van Duppen, 2013). Eva's (AMS) example of potentially deviating from the route also highlights the significance of studying not just particular intersections but also the network around them in order to achieve a comprehensive understanding of why cyclists are interacting the way they do.

In this section, we have pointed out how cyclists interact in a car-centric mobility system that is chiefly designed for the cars at the expense of cyclists. This needs to be taken into account in order to understand why cyclists interact with the design of the material environment, each other and other road users in the way they do. Though it is not our intention to take sides in the public debate we argue that there is a need to design the material environment so that it meets the needs of cyclists to a greater extent.

5.2 The implications of the social interactions

Based on our findings we identify how the social interactions between cyclists and between cyclists and other road users take place as cyclists 'negotiate' while in motion. In this section, we will discuss how the flexibility of the bike stages the interactions of cyclists as it facilitates and sets the boundaries of how cyclists can interact with the design of the material environment, each other and other road users. To do so we present a number of examples of the flexibility of cyclists and how it stages the interaction of cyclists with the design, each other and other road users.

5.2.1 The flexibility of cyclists

The flexibility of the bike is above all reflected in the desire lines studies of the selected intersections in Amsterdam and Copenhagen, which illustrate how cyclists travel along a vast number of specific desire lines. These include the route that was intended when the intersection was designed, but also inherently different and unauthorised routes through the intersection. The number of desire lines stresses that cyclists are not forced to follow the predefined route nowhere as rigidly as is the case for cars. Hence, it is also the very flexibility of cyclists that enable them to disregard traffic rules in a way which is more obvious to observers.

This flexibility that is illustrated in the desire lines of cyclists is manifested in a number of different interactions of cyclists with the design, each other and other road users. Contrary to cars, cyclists are much more flexible in the way they can position themselves at intersections. Wiske (AMS) and Eva (AMS) explain that they usually position themselves in front at an intersection as it enables them to go quickly when it turns green without having to wait for other cyclists starting (Picture 25). Riding her cargo bike Ditte (CPH) describes how she usually positions herself behind other cyclists so she is not in the way of cyclists that want to overtake her (Picture 25). At the same time, Ditte explains that she would have squeezed her way through to move closer to the intersection if she had been on her regular bike. This illustrates how Ditte is interacting differently depending on the type of bike she is riding.

Picture 25: Eva (left & middle) and Ditte (right) positioning themselves differently at intersections

Another example of the flexibility of the bike is reflected in the possibility of cyclists to get off the bike and temporarily become a pedestrian. This is exemplified in the way Jonas (CPH) chooses to cross Artillerivej as he dismounts his bike and uses the zebra crossing to get to the other side (Picture 26).

Picture 26: Jonas dismounts his bike and becomes a 'pedestrian' to cross Artillerivej

In line with Jonas, Kamilla (CPH) explains that she sometimes get off her bike and uses the 'pedestrian' technique to do a "*faster*" left turn in the intersections she knows well. Copenhagenize (2012; 2013c) have also identified the same behaviour of cyclists at various intersections in Copenhagen which they refer to as the *"Biker-Walker-Biker"* technique. Moreover, Eva (AMS) describes how the amount of traffic and the time of the day also influences the way she rides. She explains how she usually waits for the green light but occasionally chooses to go through a red light: *"It is just really busy in the city and safer to wait. Sometimes if it is a Sunday morning or it is really quiet on the street and you can just see everything, I do it, but not during the rush hour. Then I will just wait."* (Eva, AMS). Yet again, this exemplifies the flexibility of the cyclists, as they are capable of adapting to the different amount of traffic during the day.

The examples mentioned above refer primarily to the flexibility of the bike in relation to cyclists' interactions with the design of the material environment; however, as indicated in the last example cyclists can also be flexible in relation to their social interactions with each other and other road users. This is reflected through the different 'negotiation in motion' techniques of cyclists, which we have identified in the analysis. Being exposed to the urban environment cyclists can use a great deal of body language including eye contact and hand signalling which gives other cyclists the possibility to 'read' the intentions of other cyclists and pedestrians. As Jensen notes:

"the body in motion is working hard to orient itself, make complex decisions and interpret the motives and intentions of other bodies we may say that what is taking place is 'coordination in motion'." (Jensen, 2013: 120).

Accordingly, the flexibility of the bike enables cyclists to "*assess*" (Ditte, CPH), "*calculate*" (Geert, AMS) or "*mediate"* (Karen, AMS) flexibly between other cyclists and road users, themselves and the material environment in order to get safely through the city without disturbing the flow of other traffic users. The application of different *speeds* is another 'negotiation in motion' technique that exemplifies the flexibility of cyclists. Thus, we have described how some of our participants in Amsterdam pick up speed when approaching a zebra crossing in order to communicate with the pedestrians. In Jensen's study of mobile interactions at Nytorv (2010) he also found how the "*power of speed*" is used by cyclists as a negotiation technique to dominate the 'negotiation in motion'. We have also identified how our participants interact differently according to the 'mobile with' i.e. if it is an old lady, a family with children or a young guy on a race bike.

In this section we have shown the very flexibility of cyclists and how it is important to take this into account in order to explain why cyclists interact in the way they do. Hence, it is essential to acknowledge that the flexibility of the bike stages the interactions of cyclists as it

facilitates and sets the boundaries of how cyclists can interact with the design of the material environment, each other and other road users.

5.3 The implications of the embodied performances of cycling

Based on our findings we have explored how the embodiment of cycling in Amsterdam and Copenhagen shapes the 'mobility culture' through informal 'cycle codes' and thereby the mobilities of cycling. In the following, we will discuss the implications of this as we highlight how cyclists' individual perception of safety to a great extent stages the interactions of cyclists which are manifested in different 'riding styles'. This being so we argue that cyclists also adapt to the unwritten rules and the informal 'cycling codes' of Amsterdam and Copenhagen in order to feel safe.

5.3.1 Cyclists' individual perception of safety

Based on the interviews with our participants we identify that their behaviour to a great extent is motivated by their individual perception of safety. In this the presence of other road users, especially cars and trucks, play a crucial role as cyclists are the *"smallest"* in traffic (Kamilla, CPH). This is reflected in numerous situations, especially at intersections where cyclists face potential conflicts with right-turning cars and trucks. Hence, some cyclists deliberately make a curve around cars waiting to turn right to allow more space (Kamilla, CPH), others cyclists pick up speed in order to be seen by the cars (Richard, AMS) just as some cyclists deliberately wait until a car has turned right. *"It was the safer option to let the car go."* (Oliver, CPH). In situations where trucks are turning right our participants are generally more careful and adjust their behaviour accordingly to make sure that they get noticed. *"As a cyclist you just know that you have to be careful of trucks and the trucks they know they have to be careful of cyclists"* (Eva, AMS). Correspondingly, Suzie (CPH) explains how she would gladly stay behind a truck even though that means she would miss the green light.

Richard (AMS) explains how the question of feeling safe is more important than the attractiveness of the surroundings for his choice of route while Jonas (CPH) elaborates on this as he explains how he tends to avoid streets without cycle tracks for safety reasons. Specifically, Geert (AMS) describes the Ceintuurbaan / Ferdinand Bolstraat intersection as dangerous as he once almost had an accident in this intersection going through a red light where he miscalculated the speed of an approaching car, which has made him extra cautious.

