A New Cycle

Understanding current challenges of increasing cycling in a *city of cyclists*

Alici Muhana Iannitelli

Master Thesis Series in Environmental Studies and Sustainability Science,
No 2018:016

A thesis submitted in partial fulfillment of the requirements of Lund University International Master's Programme in Environmental Studies and Sustainability Science (30hp/credits)

LUCSUS
Lund University Centre for Sustainability Studies

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Submitted May 15, 2018

Supervisor: Genesis Yengoh, LUCSUS, Lund University

Abstract

In the global context of an ever-growing trend of automobility and all its drawbacks, cycling offers an environmentally and socially sustainable transport alternative. Copenhagen has become one of the best cities for cycling, and impressive advances in promoting this practice have raised their cycling share up to 41% of all trips to work/education. However, municipal cycling goals have been postponed and percentages have slightly decreased, while the city is experiencing accentuated population growth and car ownership is rising. In addition, cars still hold dominance in the share of all trips, in the urban landscape and in mobility rationalities. Precisely due to its cycling status and ambitions, this thesis analyzes the city's previous cycling developments and current challenges regarding further increase in cycling share.

To address my inquiries, a literature review and semi-structured interviews were conducted, while applying the lens of social practice theory. Findings reveal the dynamics between elements and practices, and identifies challenges within and between social practice theory's elements. Historical developments leading up to the current cycling state make clear the constant interaction of material, meaning and competence aspects of cycling throughout time, and reveal a relation between the practices of cycling and driving. These findings set important context-based knowledge for understanding the state and challenges that were also identified by key informants. Current challenges in increasing cycling share are also examined using the theory and influence of and between the elements is made clear.

The strongest finding of this part was the space given to cyclists, as well as the reluctance to take away from motorized traffic, hindered by voter support. These then triggered meaning and competence challenges associated to cycling. In addition to these, challenges were encountered in decision-making. These include national level, whose influence lies mainly in measures to decrease car use and ownership; police, who have the power to veto urban planning projects and the complex cross-municipal planning for cycling and intermodal means.

Future research could advance policy recommendations for developments in all areas of cycling as a social practice, including material resolutions of the current antagonistic relationship between cars and bicycles in the urban landscape, competence considerations of inter-institutional collaboration in pro-cycling administration, and the advancement of meaning current with sustainable practices and visions of livable, healthy and viable cities of the future.

Keywords: cycling, bicycle, cycling share, sustainable mobility, social practice theory, Copenhagen.

Word count: 13607

Acknowledgements

This process was challenging in a lot of ways, and I could not have done it without amazing people who have supported me until this glorious moment.

First and foremost, my family. I promise you are not in this text just because you are my family. Each and every one of you have been so fundamental for this realization. Mom, you inspire me so much, a hero for me in so many ways. You were my guiding voice in moments of despair and patiently helped me get passed my tantrums (not much has changed in 20 years). Dad, you always make me remember why I decided to take this program in the first place, thank you for inspiring me to contribute in making this world a better place. Nana, my momster, your kind words were so important for me. Thank you for making me become a good student; I'm sure I wouldn't be graduating in a fancy master's if it weren't for your active presence throughout my school days. Maya, calling you every other day was really essential for my mental sanity. Thanks for being my psychologist and being by my side – even though literally in the other side of the world. Benji, brother from another mother, thanks for also making me get into this field, our discussions were super influential. You're all my foundation, so thank you for everything.

Amanda. If it weren't for you, I don't think I would have had returned the second year. I (and a bunch of Lumesians) admire you immensely. Your willingness to genuinely help has changed lives – at least mine. Thank you, from the bottom of my heart, for being there in every moment.

Thank you, Genesis, for guiding me in this process, all the valuable supervision feedbacks and motivation to keep going. Thank you, Chad, for being readily available to help me out in times of need. A big thanks to Julie Schack, who was so kind to meet with me to talk about the topic in the start of this process, and to take me around cycling in Copenhagen.

Batch 19. I will hold the memories and all that I have learned with this second family in a warm spot in my heart, forever. You have all taught me such important things, a bunch of hippies being the best version of themselves. I miss you here! In particular, there are some kind souls that deserve specific mention from their selfless assistance to me in this research process. Gisela, Lars, Alice, Oli, Rakel, Sanne, Neha, Colin, Gabi, Felix, Aakash, Johannes… Thank you so so much for showing me the light at the end of the tunnel.

Batch 20, although I arrived a bit late, I feel that I have made friends for life. Josephine, our sun bathing, chatting, meditating and dancing in thesis work breaks are among my funniest memories this year. We have become one ☹+☹=😊. Thesis group, in particular Fabian and Stephanie – you're awesome. Thank you for all the support and motivational speeches in times of need.

Batch 21. (I promise this is the last batch). Your lively spirit and creative souls have kept me going with a smile on my face. Making music with you put extra color in my days and you are such a great group. Keep hugging.

Last but not least, I would not be here if it weren't for the Science Without Borders and the LU Global scholarships. Therefore, I thank these funding programs and the unique life opportunity that they have provided me.

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List of abbreviations

SPT	Social Practice Theory
DCF	Danish Cyclist Federation

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1. Introduction

The rising popularity of private motorized vehicles since the 1920s and especially from the second half of the last century (Frumkin, 2002; Sperling & Gordon, 2008) has extensively shaped cities, geographical connections and lifestyles (J. Urry, Leach, Dunn, Coulton, & Livable Cities Team, 2017). Although cars provide movement autonomy, flexibility, convenience and comfort (Sperling & Gordon, 2008) motorized vehicles have contributed to a wide range of contemporary problems. Cars are tied to a complex of path-dependent aspects of culture and infrastructure, which combine to make the *car system* the major contributor to resource depletion (Urry, 2004). Accelerated investments in the motorized system have shifted priorities in transportation and planning within and between cities; by enabling urban sprawl and lowering urban density, increased car dependency radically changes landscapes (Frumkin, 2002). Transportation accounts for over a quarter of global greenhouse gas emissions, with passenger vehicles being responsible for 32.5% of that percentage (European Environment Agency, 2015), therefore making it a significant contributor to climate change. Cars contribute to congestion, noise and to several health issues including morbidity and mortality related to air pollution, physical inactivity and accidents (Frumkin, 2002; Nieuwenhuijsen & Khreis, 2016). In addition to these consequences, they have also been linked to significant changes in the nature of mobility, which affects access, social cohesion and interactions, contributing to social exclusion (Lucas, 2004). While the car system is directly tied to a number of complex sustainability challenges of modern societies, car ownership and use are still expected to rise (Essebo & Baeten, 2012). In these times of great concern about environmental degradation and human health, these challenges deserve our attention.

In 2011, the European Commission published a White Paper on Transport, defining aims and priorities for future mobility, suggesting a minimum 60% reduction in greenhouse gas emissions by 2050[1] (European Commission, 2011). The paper states that ”in practice, transport has to use less and cleaner energy, better exploit a modern infrastructure and reduce its negative impact on the environment and key natural assets like water, land and ecosystems” (European Commission, 2011, p. 6). Considering the pressing need for transportation transitions, a wave of urban transport change has been affecting some Western cities (Oldenziel, Emanuel, Albert de la Bruheze & Veraart, 2016).

[1] The goal is compared to the emissions in 1990 (European Commission, 2011).

Cycling as a mode of transport provides benefits related to the most pressing global challenges we face today including oil dependency, climate change, air pollution and health related issues (Kingham & Tranter, 2015). Cycling also contributes to physical and mental health, stronger connection to the natural environment, and increased well-being and happiness (Kingham & Tranter, 2015). In cities where people cycle more, not only are people healthier and happier, but economic analyses show that investments in cycling give superior returns as compared to cars, especially regarding health expenditures (City of Copenhagen, 2009; Deenihan & Caulfield, 2014; Gössling & Choi, 2015). These studies provide evidence that shifting to cycling mobilities positively influence various aspects of society.

In some European cities like Amsterdam, Utrecht, Copenhagen and Malmo, cycling has played a particular role in changing mobilities, creating the possibility of using the bicycle as a feasible and safe transport mode (Oldenziel et al., 2016). These cities significantly increased their modal share of cycling, and according to the Copenhagenize indicator[2], currently rank among the top 10 cycling cities in the world. As a result, 'cycling cities' have published a great deal of grey literature on the status and goals of increasing cycling share[3], and many municipalities are following similar steps. Although the global trends show a greater shift towards the car system (Essebo & Baeten, 2012), the fact that these cities succesfully established cycling as an attractive everyday mobility practice may yet challenge the car system and all its unsustainable consequences.

While these cities have made admirable advances in increasing their cycling shares and other forms of sustainable transport, car use still accounts for a high share of trips. Some scholars claim that despite their advances in promoting cycling, the so-called 'cycling cities' are "often designed for cars at the expense of cyclists" (Olsen & Bækgaard, 2015, p. 71), and cars are still the strongest determinants of the urban mobility landscape (Freudendal-Pedersen, 2015).

There is a knowledge gap in understanding difficulties in further increasing cycling mode share in cities that are already considered bicycle-friendly. This thesis explores the challenges of increasing cycle mode shares through a case study in Copenhagen, one of the 'cycling cities' previously mentioned. In light of the negative environmental, social and economic implications of private motorized vehicles, including resource depletion, the climate crisis and socio-economic pressures, studies that elaborate on challenging the dominance of automobiles are important for contributing to a less car-centric future.

[2] See http://copenhagenizeindex.eu
[3] 'Cycling share' is the percentage of trips that are made by bicycle.

It is important to note that by increasing cycling shares one does not automatically decrease car use. This thesis considers cycling as an alternative means of transport that challenges the dominant car system and many of its drawbacks. There are other means of transportation within cities that also have an influence and implication on the topics discussed, but the scope of this research will be restricted to the practice of cycling.

1.1. Setting the context

Copenhagen is the capital of Denmark and currently hosts around 600.000 inhabitants in its inner city (City of Copenhagen, 2016). The percentage of regional residents who cycle to work or education in Copenhagen is currently 41%; when considering residents of Copenhagen the percentage goes up to 62% (City of Copenhagen, 2017a). These high numbers are a result of impressive efforts by the municipality to increase cycling especially since the 1970s (Gössling, 2013). Together, these measures have made Copenhagen a leading global example of a *city of cyclists* (Reid, 2017).