"The thought is not crossing my mind to go through the red light here, while in other parts of Amsterdam I sometimes do that. You make a calculation: so can you go through here or not. And here it is absolutely not an option." (Geert, AMS).

Similarly Kamilla (CPH) adds to this explaining how she would sometimes go through a red light, although she would only consider doing it at intersections that she knows well. However, this also shows how the perception of safety is often closely interlinked with the knowledge that the cyclists have of the particular place as well and how this also affects the

behaviour of cyclist. "*When I'm familiar with it [the intersection], then I am also familiar with how other people interact in it, so I base my behaviour on how I cycle on that, too."* (Karen, AMS). Another example is that some of our participants chose to be 'mobile with' other cyclists in places that they are not familiar with. This is an example of how other cyclists temporarily become 'mobile body semiotics' and can work as guidance. Ditte explains this approaching the roundabout at Fisketorvet:

"now I realise that I've never cycled this way around the roundabout, so I start to think how I should do that because I can't do an immediate left turn and then I think that I'll just follow all the others [the other cyclists]" (Ditte, CPH - own translation).

However, cyclists also become 'mobile with' because it provides a feeling of what Vanderbilt terms 'safety in numbers' (Vanderbilt, 2008:86 in Jensen, 2013). The idea is that the other road users will pay more attention and will have to yield because several cyclists (and pedestrians) are mobile together. This is clearly evident when Karen (AMS) and Geert (AMS) attempt the left turn at the Ferdinand Bolstraat / Stadhouderskade intersection as they both decide to wait for other cyclists to cross as no traffic light is installed to guide them across.

Altogether, we have found that the behaviour of cyclists and hence the interactions of cyclists is strongly influenced by the perception of feeling safe. That the perception of safety i guides the behaviour of cyclists is also reflected in previous studies. For instance, the studies of Wood (2010) and Spinney (2007) on the embodied performances of commuter cyclists in London show how the perception of safety is crucial for interactions of cyclists. Furthermore, Oliver (CPH) and Christian (AMS) explain how they continuously look over their shoulder in order to feel safe. "*The more I can see, the safer I feel on my bike. (...) I do look around a lot just for safety reasons.*" (Oliver, CPH). Still this is not unique for Oliver and Christian as all of our participants to different extents look around for safety reasons. This is also reflected in the technique of ringing the bell in order to get the attention of other cyclists because they feel unsafe about what the other cyclists or road users are going to do. Similarly, van Duppen et al., (2013) who have studied the embodied experience of commuter cycling in the Dutch city of Utrecht, also highlight the importance of the perception of safety and how it guides the behaviour of cyclists:

"Firstly, the trajectories [of the daily bike commute] involve continuous negotiations 'in motion' with other traffic. For this, cyclists have developed tactics of manoeuvring, positioning oneself safely on the road and adjusting to the pace and rhythm of others".
(van Duppen et al., 2013:242).

In this they describe how the perception of safety influences how cyclists manoeuvre and position themselves through continuous negotiations 'in motion' with other cyclists and other road users.

5.3.2 Individual 'riding styles' of cyclists

Still, the extent to which cyclists motivate their interactions based on the perceived safety obviously various from cyclists to cyclist just like the mood and purpose of the trip have an influence. This is the case as cycling like any other mode of mobility is an embodied practice, which is expressed in the affective and tacit acts of cyclists. Oliver elaborates on this as he describes the situation where he is in a hurry and how it makes him take decisions faster, which makes him take more risks:

"[Being in a hurry] it is like this risk/time sort of ratio is a bit different (…) Everything changes when you are in a hurry. (…) Your brain is thinking about how late you are going to be for work and how much your boss is going to kill you. You are thinking about that all the time – you are not thinking so much about your own safety. Your priorities are in a different place." (Oliver, CPH).

This is an example of how the perception of safety may be subject to different priorities, which also vary from cyclists to cyclists. This is also reflected in a study of commuter cycling in the city of Birmingham, UK, where it is described how the participants in the study practice different 'riding styles' and take various trajectories to reduce the risk of being hit by a motorised vehicle (Jones, 2012). In the study of commuter cyclists in Utrecht there is an example of a woman, who has adopted *"a more 'secure and defensive' riding style"* after experiencing a major incident as a child (van Duppen et al., 2013: 240). Similarly Karen (AMS) in our study explains how she had an accident a few months earlier and how she since then has been more cautious and prefers to stop and be safe. On the contrary Wiske (AMS) describes how she is not only a regular cyclist but also a regular motorcyclist, which she explains influences her 'riding style'. Richard (AMS) is an example of a third 'riding style' as he describes how he has learned *"not to stress"* and to *"feel safe"* cycling in Amsterdam. He elaborates on this process:

*"I have learnt in Amsterdam to bike with not so much energy. When I was first living in Amsterdam, everyday I had quarrels with cars and scooters. But if I do that, I will be very stressed every day. So I said to myself after a few years (…) I need to stop yelling and screaming at people and just focus on doing my job." (*Richard, AMS*).*

The life experience of Richard can thus be described as another 'riding style'. Accordingly, van Acker describes the prevalence of different mobilities biographies, which among others are impacted by the 'life stage' (van Acker et al. 2010). The prevalence of distinct 'riding styles' based on different mobilities biographies are clear examples of how cycling is an embodied practice and how this stages the interactions of cyclists with the design, each other and other road users. Accordingly we argue that the embodied performances of cyclists need to be acknowledged in order to understand why cyclists interact with the material environment, each other and other road users in the way they do. In the next section we will highlight how

the embodied performances of cyclists make cycling in Amsterdam and Copenhagen inherently different.

5.3.3 The 'mobility cultures of Amsterdam and Copenhagen

The embodied performances of cyclists are not only reflected in different 'riding styles' that distinguish the practice of cycling of individual cyclists but also in distinct 'mobility cultures' which also distinguish the practice of cyclists between different cities and countries. We will now elaborate on this as we argue that cyclists to a great extent adapt to the unwritten rules and the informal 'cycling codes' of Amsterdam and Copenhagen in order to feel safe. Following this we will summarise the main differences between cycling in Amsterdam and Copenhagen to describe how the embodied performances stage the interactions of cyclists differently in the two cities.

The answers given by our participants indicate that cyclists to a high extent adapt to the unwritten rules and the informal 'cycling codes' of Amsterdam and Copenhagen in order to feel safe. This is manifested in different informal 'cycling codes' that a significant number of cyclists follow in both cities. As described by Geert (AMS):

"I once said that if you obey to all the traffic rules here in Amsterdam as a cyclist whereas everyone else isn't it becomes more dangerous than just going along the flow. It is like driving 70 km on a highway, that's dangerous too. If you are new in Amsterdam, you get a bike and cycling around I think it is a bit of a culture shock. It was to me when I came to Amsterdam."
(Geert, AMS).

In line with Geert (AMS), Richard (CPH) gives an example of an intersection in Amsterdam that is so busy at rush hour that as a cyclist you will never make it to the other side if you follow all the traffic rules. Oppositely to this Oliver (CPH) describes how he suddenly needed to comply with certain traffic rules coming to Copenhagen such as yielding to pedestrians and using hand signalling. These rules and aspects of cycling were practices that he needed to relearn biking in Copenhagen. Oliver elaborates on yielding for pedestrians and the adaption process of coming to Copenhagen:

"*It's been a few months since I noticed that [cyclists should yield to pedestrians], so now I have conformed (…), but I think in the beginning I was kind of like 'Oh yeah, I should stop for these pedestrians'. So I had to sort of rethink my attitude as a cyclist."* (Oliver, CPH).

This quote highlights the challenge cyclists unfamiliar with the informal 'cycle code' are confronted with because they have to adapt to the 'mobility culture' for cycling in Amsterdam or Copenhagen. Being used to cycling in the Netherlands Suzie also describes the difficulties of adapting to cycling in Copenhagen. She explains that her father came to visit and that she needed to tell him that he could not bike like home and that he had to follow the rules. *"Follow the rules that we never follow, basically."* (Suzie, CPH). Furthermore, Suzie explains that she

also needed to adjust her own behaviour coming to Copenhagen. Telling about how she used to jump red lights at her previous school, we asked her if she sometimes considers jumping red lights in Copenhagen: "*I mean I would but not in Copenhagen, but anywhere else – yes. (…) Here, because no one jumps a red light, cars are never looking and expecting you to jump a red light." (*Suzie, CPH*).* The answer from Suzie is an example of the adaption process from one 'cycle code' to another.

We were surprised to observe that no cyclists in Amsterdam use the Danish 'stop signal' where cyclist bend there left arm and stick it in the air to signal that they are stopping. Karen (AMS) explains that she at one point learned the stop sign for cyclists while living in Copenhagen but now she does not remember it anymore. According to Suzie there exists no 'stopping' signal for cyclists in the Netherlands similar to the Danish one. Like other participants, she uses the Danish hand signalling and especially the 'stop' sign at places where it is not obvious for other traffic users that she is stopping. For example in front of her house as she points to the simple fact that "*no one knows I live there."* (Suzie, CPH). The usage of the 'stopping' sign in Copenhagen and the absence of a 'stopping' sign in Amsterdam is another example of a distinction between the 'cycling codes' in the two cities. As mentioned above not yielding to pedestrians in zebra crossing is a part of the unwritten 'cycle code' for Amsterdam. Having biked in Copenhagen and American cities Karen describes how it is contradictory for her not to yield for pedestrians in Amsterdam: *"I am still trying to yield to pedestrians but if there are a lot of cyclists going through I go there too."*(Karen, AMS). This exemplifies how it is not only a challenge to adapt but also to go against the informal 'cycling code' of a city. In this situation Karen (AMS) can choose to break the official traffic rules and to counteract her personal intentions by not yielding to the pedestrians. On the other hand, if she yields to the pedestrians she will also interfere with the flow of other cyclists and interact in a way others do not anticipate. A similar dilemma is described by a cyclist in van Duppen et al. (2013) as he was: *"even forced (…) to follow the stream [of cyclists] running the red light because stopping would result in other cyclists bumping into his back."* (van Duppen et al., 2013: 240). The examples illustrate one of the many dilemmas that cyclists go through on a daily basis as they have to relate to the official rules as well as personal intentions, anticipations and traffic flows.

In this section we have pointed out how cyclists' individual perception of safety to a great extent also stages the interactions of cyclists. This is reflected in individual 'riding styles' of cyclists as well as in distinct 'mobility cultures' which also distinguish the practice of cyclists between different cities and countries as we argue that cyclists to a great extent adapt to the unwritten rules and the informal 'cycling codes' of Amsterdam and Copenhagen in order to feel safe.

5.4 Understanding the embodiment of cycling

This study highlights the embodiment of mobile practices generally and that of cycling specifically. Working with the cases of Amsterdam and Copenhagen as being some of the most cycling-friendly cities in the world we find that cycling is still inherently different in the two cities due to the prevalence of distinct 'mobility cultures'. Based on our findings we argue that cycling in Amsterdam can be characterised as an organised disorder. The reason for this is that cycling in Amsterdam is structured by the road design, the semiotic system and the traffic rules while at the same time cycling is also characterised by a certain degree of disorder which is reflected in the self-interpretation of the traffic rules. The process of self-interpretation is reproduced and sustained by the majority of cyclists and it therefore becomes ingrained among regular cyclists and part of the 'cycle code' in Amsterdam. Contrary, we find that cycling in Copenhagen can be characterised as more organised and disciplined. In Copenhagen the infrastructural design on most roads separate the different means of mobility which leads to a more structured and organised system where rule bending and jumping red lights is not as common for cyclists in Copenhagen as in Amsterdam. Accordingly Suzie and Karen who are familiar with cycling in both Amsterdam and Copenhagen describe how cycling in Copenhagen is *"more structured (...) whereas in Amsterdam it is all a bit more fluid because you are interacting much more with the cars and the pedestrians."* (Suzie, CPH) and how *"people somewhat follow the rules a bit more [in Copenhagen]"* (Karen, AMS) We know that others may have different experiences of cycling in Copenhagen thus criticising our characterisation of cycling in Copenhagen as they find that cyclists in Copenhagen generally ride inexpediently and neglect the traffic rules. We are aware of this, however, our characterisation should be seen in relation to cycling in Amsterdam and in this perspective we argue that the cyclists in Copenhagen to a greater extent ride according to the rules, whereas cyclists in Amsterdam rather bike according to the conditions. We acknowledge that there are cyclists in Copenhagen that deviate from this description, nevertheless, we argue that the unwritten rules or 'cycling code' in Amsterdam compared with Copenhagen to a greater extent legitimise behaviour that diverges from the official traffic rules.

Ultimately, all cyclists travel from A to B whereas the way they do it is inherently different. The unique 'cycling codes' of Amsterdam and Copenhagen stage a system of mobilities that cyclists have to interact in and navigate through on a daily basis. Therefore, cyclists who are not used to the distinctive system and the 'cycling code' have to change and adjust their cycling habits in order to navigate smoothly through the city. Drawing on the terminology of Jensen, cycling in Amsterdam and Copenhagen is staged through different manuscripts that regulate cycling in each city. Every cycle trip can be understood as a play in which each cyclists choreographs the play according to the manuscript. This underlines the importance of acknowledging the embodiment of cycling as the embodied performances of cyclists' stage the interactions of cyclists 'in situ'.

5.5 Understanding cycling 'in situ'

In order to identify why cyclists interact with the material environment, each other and other road users in the way they do we have highlighted how the contemporary car-centric design of the material environment stages the interactions of cyclists 'from above'. We have also shown how the flexibility of the bike stages the interactions of cyclists as it facilitates and sets the boundaries of how cyclists can interact with the design of the material environment, each other and other road users. Finally, we have uncovered how cyclists' individual perception of safety to a high extent also stages the interactions of cyclists which are manifested in different 'riding styles'. Following this we have highlighted that the embodied performances of cycling also shape informal 'cycle codes' and 'mobility cultures' that make cycling in Amsterdam and Copenhagen inherently different.