Although there have been large municipal, national and private investments to increase cycling (City of Copenhagen, 2017a), Copenhagen is facing some problems. When excluding walking, car use still accounts for 43% of all trips (City of Copenhagen, 2017b), and car traffic and ownership is rising (Carstensen, Olafsson, Bech, Poulsen, & Zhao, 2015; Freudendal-Pedersen, 2015b; Koglin, 2013). When it comes to road space, 66% is dedicated to traffic lanes and parking spaces, while cycle infrastructure occupies only 7% of such (City of Copenhagen, 2017a). Even in the self-labeled *city of cyclists*, motorized transport still plays a dominant role in urban space (Freudendal-Pedersen, 2015b; Koglin, 2013). Freudendal-Pedersen's (2015a) study in Copenhagen proves that such dominance also plays out in people's daily rationalities of transportation, as the car still has a strong role in people's ideas of mobility, affecting policy and planning.

In 2008, the city's goal was to increase the share of bicycle trips to work or school to 50% by 2015 (City of Copenhagen, 2009). In 2016, this goal was postponed to 2025 and incremented with the goal of becoming CO_2 neutral (City of Copenhagen, 2017a). In addition, the share of cyclists decreased from 2014 (45%) to 2016 (41%) (City of Copenhagen, 2014, 2017a), and questions have been raised regarding whether cycling shares in Copenhagen have peaked (Cathcart-Keays, 2017). As Copenhagen's population is expected to grow steadily (City of Copenhagen, 2016) by a rate of about 1000 people per month (Schiøtt Stenbæk Madse & Streuli, 2017), the city faces significant challenges in increasing cycling share and achieving the municipality's goals.

These goals include becoming CO_2 neutral by 2025 (City of Copenhagen, 2011b), with plans to achieve 50% cycling shares of trips to work or school and reducing car shares by 9% for all trips that start or finish in Copenhagen (City of Copenhagen, 2017a). The City of Copenhagen has developed a Bicycle Track Priority Plan 2017-2025, which will use 70% of the forecasted investments towards cycling in the city (City of Copenhagen, 2017a) to address widening, reforming and building of cycle lanes within the city (City of Copenhagen, 2017c)

1.1.1. Aim and Research Questions

This thesis aims to study the factors influencing cycling share in a city which has already accomplished impressive mode shifts. The inquiry will answer the following research questions:

Research question: What are the factors influencing cycling share[4] in the *city of cyclists*?

Sub-RQ1: How do historical developments explain the current cycling situation in Copenhagen?

Sub-RQ2: What are the major challenges for further increasing cycling share in Copenhagen?

To answer these questions, I first present my theoretical perspectives which accompanied the research and findings: structuration theory and social practice theory framework. I present the methods used to address the research questions, divided into literature review and semi-structured interviews, in addition to data analysis and limitations. I report the results and discuss the findings, and I conclude my thesis elaborating on suggestions for further research.

1.2. Contribution to Sustainability Science

Sustainability science emerged from the need of contemporary societies to understand socio-ecological interactions (Kates et al., 2001). We are in a time that these interactions no longer can be overlooked, and human societies must change to respect planetary boundaries (Rockstrom et al., 2009). This study is placed within this research field as it looks at the expansion of a mobility practice that has positive implications in different aspects of sustainability science: affecting climate change impacts and social issues such as health and exclusion, as explained above. The questions, framework and findings embrace place-based complexities (Clark & Dickson, 2003) and interdisciplinarity (Kates et al., 2001), important for sustainability science.

[4] The share mainly discussed and for which cycling goals have been set are “all trips to work/education” (41%) (City of Copenhagen, 2017a, p. 4).

Kates et al. (2001) argue that sustainability science research must to focus “on ways of promoting the social learning that will be necessary to navigate the transition to sustainability” (p. 642). This paper extracts social learning from the experience of a city which is an acknowledged leader in cycling yet is struggling to continue to make progress on its goals. As recommended by Kates (2011), this knowledge can be transformed into action by Copenhagen and other cities that attempt to emulate and surpass the cycling achievements of Copenhagen.

2. Theory

2.1. Structuration Theory

The path-dependent nature of the car system (Urry, 2004) raises issues regarding change in such systems. Discussions on stability and change in society involving structure and agency are longstanding and persist (Mahoney & Snyder, 1999). *Agency* involves individual choices and subjectivities on the micro level; *structure* involves social forces and other macro level factors that influence these choices and meanings (Mahoney & Snyder, 1999). Different theories offer perspectives that explain or question how change (or lack thereof) comes about in societies (Shove, Pantzar, & Watson, 2012). Structuration theory argues for the relationship between agency and structure as a reciprocal process: "the structural properties of social systems are both medium and outcome of the practices they recursively organize" (Giddens, 1984, p. 25). Therefore, structures enable/constrain performance of practices by agents and practices reproduce structures (Sewell, 1992; Shove et al., 2012), as in Figure 1.

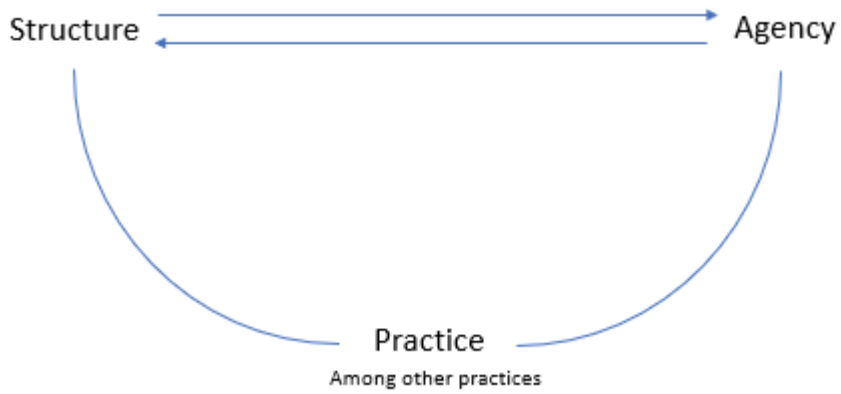

Figure 1. Own illustration based on duality (rooting from Gidden's work) and practice positioned between structure and agency.

Sewell (1992) considers that practice involves both schemas (rules, or procedures) and resources (human and non-human), which in reciprocity, constitute social processes. As Sewell (1992) puts it, "Structures (…) are constituted by mutually sustaining cultural schemas and sets of resources that empower and constrain social action and tend to be reproduced by that action" (p. 27). Using the lens of structuration theory, the increase of cycling must have sustained schemas and resources that empower cycling and constrain more unsustainable transport modes by social subjects. The shift of

practices, the increasing use of bicycles and related attributes then reproduce the structure which enabled it.

2.1.1. Social Practice Theory

Rooted in Giddens' theory of structuration, theories of practice emerge from the need to apply duality toward more pragmatic understandings of how practices occur (Shove et al., 2012). Different from other theories, social practice theory (SPT) focuses on the practice itself, which lies somewhere between the individual and the structure (Shove et al., 2012). When using this concept to inform behavior change, one must focus on the performance of practice rather than the processes that proceed individual decisions (Shove et al., 2012). In this context, the theory broadens the responsibility for practices to a relational social fabric where individuals become "*carriers* or hosts of a practice" (Shove et al., 2012, p. 7). With an understanding of practices that does not place sole responsibility on the individual for performing in a certain way, more space can be given to other aspects influencing lifestyle choices.

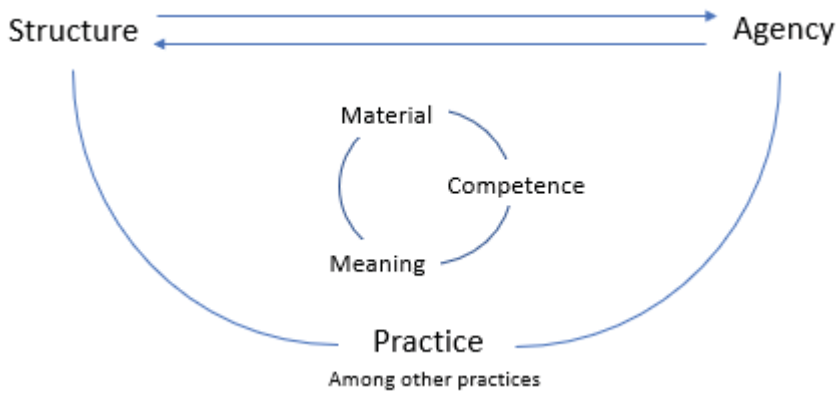

Figure 2. Own illustration based on Shove et al.'s work on SPT.

Shove, Pantzar and Watson (2012) created an analytical framework for a more pragmatic understanding of the conditions under which practices form, are maintained or abandoned (Hargreaves, 2011; Shove et al., 2012). In this view, practices are composed of three elements: *material*, *competence* and *meaning* (Figure 2) (Shove et al., 2012). *Material* involves the physical dispositions that enable the practice (Shove et al., 2012). In the case of cycling, this includes things like infrastructure or urban space, bicycle facilities, bicycles themselves, the people who cycle and integration with other transport modes (Larsen, 2017b). *Competence* refers to the ability to perform the practice or "shared understandings of good or appropriate performance." (Shove et al., 2012, p. 23). For cycling, this would include the ability to perform the physical activity, as well as knowing the

traffic rules (Larsen, 2017b). Finally, *meaning* refers to the shared rationales or ideas associated with the practice, its "social and symbolic significance" (Shove et al., 2012, p. 23). For cycling, this could include normalization[5] and ideas of safety, environment, affordability, etc. These three elements are connected when individuals perform practices, and their disconnection causes the practice to come to a halt (Shove et al., 2012).

Previous developments of a practice are important to understand the practice's current situation and how it may play out in the future (Shove et al., 2012; Warde, 2005). In this sense, "...theories of practice draw attention to the historically and culturally specific trajectories of what people do, the details of which reflect distinctive accumulations of meaning, materiality and competence and the relative positioning of one practice with respect to others." (Shove et al., 2012, p. 145). For this reason, understanding Copenhagen's previous cycling developments is fundamental for analyzing the process that the practice went through and for explaining current configurations, meanings and relations to other practices and potential future pathways.