These findings are identified applying the *Staging Mobilities* framework, which has proved useful to point out the dimensions of staging mobilities 'in situ' and thus the motivations behind the interactions of cyclists. However, these distinctions are only made for operational reasons and thus we stress the importance of applying a holistic approach in mobility studies as the three dimensions of the *Staging Mobilities* framework stage the mobilities of cyclist 'in situ' in interplay. This interplay of the three dimensions may be exemplified by Jonas' decision to dismount his bike and to use the zebra crossing in order to get across Artillerivej. Firstly, the car-centric design of the material environment that makes it difficult for cyclists to cross Artillerivej stages him as he decides to use the zebra crossing to get to the other side. Secondly, the flexibility of the bike stages him as it enables him to quickly dismount his bike, which makes it possible for him to use the zebra crossing as a pedestrian in order for him to 'stay on the move'. Thirdly, the embodied performance stages him to go for what he perceives as the safest option. Accordingly, we suggest a diagram that explains why cyclists interact with the design, each other and other road users in the way they do. Just like in the *Staging Mobilities* framework one should think of mobilities as being staged from above through the design of the physical settings and material spaces as well as 'staged from below' through the social interactions and embodied performances of cyclists. Unlike the *Staging Mobilities* framework, the diagram specifically addresses the mobilities of cyclists 'in situ' as it includes the three key factors we have identified in this study: the *car- centric design* of the material environment, the *flexibility* of cyclists and the *perception of safety* of cyclists.

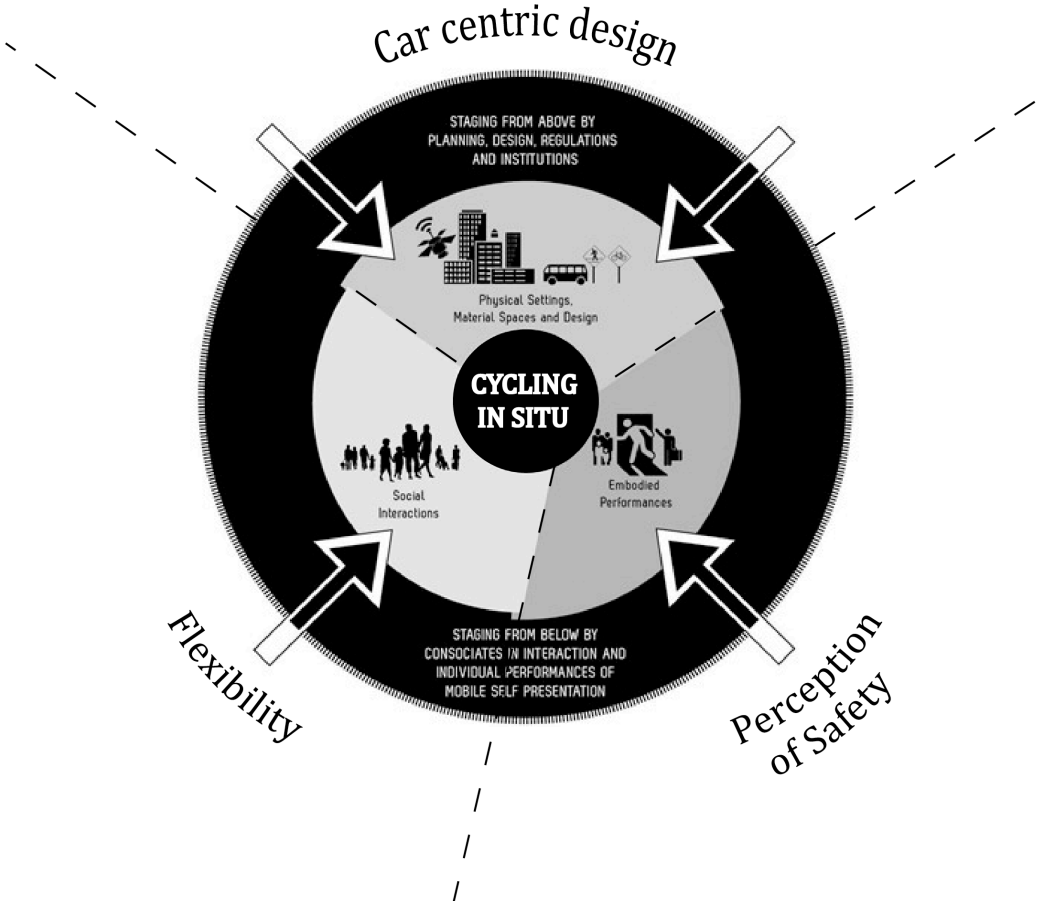


Diagram 1: Cycling 'in situ' inspired by Jensen (2013)

The diagram is based on our findings, which we have found studying mobilities 'in situ'. However, with the diagram we suggest an understanding of the mobilities of cyclists, which is applicable for the city as a whole. This is in accordance with our argument that mobilities must be studied 'in situ' while at the same time mobilities must also be understood in relation to the infrastructural system as a whole. Hence, a mobile situation may unfold in an infrastructural design in which car traffic is restricted or absent for which reason the mobilities of cyclists are not staged through a car-centric material environment. A diagram is a simplified image of the world (Jensen, 2013), however, the aim of the diagram is that it can serve as what Jensen terms a 'vehicle of thought', which represent an attempt to supplement the linguistic vocabulary with visuals that may work to inspire further reflection (Jensen, 2014). Accordingly, the diagram is an attempt to communicate our findings of this study in a simplified way to enhance the application in future studies on cycling.

5.6 Implications for future studies and promotion of cycling

The aim of this study has been to obtain a better understanding of the behaviour of cyclists as we have studied how the interactions of cyclists unfold 'in situ' in order to be able to design expediently for cyclists. In so doing we have contributed to a better understanding of cycling as an embodied practice as we have shown how the embodiment of cycling has implications

for the practice of cycling. Based on the findings of this study we identify three implications for futures studies of cycling, which we argue are important to acknowledge in order to enable future promotion of cycling.

Firstly, we argue that existing studies evaluating infrastructural designs have shortcomings as they fail to take the embodiment of cycling into account and that future studies on cycling, and mobilities in general, should acknowledge the embodiment of mobile practices. Accordingly, we question the applicability of studies that aim at comparing infrastructural designs through benchmark systems in order to formulate standardised guidelines for infrastructural design. In this we do not question the potentials of this approach as it is in fact possible to evaluate different infrastructural designs e.g. in terms of their objective safety in terms of fatalities per kilometre cycled. This can for instance be useful to point out weak spots in the existing infrastructural design in to order to identify where improvements are most needed. Instead we question the applicability of such studies to identify the best solutions for such improvements as we argue that it is the individual's perception of safety (as part of the embodied performance) rather than the objective safety features of the infrastructural design that determine whether people will use it or not.

Secondly, due to the embodiment of cycling and the implications it has on the individual perception of safety we also question the applicability of the categories of 'conformists', 'momentumists' and 'recklists' cyclists in the existing desire lines studies (Imbert & te Brömmelstroet, 2014) on which this study builds. The reason for this is that we argue that such categorisations are inadequate to capture the individual perceptions of cyclists. Hence, the individual perception of a 'momentumist' and a 'recklist' cyclist may differ between individuals and between cities as cycling is embodied differently.