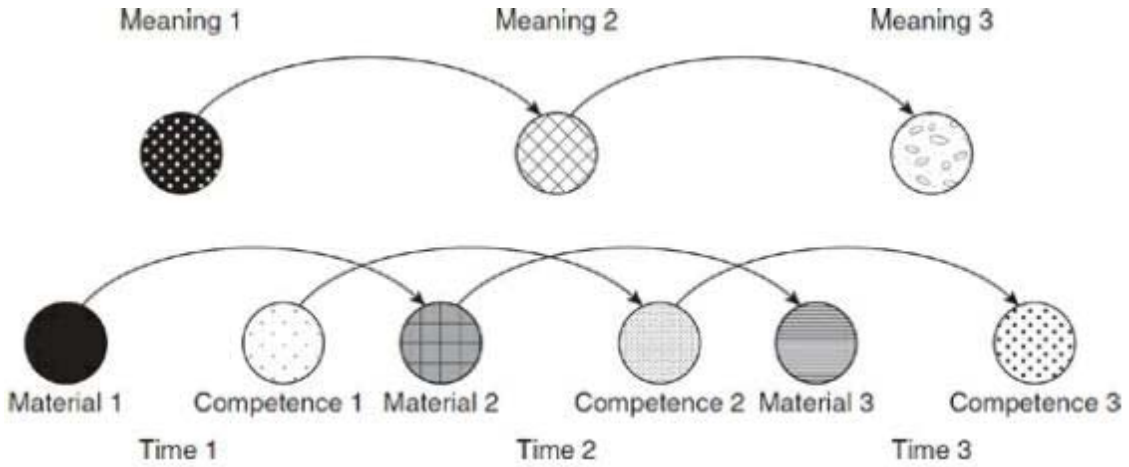

Figure 3. Elements of practice change over time (Shove et al., 2012).

As Figure 3 shows, practices must be maintained over time not by stabilizing the elements and their links but by constantly adapting them to new conditions. In understanding the fostering of practices in this way, the enabling of cycling in Copenhagen, where much has already been done, must adapt to emerging conditions and new challenges to accomodate elements and their connections.

When understanding the adoption of more sustainable practices, one must also consider the breaking of links of more unsustainable practices (Hargreaves, 2011). The scope of this thesis does not include a comparative analysis of the cycling and driving, for example. Instead, it focuses on the

[5] This is making the practice something normal and de-politicized (Larsen, 2017b).

challenges of expanding cycling without ignoring how other modes (particularly driving) pose a challenge for increasing cycling. This is done in recognition that practices influence and affect each other (Warde, 2005).

SPT has been used to analyze cycling in understanding the elements and their connections (Larsen, 2017b; Spotswood, Chatterton, Tapp, & Williams, 2015). It allows for in-depth and interdisciplinary understanding of complex factors influencing the practice of cycling (Spotswood et al., 2015). My research questions resonate with theories of practice in the way that it is asked – there is focus on the practice of cycling rather than on those who perform it (Warde, 2005). These are intrinsically co-dependent; however, when putting practice as the center of focus, it embraces the dynamics between elements and other practices, as well as agency and structure, as shown above. This framework is relevant for this research by exploring these dynamics throughout time and today, and in looking for possible avenues for continued cycling increase.

3. Methods

This research uses what Flyvbjerg (2006) calls an extreme case-study; it is precisely because Copenhagen is the *city of cyclists* that I have chosen to study. As Table 1 shows, I collected both primary and secondary data to address my sub-RQs. A literature review was conducted to understand the historical dimension of cycling in Copenhagen. To understand the current state, and to provide a transition from sub-RQ1 to sub-RQ2, information from both the interviews and literature was used. To answer sub-RQ2, semi-structured interviews were undertaken.

Table 1. Method's representation.

Content	Methods	Sub-RQs answered
Historical trajectory analysis	Literature review	Sub-RQ1
Current configurations	Literature review Semi-structured interviews	All sub-RQs
Current challenges	Semi-structured interviews	Sub-RQ2

3.1. Literature Review

A literature review was conducted, in which evaluated secondary data with sub-RQ1 in mind, and analyzed it with the lens of SPT[6]. Search strings (Appendix A) were used in LU Lovisa Library and Scopus search engines. Literature relevant to address sub-RQ1 was included in the analysis. In addition to articles and book chapters, grey literature (namely all municipal cycling accounts and plans available online in English) was used to understand the more recent developments, status, and strategies. These were explored in line with SPT. Some material was provided through email by informants (Jensen, 2013; CREATE project, 2016; Carstensen & Ebert, 2012; The Capital Region of Denmark, 2016). In investigating further sources, snowballing was used with the encountered literature, allowing me to delve further into material on the topic in English. To summarize the

[6] This resembles Torraco's (2005) definition of an integrative literature review, as secondary data was focused on answering a question and analyzed through a lens. However, I did not do a critical analysis of the literature found, but rather arrived at conclusions based on these procedures.

knowledge accumulated through the literature review, I have developed a timeline that illustrates the key developments in the evolution of cycling in Copenhagen.

3.2. Semi-structured interviews

To identify barriers for cycling increase and understand contextual factors involved in cycling decision-making, semi-structured interviews were conducted with key informants. Bryman (2016) explains that this method allows for a certain flexibility in conducting interviews, but still ”the interviewer does follow a script, to a certain extent” (p. 468). In alignment with the explorative nature of sub-RQ2, follow-up questions were often asked to understand the informants’ perceptions and knowledge of the challenges. Informants were aware of the research aim and all gave permission to be recorded before the interview. Public employees were anonymized to protect their privacy, and other informants gave explicit permission to use their names.

The actors approached come from varied backgrounds and positions (Appendix C), but all have experience working with or researching cycling in Copenhagen. Two municipal employees (M1 and M2), one member of the Capital Region (R1), two Danish Road Directorate employees (N1 and N2), four transport consultants (CEOs of consultancies within the Cycling Embassy of Denmark), two scholars who have researched the topic in different ways and an NGO that practices cycling in its activities all participated in interviews. The two national level employees were present in the same interview. All informants except one cycle daily in Copenhagen. Thus, the primary data can be seen as relevant not only regarding the experience and structural/institutional knowledge on cycling development, but also as reflecting the perspective of individuals involved in the everyday practice. In total, 11 interviews were conducted[7], providing 12 hours of primary data recordings and some follow-up emails[8].

The sampling strategies used involve mainly purposive sampling (Bryman, 2015), by sending emails asking for an interview based on professional experience/work in the area and knowledge of cycling in Copenhagen. Snowball sampling was also used in cases where informants recommended other experts’ possible insights (Bryman, 2016). The interviews were conducted face-to-face and via video-call, some of which included follow-up emails (Appendix D). Although planned to last around 40 minutes, most interviews lasted over an hour. The same interview guide was used (Appendix B) for all interviews.

[7] All of them were conducted in English, which is not the first language of any of the informants.
[8] This happened in 3 different interviews: (1) pilot interview after which a few questions were added, (2) due to technical difficulties with the video call, (3) informant’s time constraints, stopping the interview process.

Starting from the broad question of challenges for cycling share increase, questions incorporated SPT framing of the practice of cycling and, where appropriate, included the car system's influence on the challenges. Articles that applied SPT to cycling were used as the basis for some questions (Larsen, 2017b; Spotswood et al., 2015), in addition to literature on barriers to cycling in Copenhagen on an individual level (Freudendal-pedersen, 2015). The interview questions were peer reviewed and the first was a pilot interview, as suggested by Bryman (2016), and follow-up questions were made via email.

3.3 Data analysis

Transcriptions were based on combining two transcription methods, "selective protocol" and "clean read transcript"; a large majority of the content was written in full – not including the initial introduction and moments when the conversation became unrelated to the purpose of the interviews (Mayring, 2014).

Coding was used for analyzing primary data solve the common overlap between the categories. This coding process combined inductive and deductive procedures as there was an initial outline of the framework; however, sub-categories were created from the information collected on the challenges. For information that was involved in all categories, I created an "other" category and more specific sub categories to make sure important information was not ignored. Challenges identified after the initial broader question without asking more specific questions were color-coded.

3.4. Reflexivity and limitations

It has been more and more acknowledged that the ability to reflect on personal justifications of why and how research is done, is itself important for research (Bryman, 2016). I do not believe I would have conducted this thesis if I had not had interest in all aspects of it. This is not to say topics and thoeries were blindly chosen merely based on my interests, but that my embodied experience and my values have influenced these choices. Nonetheless, I hope I have justified why, apart from my interests, these questions were made, and procedures were chosen. Limitations may exist due to the fact that I am not Danish, nor do I speak Danish, which could have provided the research with richer contextual knowledge and eased communication with informants.

Doing this research has been a journey with many curves, bumps and nice encounters. Above all, this was a learning process! In recognition of this, there are things that could have been done differently that might have beneficial for this study. My data collection had its limitations. What fueled this study was the questioning of car-dominance in the *city of cyclists*, as shown in my introduction.

Despite aiming to evaluate hindrances of increasing cycling share, the way I framed my study and phrased some questions in my initial interviews can have triggered this comparison between the modes. However, in the latter stage of my interviews, when I was acutely aware of this and only spoke of the practice of cycling, the contrast with driving was raised by the interviewees all the same. This suggests that although my initial standpoint for this study was of contrast between practices, when not hinting this, the connection between such practices was omnipresent in informants' understandings of the challenges for cycling share increase.

4. Findings and discussion

This chapter is divided in 3 parts: (1) historical developments, a timeline of cycling in Copenhagen, and today's status as seen through the literature reviewed, (2) current institutional configurations in Copenhagen in regard to cycling, researched through combined methods of literature review and interviews, and (3) the results of the interviews on the challenges the city faces in further increasing cycling share. These will be discussed in relation to SPT (material, competence and meaning) and previous research.

4.1. Cycles going in cycles: historical trajectory of cycling in Copenhagen

4.1.1. Sunrise: cycling golden age

Prior to advocacy for cycling and the construction of cycling infrastructure, the practice has a long and interesting history that shaped the cycling identity that Danish culture embraces (Carstensen & Ebert, 2012). Globally, the affordability of the bicycle at the start of the 20th century led to a bike boom in many European cities, and in Denmark this was aided even more due to its connection to nationality (Carstensen & Ebert, 2012). As a result, there was a transition at that time from cycling as largely a bourgeois leisure practice to its becoming standard transportation practice for the working class (Carstensen & Ebert, 2012). This change in meaning broadened the public that adopted cycling, allowing it to become much more popular. Interestingly, the Danish Cyclist Federation (DCF) initially combined these two different groups with similar interests in promoting better conditions for cyclists, and became important in actively advocating for cyclists' right to urban space at this time (Carstensen & Ebert, 2012; Carstensen et al., 2015).

Copenhagen's century of investment in cycling infrastructure (Carstensen et al., 2015; Reid, 2017) started in 1905 with the construction of the first bike track, a reaction to conflicts with carriages and discomfort caused by cobble-stone roads (Koglin, 2015b). In the inter-war period, cycling was seen as a cheap and efficient means of transport, especially in the context of socio-economic crisis and of a significant working-class population (Norgaard, 1981 as cited in Emanuel, 2016). The construction of bike infrastructure also aided the unemployment issue (Carstensen et al., 2015). In addition to DCF's strong role and strategies, these factors caused cycling to be a popular modal choice in the 1930s, amounting to around 52% when not including walking (Norgaard, 1981 as cited in Emanuel, 2016). During and after the Second World War, the city and country had limited more financial resources for big changes in infrastructure (Koglin, 2013); therefore, at that time, cycling offered not only a

reasonable option for the citizens of Copenhagen, but also for the national and municipal government due to their restricted expenditures (Carstensen et al., 2015; Koglin, 2013). This played out in the landscape and busy roads were packed with cyclists taking over the road space (N. Jensen, 2013), focusing political attention on cycling, increasing its significance and making it visible in the urban landscape's infrastructure. Applying the lens of SPT, the meaning of cycling as affordable, enabled material dispositions to flourish, nurturing the practice.

4.1.2. Dusk: car boom

Cars boomed in the 1950s and 60s in Copenhagen and took over the urban landscape, outpacing bike traffic (Carstensen et al., 2015). Like most Western cities at the time, Copenhagen's transportation focus shifted dramatically towards car traffic (Koglin, 2013); urban sprawl caused an increase in car ownership (CREATE project, 2016). The bus system in 1960 replaced the trams that were previously planned, due to its ability to better accommodate car infrastructure (Emanuel, 2016). Beginning in the late 1950s but especially in the early 1970s, several kilometers of cycle lanes were removed, and cycling hit a low point (Carstensen et al., 2015; Emanuel, 2016). The meanings tied to cycling changed again: it became an 'outdated technology' (Carstensen & Ebert, 2012). However, the strong connection to the country's identity allowed cycling practices to survive this change in meaning and "both the car and the bicycle shared, so to speak, the symbolism of mobility and freedom" (Carstensen & Ebert, 2012, p. 45). The majority of cycle lanes built before the rise in car popularity were not removed (Koglin, 2013) and although many owned cars, Copenhageners kept cycling (City of Copenhagen, 2002; Koglin, 2015b). Cycling thus maintained a position in Copenhagen during the car boom (Reid, 2017) and on the political agenda as well, although not as a priority mode (Freudendal-Pedersen, 2015b). But while changes in meaning and the relative prioritization of the car led to a dramatic attention shift by decision-makers and although the material element was negatively affected by cycling's meaning on a structural level, the meanings and competences that persisted on an individual level were sufficient for the practice to survive. In this period, the connections between elements were loosened, but the elements were still present, which was essential for the eventual recovery of the practice (Shove et al., 2012).

4.1.3. The new dawn: cycling renaissance

Throughout the 1970s and 1980s Copenhagen lost residents (Carstensen et al., 2015), and economic crisis was widespread throughout Denmark (Carstensen & Ebert, 2012). The oil crisis in 1973, in combination with protests and political will, caused some major car-based infrastructural plans to be abandoned by the municipality, which was key for Copenhagen's current mobility status (Carstensen

& Ebert, 2012; Emanuel, 2016; Jensen, 2013). The DCF played a major role through mass demonstrations and lobbying, going from 3,000 to 25,000 members in only five years during that period (Jensen, 2013; Emanuel, 2016), and the fatalities from car accidents caused considerable popular dissatisfaction (CREATE project, 2016). During the 1970s the DCF also lobbied for bicycles in public transport (Carstensen & Ebert, 2012); environmental organizations and politicians also supported cycling, giving the advocacy more strength (Carstensen et al., 2015). From 1975, cycle lanes were constructed at a fast rate, forming around half of today's bike infrastructure (Carstensen et al., 2015) and car-free Sundays were introduced around the same time (N. Jensen, 2013). In response to political reluctance to create a solid strategy the DCF created an infrastructural cycle plan for the city which, although not fully taken into consideration, did influence the plans for cycling during the following years (Jensen, 2013). The events that occured in this period, in combination with demonstrations of dissatisfaction by agents, caused the meanings associated with cycling to change with impact on structural levels. Decisions on material dispositions that were more pro-cycling enabled further adoption of cycling, re-linking the material element with meanings and competences that had persisted throughout the car boom.

4.1.4. Midday: cycling prevails

The increase of bicycle infrastructure continued throughout the following years and its importance prevailed in decision-making, reflected in the gradually higher cycling share from the end of the 1970s (Carstensen & Ebert, 2012). It became politically important to enhance the livability of the city, and the municipality took their focus away from enabing motorized traffic (Carstensen et al., 2015; CREATE project, 2016). The backbone of Copenhagen's bicycle infrastructure became the one-way two-curb segregated bicycle lane on each side of the road, which helped make everyday cycling an intuitive practice (Larsen, 2017; CREATE project, 2016). In the 1990s, not only did the left wing political parties support cycling, but it was included on the city's agenda (Koglin, 2015b) and the city started to brand itself as a *city of cyclists* (Emanuel, 2016). The meaning of cycling that started developing here was not only of a normal transport mode, but a strategic one. People cycled not because they did not have money to afford a car, but because it made more sense to do so (CREATE project, 2016).

In 1996 the first Bicycle Account was published by the municipality which included facts and progress regarding cycling and infrastructure (N. Jensen, 2013). In 1997 a plan was developed that included goals for cycling advances and the stagnation of car use called the Traffic and Environment Plan (City of Copenhagen, 2002). The Cycle Policy 2002-2012 encompassed these plans and goals for cycling

improvements for Copenhagen (City of Copenhagen, 2002), focusing on infrastructural improvements and maintenance as well as a combining of cycling with other transport modes and campaigns (City of Copenhagen, 2002). The policy plan also mentions the option of making car use more expensive through road pricing and fewer and more expensive car parking spots (City of Copenhagen, 2002).

Since then, Bicycle Accounts have been published every other year, covering updates in modal shares, public satisfaction with cycling, infrastructural developments for cycling, and campaigns and initiatives that promote cycling (Nielsen, Skov-Petersen, & Agervig Carstensen, 2013). These show that from the 1990s to 2010s large investments have been made not only to expand the grid and widen some lanes, but also in constructing bicycle bridges, green cycle routes, cycle superhighways and PLUS networks: one-way, wide lanes that allow cyclists to pass other cyclists that are riding side-by-side (City of Copenhagen, 2011b). On an overall scale the Bicycle Accounts show that satisfaction has been increasing among different categories.

With growing affluence and population in the 2000s and 2010s, although the city had been investing in cycling, citizens could now afford to buy and use cars and ownership and congestion grew (CREATE project, 2016); nevertheless, efforts persisted. The calculative analysis of cycling put forth in the Bicycle Accounts proved very useful as justification for a pro-cycling political focus, and became a ”dominant political rationale for cycling governance” (J. S. Jensen, Cashmore, & Elle, 2017, p. 474). The governmental approach to cycling adopted a range of justifications, and proves the multiplicity of angles where cycling can be supported (J. S. Jensen et al., 2017). The influence of certain politicians boosted attention towards cycling (Emanuel, 2016) and made it a political instrument, as seen in Klaus Bondam’s (The Bicycle Mayor) campaign in 2005 (Koglin, 2015b). From this period on there has been continuous documentation of such efforts, fostering all elements. In 2007 the *Eco-Metropolis* Vision was developed for urban development in Copenhagen, which made clear the contribution of transportation to a more sustainable future (City of Copenhagen, 2007; A. Jensen, 2013). It mentions that more investments on cycling and restrictions of car use were needed to accomplish their goals (City of Copenhagen, 2007).

Gössling (2013) found that mainly command-and-control (infrastructure, services, one-way streets, etc) and soft policy (education, information) measures adopted over time have largely been successful. However, he points out that market-based measures making car use less attractive have been adopted to a limited extent in Copenhagen (Gössling, 2013). A few accomplishments that stand out in literature include the ”green waves”, an interconnected system of traffic signals that give cyclists priority during rush hours; furthermore Nørrebrogade, a pilot project started in 2008 based

on giving proportional road space for the modes that were being used, decreasing the space for cars and increasing that of cyclists and buses; and Karma campaign, raising awareness of issues regarding cyclists' behavior (City of Copenhagen, 2009, 2014).

Promoting cycling has been an important tool for the city's *eco-friendly* fame; hence, cycling has a positive meaning in a political perspective. Reinforcing the connections between its material, competence and meaning dimensions, this political attention helps expand the practice. Similarly, the growing adoption of the practice enhances the positive meaning and the structures that enable it, fostering more political attention. Larsen (2017b) conducted a study using the lens of SPT to analyze how cycling can recruit so many carriers and found that there is enablement of elements and their connections, which can explain the large shares of practitioners. Currently, 41% cycle to work/school, and 24% drive (City of Copenhagen, 2017b). These numbers are related to a joint investment of 2 million DKK from municipal, state and private funds since 2004 (City of Copenhagen, 2017a). As this historical analysis shows, cycling culture is strong and is accpeted as a normal activity for most, taking advantage of the readily available bicycles, tracks, bridges and highways. Today's status has been achieved through a combination of events and circumstances, pushed forward by cultural, economic and political motivations (see Figure 4) (Koglin, 2015b). These factors have triggered material dispositions, competences, meanings and their connections, associated with the bicycle differently in different points in time.