Thirdly, we argue that cycling studies focussing solely on 'commuters' have certain shortcomings. The participants in our ride-along interviews have various degrees of knowledge of the studied route. Our study shows that the different degree of experience enhances different valuable insights into the usage and the perception of the route and the intersections. For instance, the daily users have a comprehensive knowledge for which reason they can point out issues that happen on a daily basis. However, for the same reason cyclists who are familiar with the design of the material environment are often unreflective about how they are interacting with it, other cyclists and other road users. On the other hand, cyclists who are less familiar with the design of the material environment are more reflective about their behaviour and for that reason they can provide other valuable insights i.e. how the design of the material environment is perceived by cyclists who encounter it for the first time. This knowledge is crucial if cycling is to be promoted and thus we argue that the studies that focus solely on commuters have shortcomings as they lack these perspective and insights.

Having identified the car-centric design of the material environment, the flexibility of cyclists and the perception of safety of cyclists as key factors in understanding the motivations of cyclists, the question arises how infrastructure can actually be designed flexibly and safely according to 'the logic of cyclists'. This is beyond the scope of this study, however, we urge other scholars to study flexible and safe design solutions also taking the embodied performances of cyclists into account. Despite being some of the world's best cities for cycling, we have highlighted that the infrastructure for cyclists is often designed in ways where cars are given a higher priority than cyclists. We feel it is important to emphasise that this study is not a proclamation against cars; however, in accordance with Hull et al. (2014) we argue that cyclists generally need to be granted the same priority as cars if Amsterdam and Copenhagen are to fulfil their policy visions of further promoting cycling as a mode of mobility. To illustrate this we will take point of departure in Jensen's notion of the city as a 'mobile biotope', which he uses to emphasise that the city is a fully human-created environment for mobilities and living where the mobile practices not only sustain the liveability of the sites and places but are also the outcomes of these environments. Accordingly, we argue that the mobility system of the city is comparable with an ecosystem. Using the metaphor of the mobility system of the city as an ecosystem we argue that the car holds a predominant position in this ecosystem, which cyclists in the word of Latham and Wood (2015) have started to "*recolonize"* in growing numbers. The idea is that the living conditions e.g. the infrastructures and the quality thereof, for each mode of mobility determines their number just like the living conditions of species in an ecosystem determine their number. In this way of thinking urban mobility, the living conditions for cyclists must be improved in order to promote cycling as a mode of mobility. However, just like in an ecosystem this does not have to imply that other species, in this case the car, must suffer from poorer living conditions.

Accordingly, we argue that there is a great potential in optimising the existing design of the material environment as cycling is a mode of mobility that has few technical requirements and which only takes up a limited amount of space. The city of Amsterdam is leading the way with their contemporary and innovative plans for optimising a number of intersections based on the findings of the existing desire lines studies. In the future we urge for similar initiatives which also acknowledge the embodiment of cycling to further promote cycling.

6 Conclusion

In response to the growing interest in the promotion of cycling the aim of this study has been to provide more structural evidence of the actual behaviour of cyclists by asking why cyclists interact with the design of the material environment, each other and other road users in the way they do in order to gain a better understanding of cycling as an embodied practice.

Based on a triangulation of methods including eleven in-depth ride-along interviews our analysis of cyclists in Amsterdam and Copenhagen points out three main factors which influences the interactions of cyclists. Firstly, we have pointed out how cyclists interact in a car-centric design of the material environment that is chiefly designed for the cars at the expense of cyclists. This needs to be taken into account in order to understand why cyclists interact with the design of the material environment, each other and other road users in the way they do. Though it is not our intension to take sides in the public debate we argue that there is a need to design the material environment so that it meets the needs of cyclists to a greater extent. Secondly, we have shown the very flexibility of cyclists and how it is important to take this into account in order to explain why cyclists interact in the way they do. Hence we find that it essential to acknowledge that it is the flexibility of the bike that stages the interactions of cyclists as it facilitates and sets the boundaries of how cyclists can interact with the design of the material environment, each other and other road users. Thirdly, we have pointed out how cyclists' individual perception of safety to a great extent also stages the interactions of cyclists. This is reflected in individual 'riding styles' of cyclists as well as in distinct 'mobility cultures' which also distinguish the practice of cyclists between different cities and countries as we argue that cyclists to a great extent adapt to the unwritten rules and the informal 'cycling codes' of Amsterdam and Copenhagen in order to feel safe.

These findings have been identified applying the *Staging Mobilities* framework which has proved useful to point out the dimensions staging mobilities 'in situ' and thus the motivations behind the interactions of cyclists. Based on the *Staging Mobilities* framework and the indentified three main factors staging the interactions of cyclists, we suggest a diagram that specifically addresses the mobilities of cyclists as it includes the three key themes we have identified in this study: the *car-centric design* of the material environment, the *flexibility* of cyclists and cyclists' individual *perception of safety*.

Doing case studies of two of the world's most bike friendly cities we have also found that despite being similar on a number of statistical parameters, cycling in Amsterdam and Copenhagen is inherently different. Accordingly, we have argued that cycling in Amsterdam can be characterised as an organised disorder, as cycling is structured by the road design, the semiotic systems and the traffic rules while at the same time the informal 'cycling code' of Amsterdam is adding a certain degree of disorder which is reflected in the cyclists' self-interpretation of the traffic rules. On the contrary, in Copenhagen the infrastructural design of

most roads separate the different means of mobility which leads to a more structured and organized system where rule bending and jumping red lights is not as common for cyclists as in Amsterdam. The different experience of cycling in Amsterdam and Copenhagen highlights the embodiment of cycling as cyclists interact differently in the two cities. Accordingly, we argue that future studies and initiatives to promote cycling need to acknowledge and take the embodiment of cycling into account.

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8 Appendix

Interview guide – Before the ride interview (stage 1)

Introduction of the interviewee

- Personal background
    - Name
    - Age
    - Profession
    - Residence
- Motivation for cycling
    - How often do you use your cycle?
    - How well do you know this route?
    - Why do you cycle?
        - Cheap, fast, convenient, environmental-friendly?
- Cycling experience
    - How long time have you been biking in Amsterdam?
    - Have you been biking in other countries?

Interview guide – after the ride interview (stage 3)

Show the video from the bike ride

Can you describe the bike ride along the way?

- How did you experience the route?
- Which emotions did the route evoke?
- What are you looking at while cycling?
- What did you think about while cycling?
    - What was it that made the ride…?
        - Other cyclists?
        - Other road users?
        - The design/the surroundings?
            - The differences along the route?

What are you aware of when approaching this intersection?

- Traffic lights?
- Cars or trucks, for example right-turning vehicles?
- Pedestrians?
- Other cyclists?
- Something else?
- Scooters?
- Trams?

What are you aware of when cycling in this intersection?

- See bullet points above

How do you "communicate" with other cyclists, pedestrians and other road users?

- Bell?
- Eye contact?
- Body language?
- Talking?

How does your familiarity/knowledge of the intersections influence the way you are cycling/act/behave?

How could you get a better cycling experience? What needs to be done in order for you to have a better cycling experience?

- In relation to this specific route
- In general

Supplementary questions

- How would you characterise yourself? As a cyclist, card driver, both?

- How would you describe the cycling culture in Copenhagen?

- How does it influence your behaviour if an intersection has traffic lights compared to an intersection that doesn't have traffic lights?

REMEMBER to bring the observations into play – show the pictures from the intersections. The pictures represent typical situations from these intersections.

- Do you know this situation?
- How do you relate to this situation?
- What do you think about it?
- How would you place yourself/act in this situation?

Interview – Wiske: Thursday the 26th of March at 4pm. North -> South

Subject / question	Main points	Time	Location	Remarks
1. part of the interview				
Information about Wiske	The first part of the interview, done together with the third part due to the weather	00.00-04:00		
3. part of the interview				
Question about whether she has a driving license and if so whether she has been driving in Amsterdam	She has only been driving back home and then a few times coming from home with the car to Amsterdam	04.00-04.15		
Information about how we will do this part of the interview		04.15-05.15		
Question about what she is aware of and looking at approaching the Spiegelgracht / Weteringschans intersection	She makes sure to get eye contact with car drivers but otherwise she trust the right of way signs and just cross	05.15-05.50	Spiegelgracht /Weteringschans	
Impressions from the Spiegelgracht / Weteringschans intersection	Crossing the intersection she is aware of every "road" and signs, the tram line and cars "one by one, by one, by one".	05.50-06.15	Spiegelgracht / Weteringschans	She stresses that you can react very quickly on the bike and thereby implies that this also affects her behaviour
Question about her choice to go before another cyclist coming from her right	She explains that she checked the road and only then the cycle track. She explains that she didn't really see the cyclist coming from the right	06.15-06.50	Spiegelgracht / Weteringschans	
Talk about communicating with other cyclists	She explains that she sometimes makes eye contact in such	06.50-07.30		

	situations and that she sometimes let other cyclists go even though she has the right of way			
Question about why she looks back	In order to see whether I was still there after crossing the intersection	07.30-07.50	Spiegelgracht / Weteringschans	Example of how we influence the behavior of the interviewee
Question about what she is aware of and looking at approaching the Stadhouderskade / Museumsbrug intersection	She explains that she usually stops and wait for a red light at bigger crossing but that she looks out and go through a red light in smaller intersection s"because that's what most people do here I think"	07.50-08.30	Stadhouderskade / Museumsbrug	
Question about how she position herself at the intersection	Mostly to the left on the cycle track because she normally goes fast even though she is not in a hurry	08.30-09.00	Stadhouderskade / Museumsbrug	
Question about whether she is aware of the cars	She focuses on cars turning right and check whether they have seen her, also by assessing whether the car is speeding up or not.	09.00-10.10	Stadhouderskade / Museumsbrug	
Question about the left turn at the Stadhouderskade/ Museumsbrug coming from Spiegelgracht. Focus on cyclists coming from the right.	She explains that she would normally keep on the left of the path and squeeze in with the cyclists or go in front of them. Showing her a picture of the left-turn she explains that she would probably wait in that situation because they are three cyclists coming from the right or eventually also try to squeeze in keeping to the left	10.10-11.15	Stadhouderskade / Museumsbrug	
Question about how she relates to the right of way symbols and other cyclists in these situations	She is aware of the right of way symbols for two reasons: - As a regular car and motorbike driver you have	11.15-11.45		

	to be aware of them - If you are in an accident it's the ones fault who didn't act according to the right of way			
Question about the left turn at the Stadhouderskade/ Museumsbrug. Focus on cyclists going the other way.	She explains she would wait for cyclists going the other way if she is turning right	11.45-12.10	Stadhouderskade / Museumsbrug	
Question about zebra crossings	"I try to move on" She explains that she tries to navigate through the pedestrians without stopping. a	12.10-13.10		
Question about how she position herself at the Stadhouderskade / Hobbemakade intersection	She position herself differently to what she explained earlier but she can't explain why	13.10-14.00	Stadhouderskade / Hobbemakade	This is an example of that the questions we get are not totally reflective either
Question about why she is overtaking and what she is aware of doing it	She is overtaking because she is faster and she looks over her left shoulder to make sure she has a clear way	14.10-14.45	Stadhouderskade	
Question about what she is looking at on a street like Stadhouderskade	Due to the wheatear she was looking at whether she could possibly be wet due to a car plashing water on her. Otherwise she explains that she's following the traffic i.e. whether it's free to overtake etc.	14.45-15.20	Stadhouderskade	
Question about how she relates to the surroundings	No because she thinks she gets really tired if she looks at everything, but first moving to Amsterdam she was of course looking around during her ride	15.20-16.00		
Impressions from the Stadhouderskade	She deliberately makes a turn around a parked car because she	16.00-16.30	Stadhouderskade	

	fears that the door will open			
Question about whether she has been in accidents	She has never been in an accident, maybe with another cyclist but then it was never serious	16.30-17.00		
Question about what she is aware of and looking at approaching the Stadhouderskade / Ferdinand Bolstraat intersection	She checks if anyone is coming from the left and if there are pedestrians	17.00-17.20	Stadhouderskade / Ferdinand Bolstraat	
Question about the right turn at the Stadhouderskade/ Ferdinand Bolstraat and what she would have done if the light had been red	She would have gone also on a red light. She stresses that it's even legal to go through a red light on a right turn	17.20-17.50		
Impressions from Ferdinand Bolstraat	She stresses that the cycle path is rather thin	17.50-17.55	Ferdinand Bolstraat	
Talk about a picture with a tram on Ferdinand Bolstraat	She may wait with overtaking if a tram is behind but not even always. Depending on whether she "trust" the other cyclists. She would also cycle on the road if there were no tram and its busy, however, you need to be aware of the tracks	17.55-19.40	Ferdinand Bolstraat	
Question about what she is looking at on a street like Ferdinand Bolstraat	She is examining the surface of the road to avoid holes and cover plates, the latter also because they can be slippery	19.55-20.45	Ferdinand Bolstraat	
Question about how the weather affects her behaviour	In the winter she makes wider turns because it can be slippery, in rain she drives faster and go through more red lights. She also thinks she	20.45-22.00		

	has the “right” to go because she is outside in the rain while the car drivers a sheltered in their cars			
Question about how she relates to the cars	She makes sure to get eye-contact but then she goes if she has the right of way	22.00-22.45		
Question about a picture with a zebra crossing	She explains that she would stop if there are that many pedestrians especially if there are children etc. On the other hand she also explains that “mostly here in Amsterdam, especially when you have a lot of speed by biking, then people wait already for the crossing, they do not really go when bikes are coming or we make eye contact again”. Altogether it’s about using body language	22.45-24.00	Ferdinand Bolstraat	About communication with pedestrians
Specific question about whether she uses her bell	Yes, especially if to cyclists are next to each other and she can’t pass. Also she uses the bell if a pedestrian is unaware, although she tends to avoid using the bell in these situations because she thinks it is a bit “aggressive” and even when she does it she tries to make it quietly.	24.00-25.10		
Question about how she relates to trucks	She adjusts her behaviour and tries to stay “out of there reach” because she knows that the driver can’t always she her.	25.10-25.40		
Question about streets with no motorist traffic	She recognises that it’s different, however, this particular street is still busy with pedestrians so the	26.10-27.40	Ferdinand Bolstraat (Section without car traffic)	About intersections with and without traffic lights