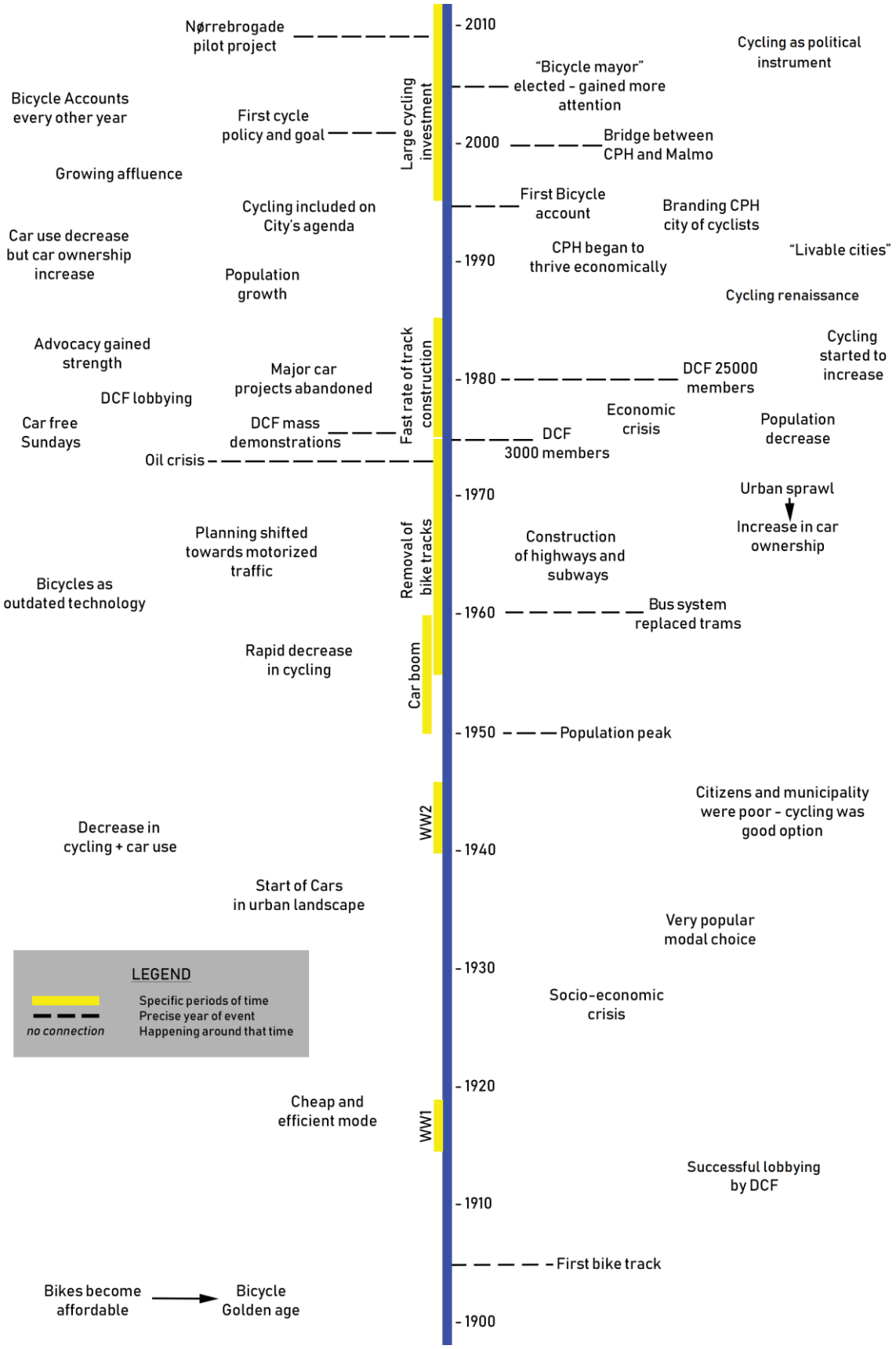

Figure 4. Historical timeline of cycling development and influencing factors in Copenhagen (CPH), created by author based on literature review as summarized in chapter 4.

4.1.5. Dynamics of practices of historical development

Conducting these analyses, one cannot ignore the influence of cars in the practice of cycling. This is not to say that by enabling one, the other is automatically constrained, but historical developments show how the popularity of cycling is highly influenced by elements associated with cars, and therefore by their dominance in the urban landscape. As Shove et al. put it, ”...there are instances in which time-use data reveals what seem to be aggressively competitive moves in which one practice colonizes resources and captures recruits at the expense of another” (2012, p. 89). In addition, the common contrasting of bicycle and car use in municipal reports provide evidence of these trade-offs.

However, these practices do not only have a competitive relationship. As Geels (2005) explains and Shove et al. (2012) elaborate on, the bicycle brought about similar meanings (e.g. it was faster than walking and more flexible than public transport) and infrastructural demands (e.g. smoother roads) that was later applied to cars. In addition, the persistence of cycling throughout the car boom indicates that, different to other contexts, the emergence of driving did not completely replace utility cycling: while global trends during the car boom caused a radical decrease in cycling, despite also affecting Copenhagen greatly, the practice persisted. The relation between these two practices and among other mobility practices must be seen as inherently dynamic (Shove et al., 2012).

The transformative interaction between contexts, elements and other practices throughout time is an interesting way to understand the changes in popularity of cycling as a transport mode. It provides a useful lens for finding the contextual drivers that influence the practice and how the *city of cyclists* status came about.

4.2. Current challenges

4.2.1. Institutional configurations

To understand important aspects of the practice and its enablement, the institutional configurations in which are woven in decision-making regarding such practice are fundamental (Shove et al., 2012). Different governmental jurisdictions have different responsibilities in relation to mobility. Overall the municipality of Copenhagen has been the leading actor in enabling more cycling within the city and to some extent in limiting car use through previously mentioned measures. The integrated and consensus-based structure in the decision-making administration of the municipality positively influences urban planning for cycling (Koglin, 2015a).

Understanding urban transport as a net that is denser in, but not restricted to, inner parts of the city, it is important to understand regional configurations. There is a ”Capital Region” authority, encompassing 29 municipalities (The Capital Region of Denmark, 2016). R1 explained that health and hospitals are their major responsibilities, but much smaller sectors also exist, such as ’regional development’. Transport and infrastructure is one sub-sector, and shares responsibilities between municipal and national jurisdictions. For cross-boundary cycling projects there is a collaboration between jurisdictions in developing *cycle superhighways* (Nielsen et al., 2013). According to R1, the Capital Region does not have authority over roads or tracks and physical planning, but it does co-finance these projects along with municipal and state levels. Municipal and national levels then fund the construction and maintenance costs. Currently, there are eight cycle superhighways in the region with others on the way, and their target are longer distance commuters (The Capital Region of Denmark, 2016). When it comes to public transport in Copenhagen and the Capital Region, different companies are operating for different modes. Although the region funds regional public transport (Tosun, n.d.), R1 and M1 explained they have no legal basis for planning. Currently, there is communication between the different companies to ensure coherence (CREATE project, 2016). In 2010, it became possible to take bicycles on the S-trains (that run along the Finger Plan[9]) for free (Carstensen & Ebert, 2012; City of Copenhagen, 2011a). Bicycles are often included in public transport systems; examples include trains, metro, bicycle parking around stations and bike sharing schemes (A. Jensen, 2013; Larsen, 2017b). Although generally not necessary within the city (Larsen, 2017b), one informant said ”there is no doubt that people living in Copenhagen are very good at using multi-modal ways of transport”.

Although the Danish government has developed country-wide cycling plans and offers funding to municipalities, cities generally have autonomy and are responsible for developing plans for cycling, including ones that cross municipal borders (Nielsen et al., 2013). As N1 and N2 explained, the way the national level aids municipalities is through ”subsidy schemes”, where municipalities can apply for grants for specific cycling projects and the Danish government can help fund the project (normally providing 40-50% of the cost). These have been popular in the past ten years; however N1 said that currently there is little money nationally being dedicated to cycling. The influence of the national level is also evident in discussions of making car use more difficult, nudging drivers to shift means of transport. The national government is responsible for taxation of vehicles’ purchase and use, with the exception of parking licenses/fees, which are municipal (CREATE project, 2016).

[9] The ”Finger Plan” makes five radial connections from inner Copenhagen to the suburbs and neighboring municipalities (CREATE project, 2016).

Before any decision is made regarding urban planning it goes through the police and they have the power to veto any such proposals. This was mentioned by six informants, most of whom identified this bureaucracy as a challenge. Examples of proposals include new facilities, widening of tracks, speed limits and the identification of intersections at which cyclists can turn right on red. According to M2, there is a two-way deal with the municipality, as the latter also needs to approve changes recommended by the police. Informants explained that the veto decision by the police does not need to be backed up by any report or formal justification, and according to some, the decision is largely made from the police's 'gut feeling', which is generally car-centric. M2 was less negative about the police's participation in decision-making than other informants, however did affirm that their veto can be a challenge when it comes to changes that are more innovative, i.e. those which have not yet been tested in the city.

4.2.2. Carrots, sticks and tambourines

When asked the first broad question about the challenges involved in increasing cycling share, many informants restated what was discussed in the literature on becoming a more pro-cycling city: 'give and take' measures (Gössling, 2013). Measures to increase cycling can be metaphorically compared to *carrots*, *sticks* and *tambourines* (N. Jensen, 2013). *Carrots* are the infrastructural changes for cycling, *tambourines* are the pro-cycling campaigns and programs, and *sticks* are the measures that restrict cars (N. Jensen, 2013). Many identified that measures that provide more *carrots* and *tambourines* have been widely used, whereas not the *stick*. As M1 puts it: "...we want to make people choose the alternatives because they're better, but we're facing that it has somehow worked, but not completely worked, since the last 5-7 years maybe the car traffic hasn't decreased (...) Why it's like this, I suppose because we politically did not focus that much on how to restrict cars." And informants have widely stated the types of measures: "I think one of the most important things is that we can't talk about the *carrot* or the *stick*, it's both. You can't ever do one or the other, you need to get the combination of these things."

4.2.3. Material within SPT

Many of the challenges identified, before asking any questions regarding this element, would fall under the category of material, showing the importance of attention to the physical aspects of cycling (Sanders & Judelman, 2018; Winters, Brauer, Setton, & Teschke, 2010).

Unequal road space for cyclists

Many informants noted that due to the growing necessity and the goals set by the municipality, there is an insufficient share of urban space dedicated to cyclists compared to motorized traffic: lanes lack capacity for the volume of cyclists. This is worsened by cargo bikes as about ”26% of all families with two or more children have a cargo bike or a bicycle trailer” (City of Copenhagen, 2015, p. 12), and this abundance puts pressure on bike track width. The growth in the number of cyclists and the dedicated space in roads has lead to a problem of crowding (Carstensen et al., 2015). Most informants felt that too much urban space is dedicated to motorized traffic, and that this a problem for increasing cycling shares. As one informant put it, “If you look at how many people are sitting in the car and how many cars there are, it's kind of ridiculous that cyclists have to be pushed (...) into a rather small amount of space compared to the amount of cyclists”. Indeed, municipal documents show that only 7% of urban space is dedicated to cyclists, while motorized traffic uses 66% (City of Copenhagen, 2017a). While cars are the most inefficient urban transport mode (Brunner, Hirz, Hirschberg, & Fallast, 2018), it was highlighted that this is a touchy subject politically and for public acceptance. However as the municipal employees said, it must be addressed considering the increasingly limited space for the growing number of people.

One particularly controversial aspect of public space was the amount dedicated to car parking. While occupying a considerable amount of urban space, parked cars reduce cycleway width by 10-15cm when parked alongside (Greibe & Buch, 2016). Even though most Copenhageners cycle to work or education, many own a car according to informants. This trend is rising, requiring more space for parking. This supports Gössling’s (2013) research that as the city’s livability attracts new residents there is increased car ownership. But there is political and public resistance to taking away car parking spaces, even though one informant claimed there are more than enough parking spaces for cars.

> “Politically it's not feasible. The thing about Copenhageners is a lot of them have both a car and a bicycle, so on a daily basis you think might use their bicycle, but when they go to the summer house or to IKEA to buy furniture, they will use their car. So removing space for cars might create some political tension and removing car parking spaces might also create angry citizens.” (N2)

As many interviewees pointed out, the way that the municipality has dealt with the issue of urban space so far is in gradually taking space, through experiments and opportunities. These incremental changes have been more easily agreed upon by politicians and accepted by citizens. Some believe

this has not been done ambitiously enough and the gradual widening of a lane here and there will not suffice the need for wider lanes, especially in relation to municipal cycling goals. The pilot project of Nørrebrogade came up often in the interviews as a very successful example of giving fair shares to the different modes. However, M2 said that in discussions of implementing a similar project in another road, politicians identified it as too 'invasive' for the car drivers to reduce their access in such a way and agreed not to repeat the pilot elsewhere. Although all informants that mentioned the project assessed it as a step in the right direction, it is interesting how the political decisions suggested otherwise. As the M2 puts it:

> "...it's not a huge success if you're sitting in a car, and that's the political climate we're in right now. (...) The majority of the politicians felt that perhaps Nørrebrogade has gone a little bit too far in giving too much space for buses and too much space for cyclists."

As Freudendal-Pedersen explained, this reluctance to reallocate space from cars is a result of a conceptual dilemma: while architectural drawings sell an ideal city without cars in the landscape, "people at the same time think they should have the right to have the car, to have all that space being occupied by cars". This can be noted in new city developments in the harbors of Copenhagen, which according to informants, have guaranteed car parking, in addition to numerous parking houses. These are often developed by *By og Havn* (City & Port Development), and "user-friendly and flexible parking is the highest priority in the neighbourhoods developed by Copenhagen City & Port Development" ("Parking", n.d.). Some informants criticized the transport choices that the city caters to with these projects, supported by research showing that such parking access triples the odds of owning cars (Christiansen et al., 2017). This relates to the city's branding and making the city attractive – with connections with public transport and cycleways – but, at the same time, spatial configurations allow for use and ownership of private motorized vehicles, which take up space, investments and practitioners.

Lack of good bicycle parking facilities

Despite large investments, some informants observed that comparing to cars, funds devoted to cycling are relatively small. The discrepency of how car projects are treated in comparison to those of bicycles can be seen with bicycle parking, and as Hoe informed, these facilities often get last priority, simply fitting in some racks where there was left-over space and money but not sufficiently providing for the volume of bicycles. According to almost all informants, bicycle parking has been a major issue for a long time. Two informants highlighted theft as a problem, one identifying cargo bikes and another identifying good quality bikes as major targets due to poor parking facilities. The lack of

capacity is observable (Otzen, 2014), leading to use of street furniture as safe spots (Larsen, 2017a). Another example mentioned by some informants is the planning of areas around stations for bicycle parking, deemed by Pucher and Buehler as “crowded, outdated, inconvenient, unguarded” (2007, p. 30). The importance of bicycle parking is underacknowledged in Copenhagen, and can negatively influence bicycle usage (Larsen, 2017a).

M1 mentioned the challenge of planning the city in a way that parking facilities did not bother other road users. Hoe explained that in the late 2010s, it was more possible to take car parking spaces and to allocate them for bicycle parking. However, this type of flexibility granted to bicycle parking planners has changed; now, in order to take a car parking space and transform it into bicycle parking, it is needed to find another space within the same city zone for that car spot to be reallocated. However, M1 said this may change now with a new bicycle parking plan that has not yet been published, which will again make it more possible to do this type of reallocation.

Commuters into and out of Copenhagen

Considering that the share of cyclists is 41% for all trips to work/study, and 62% when only looking at Copenhageners (City of Copenhagen, 2017a), questions were asked regarding the integration of commuters coming into and out of Copenhagen. Some informants identified these people as a main target for cycling share increase, as the percentage for Copenhageners are quite high. Most indicated that the possibility of taking bikes on the S-trains for free is a very successful and effective measure, also found in Freudendal-Pedersen’s interviews (2015a). In general, it seems like opportunities for intermodal means are there: within the city, although distances are short (Larsen, 2017b), it is possible to pay a small fee and take a bicycle into the metro or the train.

Nevertheless, most said that intermodal means could be enhanced. This is relevant as Parkin and Koorey (2012) argue for the potential of the combination of cycling with public transport in complementing distance, flexibility and weather-related needs. Consultants, municipal and regional representatives observed that there are some difficulties in cross-municipal planning as the different modes belong to different companies, and municipalities, regional and national levels are involved in such decisions. Some informants mentioned the difficulty regarding the area around the stations: does it belong to the transport company? Does it belong to the municipality? Who will pay? As the Capital Region does not have urban planning authority, transport projects that transcend municipal boundaries are often left to the cooperation between the municipalities and N1 and N2 see that as possibly a challenge as those municipalities may not have the same cycling agenda as Copenhagen. As M1 explains, ”we only have the national and the local planning, and this is also difficult. Transport

doesn't consider borders to other municipalities." This complexity poses a challenge for planning of cycle superhighways and intermodal means due to the number of stakeholders involved and the bureaucracy in decision-making. Some suggested that a more centralized organization would benefit pro-cycling changes.

The cycle superhighways were deemed as good projects that notheless could benefit from improvements such as better signaling systems for example, identified by two informants. Both informants and the reports by the Capital Region recognize this as a generally successful project that is improving. Additional alternatives mentioned included ideas like companies providing bikes to employees and tax deductions for those that commute by bike.

4.2.4. Competence within SPT

When it comes to competence, it is interesting to point to challenges within the practice of cycling, as the historical use of cycling has been enabled by the fact that it does not seem to require excessive knowledge or skills. In the context of Copenhagen, its flat and dense layout makes it even easier to perform such practice (Larsen, 2017b), and the cycling culture throughout generations has accumulated and passed on relevant knowledge.

Cycling skills

Questions have been asked regarding people who may have difficulties to adopt cycling, and the results did not point significantly in any particular direction. Perceptions ranged in a broad spectrum and often overlapped with other elements. Findings show a lack of infrastructural capacity impacts the ability to accommodate different skill levels (e.g. children who zig-zag vs. fast commuters); parents' fears hinder children's participation in the practice, due to limited skills. Faster cyclists make it more difficult for those who do not have fluent skills or knowledge to engage in cycling.

While utility cycling is a longstanding practice for Copenhageners, some informants mentioned the need to focus on new residents that come from different ethnicities and cultures that may cycle less. Although some informants mentioned the municipality offers courses for immigrants, I could not find this in literature.

Appropriateness of cyclist behavior

When asking about the appropriateness of cyclists' behavior (in other words, their knowledge and compliance to the written and unwritten rules), the responses again varied widely. While some identified inappropriate behavior as a big problem and said this might scare off newcomers to cycling

in Copenhagen (e.g., new residents and tourists), others said that the idea that cyclists do not follow the rules is blown out of proportion. Colville-Andersen has conducted studies in intersections that revealed that 6% of people bend the rules and only 1% break the law (Suhr, Colville-Andersen, Madruga, Kujanpää, & Maddox, 2012), therefore claiming that this is a mistaken perception. One informant went further to say that there seems to be a stigma toward cyclists on the part of the politicians; there is more willingness to change the law when cars do not comply (e.g. speed limits), which is not observed to the same extent with cyclists. A few informants said that more aggressive or stressed behavior is a part of an urban society, existing in all aspects of life including transport. The municipality has campaigns that try to address this problem (City of Copenhagen, 2015). Nonetheless, most informants who identified this competence as a problem said that it results from lack of or decreasing track space, with some mentioning the increase in cargo bikes.

Two informants talked about the lack of knowledge of the simple unwritten rules that exist for cyclists in Copenhagen. In questions about solving these, they responded about making information of these simple rules more available through licenses or panflets in bike rental places.

4.2.5. Meaning within SPT

As the literature shows (Gössling, 2013; N. Jensen, 2013; Larsen, 2017b), the idea that cycling is a normal transport means accessible to most is essential for making cycling more widely adopted in Copenhagen. Cycling has a de-politicized status (Larsen, 2017b) and cyclists in Copenhagen encompass a heterogeneous group (Carstensen & Ebert, 2012; A. Jensen, 2013). This idea is propagated through the Bicycle Accounts and media, such as the websites Copenhagenize (Freudendal-Pedersen, 2015b) and Cycle Chic[10]. According to Bicycle Accounts and informants, it is a fast and efficient way to get around and that is the main reason why people do it.

As structuration theory proposes, practices and structures produce and reproduce each other (Sewell, 1992). Considering that the majority of informants were both practitioners and knowledgable in planning, they revealed meanings in both the individual and the political, in favor (or not) of using bicycles. The informant that most explored this throughout the interview was Freudendal-Pedersen, who has conducted studies on mobility rationalities in Copenhagen. According to her, a fundamental factor hindering the further expansion of the bicycle system is what she calls ”structural stories”. Departing from Gidden’s structuration theory, ”a structural story is used to explain the rationalities behind the way we act and the choices we make when exercising our daily

[10] See http://www.copenhagencyclechic.com

routines and is a guide to certain actions" (Freudendal-Pedersen, 2007, p. 29). These stories are prevalent among those who choose not to use the bicycle and politicians' perspectives on mobility systems.