	difference is small anyway It doesn't affect her route choice directly as see rather tries to avoid traffic lights			
Question about her behaviour in intersections with and without traffic lights	In intersections without traffic light she uses more eye contact and the rules to navigate. In intersections with traffic lights she uses the traffic lights to make her way through, for instance if she has a red light but the light is green for pedestrians going the same way she can go "That's how you can safely take a red light" although only sometimes and only in smaller intersections	27.40-29.00		Good points!
Question about what she is aware of approaching the Ferdinand Bolstraat / Ceintuurbaan intersection	Cyclists from the left for which she would wait and also how she can position herself – next to the road or behind the cycle track along Ceintuurbaan. She prefers to stay next to the road as she is then able to get on quicker	29.00-30.00	Ferdinand Bolstraat / Ceintuurbaan	
Question about what she is looking at waiting at the Ferdinand Bolstraat / Ceintuurbaan intersection	She is looking a lot in both directions in order to be ready to go when the light turns green rather than to wait until the light turns green. She says this behaviour she adopted when she learned to ride a motorbike	30.00-31.10	Ferdinand Bolstraat / Ceintuurbaan	
Question about what she is looking cycling through the Ferdinand Bolstraat/	She is looking again for the same reason. She explains that it's necessary to watch out all the time	31.10-32.00	Ferdinand Bolstraat/ Ceintuurbaan	

Ceintuurbaan intersection	when you go fast on the bike, especially in intersections.			
Question about how she relates to parked cars	She pays attention to them especially if the motor is turned on	32.00-33.05	Ferdinand Bolstraat	
Question about how her familiarity with the route and intersection affect her behaviour	She mentions to examples: In an intersection she knows very well she is very careful because she knows it a dangerous spot. When she doesn't know the place she is cycling she generally cycles slower	33.05-34.25		
Question about how she would describe the cycling culture in Amsterdam	"It has its own dynamics". She explains that when her family or relatives come to Amsterdam they are like:" You are cycling like crazy how can you do that without getting accidents?" However, she explains "when you practice it every day and you are with people how practice it every day as well then you really have a kind of a language...your own rules without really communicating or you actually are communicating but in a non-verbal way. And that's a good thing"	34.25-35.40		Good points!
Question about whether there is something that can really piss her of	Cars not respecting the right of way. Cyclists that don't respond to a ring. She know from some of her friends that they can get aggressive and she does as well from time to time- it's depending also on which mode she's in	35.40-37.10		
Question about what could be done in order for her to	In other parts of the city, the north, the east and the new west the	37.10-38.15		

get a better cycling experience in Amsterdam or on this route	conditions are less good which can be annoying.			
Question about whether she behaves differently if she is cycling together with someone	She explains that she mostly cycle side by side and makes room if someone needs to pass. Generally they would wait for each other and communicate whether they can go through red lights etc.	38.15-39.40		

Appendix 3

Participants Amsterdam								
Name	Sex	Age	Nationality	Occupation	Biking frequency	Motivations for cycling	Cycling experience	Knowledge of the route
Geert	M	35	Dutch	Civil servant	Every other day	It is quicker, gives more flexibility and freedom	Has been living and biking the last 12 years In Amsterdam	He know the route pretty well as he comes by once in a while
Wiske	F	26	Dutch	Student	Every day	It is the fastest way to get around	Has been living and biking in Amsterdam for 4 years.	The route is quite near to where she lives, but she doesn't use it everyday
Eva	F	32	Dutch	Working for the water utilities of Amsterdam	Every day	It is the easiest way to get around in Amsterdam	She has been living and biking in Amsterdam for 6 years	She knows the route quite well. Part of the route is on her way to work and she used to live in De Pijp as well
Richard	M	56	Dutch	Teaching at a hotel school	Every day	It is the easiest way to go to work, it is fast, safe and healthy	He has been living and biking in Amsterdam for 30 years.	He knows the route and has done it probably 30-50 times in his life
Christian	M	32	Canadian	Student	Every day	It is cheap, fast and being exposed to the urban environment	He is biking in his hometown Toronto, biked in Amsterdam for 8 months.	He is quite familiar with the route
Karen	F	24	American	Student	Every day	It is the most reliable, predictable and convenient transport mode.	Biked in Amsterdam for 8 months. She has biked in Copenhagen, Oakland and San Francisco	Familiar with some parts of the route, other parts she experienced for the first time

Appendix 4

Appendix 4: Participants Copenhagen								
Name	Sex	Age	Nationality	Occupation	Biking frequency	Motivations for cycling	Cycling experience	Knowledge of the route
Kamilla	F	27	Danish	Student	Every day	Copenhagen is a nice city for cycling. She enjoys being outside and it is the most practical way to get around	She has been biking as a child and the last 5 years in Copenhagen	She used to commute on most parts of this route when is did an internship on Amager. She thinks it is a good route
Ditte	F	42	Danish	Teacher at the university	Every day	She cycles because of the exercise and the flexibility compared to public transport. She describes herself as a "careful cyclist"	She has been biking in Copenhagen for the last 20 years.	She has a reasonable knowledge of the route as some of it is on the way to her work.
Suzie	F	24	Dutch	Student	Every day	She cycles because it is easier and faster than walking or owning a car	She has been biking in Copenhagen for 1,5 years. Has biked in Amsterdam but only for a weekend.	The part along the waterfront and across Brygge-broen is on her way to her university
Jonas	M	48	Danish	Architect	Every day	He cycles because it gives him freedom and because it's good for the environment. Generally, he characterises himself as a "bike nerd".	He has lived in Copenhagen all his life and the bike has always been his primary mode of transport.	He cycles the route of study twice a day
Oliver	M	31	English	Student	Every day	He cycles because it is free, easy, fast, healthy and enjoyable	He has biked in Copenhagen for 7 months, previous also in Cambridge and in London	He has never done the route before

Appendix 5

Field notes Amsterdam – Andreas

Just arrived in Amsterdam the renting of a bike in Amsterdam turned out to be very easy. With a help of a friend living in Amsterdam who hold a Dutch travel card we were able to rent two OV Fiets. The bikes are available at every major train station in the Netherlands and are intended for train passengers so they can continue their journey at their destination by bike. The selection and registration of the rent took only a few seconds and altogether the systems is a great example of the potentials of combining public transport and the bike.

On the bike everything seemed rather chaotic at first. We struggled to find our way from the Central station until we realised that we had to go on the other side of the street on a two-way cycle path. This is common in Amsterdam and knowing your route it often makes it easier to cycle, also because a two-way cycle path may be supplemented with a one-way cycle path on the other side of the street. Heading towards our accommodation in Amsterdam West we followed a nice street with shops and cafes dominated by cyclists and only limited one-way car traffic. In Amsterdam many streets are one-way streets, however, the large majority of one-way street are two-way streets for bikes – and that works and it makes it easy to be a cyclists as you are allowed to go most ways. Still the way finding can be difficult as destination signs are limited to major destinations on major roads.