Meaning and Agency

Some informants explained that in Copenhagen the low-hanging fruit have been harvested, and a heterogenous parcel of the population that needs to be addressed. In another instance of relative competition between cycling and cars, reasons for not choosing the bicycle include negative meanings of cycling in comparison to positive meanings of driving. Negative meanings included circumstances that might involve distance, unwillingness to exercise, weather, perception of danger and inconvenience caused by specific jobs or kids. As also noted by some informants, the major difficulty is getting those who drive to cycle (Freudendal-Pedersen, 2015a). Three mentioned that once owning a car, leaving the mental addiction of using the car and its associated meanings is difficult, and the jump is much bigger compared to other transport modes. This can also be found in transport psychology research that analyzes emotional connection and reluctance to voluntary change (Steg & Vlek, 1997; Steg, 2004). Because car use often hinders acknowledgement, or distorts the value of, alternative means (Goodwin, 1997), it could be argued that improving the cycling experience would not necessarily capture the attention of those using the car daily. The issue with transport psychology was identified by five informants, some of whom explained that the shift to other modes will not happen by only providing *carrots*. Research also shows that once a car is owned, its use tends to increase (Goodwin, 1997).

Alongside, Copenhageners are still passionate about the right to use or own a car, and according to M2, meanings attributed to cars can reduce public support for actions that may restrict their space and accessibility. Despite previous research indicating that car restrictions do not negatively affect commerce (Szarata, Nosal, Duda-Wiertel, & Franek, 2017), small business owners was a group commonly mentioned, as they tend to believe that taking away car parking spots for cycling, for example, is bad for business.

Freudendal-Pedersen cited two main stories she found that influenced bicycle use were "it's too dangerous for kids" and "cyclists are too egotistical" (Freudendal-Pedersen, 2015). In her study, these are closely related to car use, in a sense justifying why it makes sense to choose it over the bicycle. When presenting Freudendal-Pedersen's study results in the interviews, informants found that justifications for these arguments came from different perceptions. Four informants identified that they are consequences of the abundance of cyclists and lack of space, along with an attitude

problem, which another informant also identified. Two people identified the stigma of the ’reckless cyclist’.

A predominant perspective was that ”it’s too dangerous for kids” results from perceived danger. Two informants said the Danish Road Safety Committee influences this perception by nurturing the culture of fear in things like promoting helmets use. According to both, this is an example of how this agent triggers an idea that it not safe to cycle, and that if accidents occur, the fault is on the cyclist. Perceived fear, according to three informants, causes a negative feedback. As M2 puts it:

> ”The safety for kids is a big issue around the schools in Copenhagen, and it's a downward spiral, because if some parents feel or decide it's too unsafe for kids to ride on their bikes or walk to school, they will bring them by car, and then by bringing the car close to the school (...) the next parent on the bike will say ’this is too dangerous’, they will jump in the car, and then in no time at all people will use their car to the school.”

Indeed, trends show an increase in the past decade of those who take their children by car (Freudendal-Pedersen, 2015a). Research says motorized traffic discourages the practices of walking and cycling, enhacing the perception of risk by non-motorized road users (Jacobsen, Racioppi, & Rutter, 2009). Accordingly, Koglin’s (2013) survey shows that motorized traffic is the biggest threat in cyclists’ perception in Copenhagen. In this way, combining the results of this question with the literature, arguably one of the main arguments for not choosing the bicycle in Copenhagen can be associated with motorized traffic’s negative influence on perceptions of risk, which in turn causes increased car use and further increases perception of danger.

Perceptions of danger are also increasing due to the growing numbers of cyclists in the lanes as bicycle lane crowding has a negative effect on people’s perceptions of cycling (Sanders & Judelman, 2018; Vedel, Jacobsen, & Skov-Petersen, 2017). These results ressonate with Freudendal-Pedersen’s findings, and key informants’ knowledge shed light on possible causes for such stories.

Meaning and Structure

On a more structural level, no negative meanings were associated to cycling: the practice is so engrained in the culture and the city’s branding that no politician would revert the cycling increase agenda or associate it to something negative. Rather, the political parties in power might influence the speed or the degree of change made to favor cyclists. Political motivations for attention towards cycling in decision-making varied widely, as did perspectives in the literature. A significant answer included the branding of a *city of cyclists*, in a *livable cities* competition, and that now more than ever

there are environmental concerns such as climate change, hence the contribution of transport to CO_2 reduction goals. Other ’pushes’ included limited urban space, health issues, and pragmatism. The latter was elaborated on in-depth by Colville-Andersen, who explained that Copenhagen is a city that gathers extensive data and that the knowledge acquired indicates that investing in cycling is a pragmatic business model: "For what you invest and for what you get out of it, with public health and everything else... That's why we do it". In this sense, the meanings associated with cycling have been accumulated from different benefits that cycling provides, but particularly in the global context of increasing urgency to address environmental pressures and the inter-city competition for *livability* and their ability to attract businesses.

Informants identified the meanings attributed to cars as challenges for a further expansion of cycling. According to Freudendal-Pedersen, the connection of cars to growth, along with the competition between international cities for attracting business impacts how mobility systems are valued and their prioritization. In other words, there is some controversy: despite wanting to attract businesses through *livable* and *cycling city* branding, the fact that they have an agenda for economic growth and its connections with cars hinders more dramatic shifts in attention and decision-making.

> "... because people do know the car is polluting and that it takes up a lot of space, we constructed structural stories that is a way of making this common agreement with everyone that ’of course that this is what you do when you are successful or have kids or want to create a good life for them and yourself’, and what I find interesting about it is it’s reproduced in the media, reproduced in policy and planning." (Freudendal-Pedersen)

This is particularly noticed at the national level of government (and many informants claimed this level generally does not support restricting car use), as well as in some municipal sectors. Although there is an agenda to increase sustainable modes of transportation, certain sectors of the municipality such as the traffic department try to optimize travel times and create better conditions for all road users, including drivers: ”In my personal opinion, the city really wants to meet the needs of all different kinds of groups, ideally, they want it to be a perfect cycling city, but without hurting car drivers” (N2). This came up throughout the interviews with municipal employees:

> ”...the traffic management people, even though they agree on this with more green mobility, I think in their daily life they are working a lot on how to get the cars quickly through the city, because this is of course what they're working with, and it also makes sense, but sometimes the problem is if you get the cars quicker through the city, you get more cars. So there are some dilemmas here.” (M1)

As shown, positive meanings for driving can affect both public and political attention, thus influencing the number of those who cycle and the political attention given to cycling.

Relative affordability of the bicycle

Since the practice of driving and cycling may compete in practitioners, questions on relative affordability of the bicycle were included. This meant mainly costs associated to owning or using the car, where cycling would then be seen as relatively a cheaper means of transport and potentially attract more practitioners. These can costs consist of registration taxes[11], parking licences and fees, congestion charging, gas, etc. and comprise financial *stick* measures. Many informants talked about these factors before this topic was mentioned. With more affluence and the fact that in general cars and gas have become cheaper, people have become more capable of owning cars. This has been triggered with the new state-level regulations that reduced the registration tax (CREATE project, 2016). The influence on car ownership interestingly puts more pressure particularly on car parking, as many do not use their cars on a daily basis.

Henceforth, the financial tool that the municipality has in restricting cars is precisely what the population needs to accommodate their increased car ownership, creating a dilemma in public acceptance. Parking licenses were identified by many as very cheap – licenses for those living in Copenhagen range from 100-1000 kroner a year, depending on how polluting the car is. It does not take into consideration the actual cost of the renting of that space, and Koglin explains that things deemed 'externalities' are left out of this calculation. According to municipal informants, the raising of parking fees and elimination of parking spots is politically sensitive and lacks voter support. New parts of town, however, such as Ørestad, have increased prices for parking. N1 thinks that raising the cost of parking licenses in Copenhagen would not necessarily increase cycling share, as she explains that most people cycle on a daily basis and have a car. However, research elsewhere shows relations between the parking prices and car ownership (Seya, Nakamichi, & Yamagata, 2016), which can affect urban space for other modes like cycling.

Congestion charging, a fee drivers must pay for using the city's road space during rush hours, is a popular topic in Copenhagen as the state level, under the political influence of municipalities that surround Copenhagen, denied the implementation of such in Copenhagen. This tool has been succesfully implemented in other cities such as London (Beevers & Carslaw, 2005) and Stockholm (Borjesson, Eliasson, Hugosson, & Brundell-freij, 2012) but surprisingly has not been implemented in

[11] A registration tax is paid when registering a vehicle in Denmark, introduced with the intention of financial public support for car infrastructure (The Danish Ecological Council, n.d.).

Copenhagen. It had been mentioned a few times in municipal documents up until the *Bicycle Strategy for 2011-2025*, after which it was not brought up again. According to M1, this decision was the biggest reason for not reaching the goal set for 2015. M1 also said that this might be brought up for discussion again with smarter technology. According to many informants, it must be implemented at some point in Copenhagen, particularly considering the knowledge on cycling shares and transport psychology.

Many informants said these *stick* tools were underused and that buying and/or using a car is generally very cheap. These tools are justified by research revealing that measures that raise the cost of cars has a bigger effect in modal choice change than only facilitating other means (Washbrook, Haider, & Jaccard, 2006). Spotswood et al.'s (2015) study that applied SPT to cycling in the UK found that an important argument for choosing to use the bicycle was relative affordability, therefore being an interesting levarage point. Other ideas mentioned in this category included decreasing fees on public transport and more tax deductions for those who cycle long distances.

4.3. Interaction of SPT elements and practices

It can be seen that there is constant interaction between the elements among the challenges identified. For example, the inappropriateness of cyclists' road manners (competence) is connected to the perceived danger for kids (meaning), which is then attributed by many to cramped lanes and lack of space (material). A prevalent and paradoxical challenge lies in need for more space for one of the most space-efficient transport modes. It can be concluded that the space dedicated to motorized traffic negatively contributes to the connections between the elements that would foster more cycling. For example, space given to motorized traffic leads to relatively narrow space dedicated to cyclists, which then may cause reckless cyclist behavior and perceived risk, consequently leading to less (or not more) practitioners. This is a clear indicator of the connections between practices, as explained by Shove et al. (2012).