Focusing on the four intersections in De Pijp and the Weesperplein we limited our observations to these intersections and the route between them. However, coming from and having a lot of experiences from cycling in Copenhagen many things are indeed very different in Amsterdam – I knew it wouldn't be the same but still I was surprised.

In the selected intersections the design of the physical bike infrastructure is also different and for someone unfamiliar with the design and limited experience in relation to cycling in Amsterdam also confusing and at times illogic. Below I have listed my impressions and reflections about each intersection:

Museumsbrug - Stadhouderskade

- Difficult left turn from Stadhouderskade on to the cycle route under the rijksmuseum
- Confusing right of way for cyclists heading north/south on Museumsbrug as its located right before/after the traffic light

Stadhouderskade - Ferdinand Bolstraat

- Cyclists coming from Ferdinand Bolstraat north have right of way when turning left
- Cyclists heading north along Ferdinand Bolstraat often stops /take up space in the cycle track for cyclists heading eastwards on Stadhouderskade - limited space as cyclist alternatively have to stop in the zebra crossing (in which the button control for cyclists is also located)

Ceintuurbaan - Ferdinand Bolstraat

- Most cyclists just go if the way is clear

- Bicycle boxes at the traffic light -> enabling cyclists to do a direct left turn from Ceintuurbaan onto Ferdinand Bolstraat

Based on my observations of the selected intersections and cycling in Amsterdam during the first two days cycling in Amsterdam in general seems more chaotic and "unorganised" than in Copenhagen. Cyclists don't obey the traffic rules to the same extent as in Copenhagen i.e. as they cycle outside the cycle path / area reserved for cyclists either onto the road or pavement, jump red lights, ignore right of ways and zebra crossings. Cyclists often have right of way when turning left which potentially favours cyclists neglecting red lights which can induce cyclists to break the law and coming from Copenhagen a lot of right of ways don't make sense. Also cyclists passing the stop line often times can't see the traffic light, which "force" them to break the law. However, generally cyclists and car drivers seem to very tolerant and adjusted to each other along the way.

Many streets in the inner city only have an on street cycle path marked by red asphalt and/or a write line while separated cycle tracks are more common outside the very centre of the city. Also the bike infrastructure seems a lot more innovative in Amsterdam for instance in providing shortcuts at locations where it's difficult to cross a street (or logical) to do a shortcut.

Field notes Amsterdam – Mikkel

Morning d. 24/03-2015: My general impression of the traffic in Amsterdam is that is seems looser and there are not as many cars as in Copenhagen. Amsterdam doesn't have the same large arterial roads as in Copenhagen such as Åboulevarden and Tagensvej. Even though it might seem looser and in some way more chaotic I don't feel unsafe cycling here. In most places the cycle tracks are not separate and elevated from the roads as in Copenhagen. It gives the cyclists more flexibility for movement and turning for example if you need to turn left or avoid a car parked on the cycle track.

Still, you need to be aware of the trams and the scooters. It seems like the trams are everywhere so of course you need to look out for them, but you also know that they are only riding there own track and don't make any unpredictable and sudden movements. This is a bigger issue with the scooters that they are riding on the cycle tracks, taking up a lot of space and go very fast. However, I haven't really taking notice of them when cycling but mostly when I have been observing. Finally, if there is one major difference between Copenhagen and Amsterdam that I have to highlight it would be the level of tolerance among traffic user. In Amsterdam the level of tolerance seems to be very high including car drivers, trams, cyclists and pedestrians. In Copenhagen you sort of have a "war on urban space and traffic" between especially motorised traffic and cyclists which doesn't seem to be the case in Amsterdam but lets see when we go out and observe in the afternoon again and the pressure might increase on the cycle tracks.

24/03-2015: Getting home after a full day of observing and cycling through Amsterdam. A great and fun experience I most say. Still I have the impression that traffic in Amsterdam is looser and also more chaotic. You see a lot of people breaking traffic rules both men and women in all ages. It also seems like that there are more people talking on the phone while cycling but maybe it just me not noticing in Copenhagen.
After looking at a map and observing intersections we decided a route going from Weesperplein to Museumsplein and passing by four intersections from the desire line study. However, after testing the route we decided not to go with this route since there is not enough interaction happening along the way. Therefore we have tested another route from the Pijp to the inner city (near the café Hans & Grethe) which includes three intersections with desire lines. Tomorrow morning we will do another test on this route but now I already have a better feeling of this route since it imply more interaction and are actually more similar to the route chosen in Copenhagen. It will be interesting to go there tomorrow.

25/03-2015: Another day of work with the focus on observations and choosing the route. We are going from Museumsbrug to the Pijp and hopefully it will work out fine. We have our first interviews tomorrow so we will soon find out. We have used a lot of time coordinating the interviews and making the schedule but now we almost have everything planned.
This morning we went past a really crazy intersection at Elandsgracht. You had loads of cyclists, trams, cars, trucks and busses crossing the intersection and there where no traffic lights at all. It felt like being in an intersection in Asia for a couple of minutes. We stood there for 10 minutes and saw several accidents "almost happening" – indeed a very interesting intersection with a lot of negotiations in motion.

Also, we have watched some of the video material again after visiting and experiencing the intersection and it is very different. You have a completely new perception and understanding of the intersection which you can only achieve by being in the situation on street.

26/03-2015: So today we had our first interview with Enna and it went very well. The talk went on; we asked questions along the way and showed pictures from our observations to illustrate situations from the route. We will hear the interview through today and try to code it. This will help us in the further process of conducting interviews, as we will reflect on the questions we are asking and possible adjusting the interview guide with new questions or rephrasing the existing ones. We have another interview today at 5 pm with Hiske which will also be interesting.
After the interview we biked to the University and I realised that I am actually changing the way I usually bike in Copenhagen. I am influenced by the design and behaviour of other cyclists and thereby adapting to the Amsterdam bike culture. I am crossing red lights on right turns and overtaking cyclists on the inside. I guess this is what you can refer to as "*staging mobilities*".

27/03-2015: The interview with Hiske yesterday went well. We had quite a lot if rain on the bike-ride but it just made us realise that this can also have an affect on the way people are biking. Earlier today we did our third interview with Gerben. This was a very interesting interview since he was very reflective on the way he was cycling.
Already now we can see some similar patterns in the answers of the interviewees. For example how the bike chaos in Amsterdam is working by cyclists adapting to the amount and behaviour of other cyclists and not so much on the design of roads and intersections. There is sort of an unspoken language among cyclists in Amsterdam which is used to get around quickly without accidents.

30/03-2015: Today Marco was back at the UCI and we meet with him for half an hour and give him an update on our project. We discussed what we had been doing and agreed to stay in touch through the next couple of months. Watching the intersection movies again with a completely different understanding of the setting and what is going on. An interesting point that Marco highlighted was the fact that he was actually too embedded in the bicycle culture to do this study. Today we have also prepared the meeting with the planners from the Amsterdam Municipality. I am looking very much forward to this interview, as it hopefully will help us to get a better understanding of the bicycle culture and strategies in Amsterdam.