The ability to attract and nurture practitioners of cycling cannot be seen in isolation, but rather in a social fabric in which other practices are woven (Shove et al., 2012), driving being particularly discussed. This close relation with driving is cited in Spotswood et al.'s (2015) study that applies SPT to cycling. It has been argued elsewhere that the practices of cycling and driving are complementary in Copenhagen (Larsen, 2017b), by taking up different functions (e.g. cycling for shorter trips and driving for longer trips), strengthened in the fact that many Copenhageners own both bicycles and cars. This has can also be seen throughout history, where most of the material dispositions, the associated competences and meanings of cycling survived the car boom. However, with the current

state of affairs – an already dense and still growing city – my findings suggest that this peaceful idea of accommodating for all means is starting to cause conflicts with ambitions to increase cycling share. One could say that Copenhagen has reached (or is close to reaching) a point in which, with the number of practitioners, material dispositions can no longer allow existing spatial distribution for increasing cycling share.

This is because in terms of urban space, political investments and practitioners, the practices can be compared and framed as competing. Yet, despite competition between practices and the requirement of limitations on driving for the achievement of the cycling goal, the meanings associated to the car hinder more dramatic actions. This can be observed among all, including the municipality and citizens, but also in national level and police department's decisions. In other words, despite the multiple benefits that cycling brings about, and despite an already enabling environment – illustrated by its trajectory in becoming a *city of cyclists* – the major challenges found in this study stem from reluctances to truly prioritize the bicycle over the car.

SPT framework predicts that the elements and their connections must be renewed time and again for practices to persist and spread (Shove et al., 2012). Although Copenhagen has done a lot to enable and connect the elements, new situations cause the need to adapt and refresh these links, as new challenges are found. The understanding of the dynamics between the elements point to the need to take the next step in further reducing urban space dedicated to cars in favor of more for cyclists, and I have explored how these changes are hindered by meanings related to the practice of driving.

Spatial distribution is a major factor that hinders connections between the elements. However, it is important to recognize that SPT understands a dynamic and ever-evolving relation between the elements. Following this line of thought, although it is arguable that more dramatic changes in the distribution of road space is one of the major findings for sub-RQ2, I believe it is valuable to ponder on the other, equally important, elements: competence and meaning. Although this study does not provide a prescription of what should be done, in line with SPT and learning from historical developments, I argue that changing negative competences and meanings associated to cycling without entering the troublesome topic of road space might encourage more cycling. This might in turn make the discussion of road space easier. As shown in the historical section, these dynamics were fundamental for the impressive cycling share Copenhagen holds today and can be useful in identifying levarages for change.

5. Conclusion

5.1. Summary of findings

The historical developments of cycling in Copenhagen have fostered important pre-requisites for its high shares of cycling today. The dynamics between the elements of social practices can be understood in explaining its popularity in different points in time. The relation between the popularity of cycling and driving can be noted, and although these practices do not have an either-or relation (Shove et al., 2012), the analysis shows that there are multiple areas of competitive relationships. Overall, the meanings associated to cycling have transformed and been incremented, leading to the current branding of Copenhagen as a *livable* and cycling city (Emanuel, 2016). This has only been made possible through the complex dynamics of events and situations, which has given attention to the material aspects of cycling and nurtured the competences to perform. The duality of structure and agency also helps explain why the practice survived and was fostered. Competence has been maintained due to the persistent cycling culture; however, meanings and material have had more dramatic changes. Literature shows meanings associated to the bicycle have been most commonly of a normal transport mode throughout the past century, and material has also substantially been abundant. However, there was a rough patch for these elements (and therefore the practice itself) when cars got more popular. The meaning was transformed, and recently has taken the shape of being important for the city's branding and environmental commitments. For the material dimension, despite recovering, bicycles were included in the urban landscape in a way that although having a clear design, pushed the abundant cyclists to the side of the roads, occupying much less urban space (Carstensen et al., 2015). Nonetheless, when focusing in the past two decades, municipal documents show large investments and infrastructural changes have been made, and in reciprocity with the strong Copenhagen identity that cycling has held, have raised their cycling share dramatically.

As it is widely known that Copenhagen has gone a long way toward enabling cycling, it has done so to the extent that driving and the car's presence in the landscape are not too negatively affected. Despite the importance of cycling in the political drive of Copenhagen as a model *eco-metropolis*, a *livable city*, and a *city of cyclists*, convenience for car ownership and use are creating a conflict. Higher rates of car ownership resulting from increased affluence and lower car costs create a demand to cater to such 'rights'. This is not necessarily the fault of decision-makers, as car culture is supported by public opinion. There are political contradictions in some new parts of town that,

despite higher costs, provide ample space and accessibility for cars, raising questions about what type of transport choices are being encouraged.

Shares of urban space dedicated to cyclists are perceived unequal when considering their numbers, for the major part of it has been given to motorized traffic. Bicycle tracks are increasingly congested (Carstensen et al., 2015), causing problems regarding cyclist behavior and perceptions of safety. Bicycle parking facilities are often of poor quality and insufficient (Pucher & Buehler, 2007), which also affects bicycle use. Increased car ownership is putting pressure on spatial demand for car parking, judged by many informants as too cheap, and in new parts of town widely available. Parking facilities exemplify the comparatively unequal investments dedicated to these two modes: many experts believe that cycling infrastructure is given comparatively little funding, especially considering its positive economic returns in relation to cars.

Improvements in infrastructure (e.g. wider lanes, more connections) and intermodal transportation options linking bicycles to other public transportation modes could attract more practitioners. Many experts believe that modal shift from driving to cycling will likely not happen if restrictions (e.g. cost, accessibility) are not applied to cars. Many of those who do not cycle commute into or out of Copenhagen, and challenges have been encountered in cohesive management of routes and means that go beyond municipal borders, such as planning around the stations.

Although some judged recent municipal efforts for cycling increase as unambitious, many explained that the urban planning departments do what they can within their power, which is limited both due to other authorities and public acceptance. Their approach has been to gradually appropriate more space for cyclists. Despite having power over decision-making regarding local discussions such as road space, the municipality can only do so much. One barrier for more pro-cycling changes is voter support: people own more cars and are also subjugated to the meanings the car has, particularly business owners. The financial tools that could exist to limit car purchase and use are largely state level responsibilities, whose actions have been going in the other direction. Another barrier is the power of veto that the police have in decision-making, which can hinder more innovative cycling projects.

I have examined factors that influence the expansion of cycling in a very enabling environment: the *city of cyclists*. This analysis has mainly pointed towards the subtle but present obstacles that the car system poses for the often-competing bicycle system that has many good reasons to expand. To successfully increase cycling share in Copenhagen and avoid the postponing of the cycling goal once more, a choice must be made. From my conclusions, it is unlikely that it can be achieved with the

measures that have been adopted so far. While the municipality's accomplishments have given very positive results, the further development of the practice involves new hindrances that face a very difficult system to challenge: the car system. The importance of the car in the city is present and the trend of gradually increasing the dedicated space provided to bicycles no longer suffices, causing negative competences and meanings associated with cycling. Despite great attention being given to the practice and its enablement, business as usual by the municipality will likely not settle new challenges. This is because it has come to a point that achieving their cycling goal and maintaining the *eco-metropolis* branding affects another practice that is very much connected to the branding itself: economic growth and attracting businesses.

In attempting to understand the dynamics of a sustainable social practice in a city where much has already been done, one can delve into a level of social processes that reveal the most difficult part of transitioning to a more sustainable society. In the case of cycling, there is much sustained evidence about how it positively impacts in innumerable ways the lives of those who adopt it – yet it remains difficult to expand its practice further and to truly break the dominance of the car system. The author hopes this study might contribute ideas and energy for the making of a *new cycle* – one in which cities are happier, more sustainable and more human.

5.2. Potential for future research

This study has used SPT to examine a sustainable practice throughout time and challenges for its expansion, thus indicating context-specific influences of cycling in Copenhagen. In doing this, it clashed a lot with elements of another (unsustainable) practice: driving. For Hargreaves (2011), "generating more sustainable practices calls for the links and elements of existing, unsustainable practices to be challenged and broken before being replaced and re-made in more sustainable ways" (p. 83). Thus, considering their impact in cycling increase goals, future research could apply SPT to the practice of driving in the *city of cyclists*. This might allow a better understanding of how this practice is enabled and links are made, to perhaps explore how these links can be broken.

As sub-RQ2 took an exploratory approach, another idea for future research is to focus on taking these findings a step further. Henceforth, they could seek to provide alternatives to the identified challenges by suggesting policy recommendations. In their book, Shove et al. (2012) provide interesting insights on how policy can incorporate SPT rather than following traditional approaches to behavior change. As SPT has fundamentally different conceptualizations of action, change, and the

role of policy; academia and praxis could benefit by examining policies framed around this framework in a context where the main challenges have been identified through SPT.

In addition, I believe complementary results could be found in exploring similar questions in the other cycling leader: Amsterdam (Freudendal-Pedersen, 2015a). Considering they are comparable in different aspects and in cycling share (Olsen & Bækgaard, 2015), finding out how another enabling environment for cycling has developed and might face challenges will enrich the knowledge on such cities, possibly informing themselves, each other, and other cities with cycling ambitions as to important things to take into consideration. Following on this, an area that I did not find much information on was the evaluation of regional cycling plans, how cooperation and/or centralized administration could enable cross-municipal cycling increase.

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Appendix A

Search strings for literature review

TITLE-ABS-KEY ((cycling AND history OR developments AND Copenhagen) AND (Copenhagen AND city AND of AND cyclists))

Appendix B

Interview Guide

- Short presentation of myself and research.
- Permission to record
- Can I quote you in text by name?
  - If not > Asked if can use general description.
- Can I contact you again for follow-up questions?

All the following questions are in the context of Copenhagen.

Element	Questions	Objective
General	- What are the main challenges for increasing cycling share? - Why do you think the cycling goals the municipality set weren't reached?	Understand the most intuitive challenges, before discussing it within the element categories: might give clues of the most pressing issues which may or may not be encompassed in the elements' questions
Meaning	- Throughout history, there have been different drivers for the focus on cycling in policy and planning. What do you think drives cycling increase today?	Understand their perspective on the motivations today (asked here for the flow of the interview)

Material	- What do you think about bicycle infrastructure in Copenhagen?
	- How do you feel about the share of urban space dedicated to bicycles?
	- Do you think urban space dedicated to motorized traffic is a problem for cycling increase?
	  o If so, in which ways could this problem be tackled?
	  o What, do you think, the municipality can do to tackle this problem?
	- Are there enough facilities for bicycles (e.g. tire pumps, bicycle parking – including cargo bikes)?
		Understand the possible barriers and solutions within the material element of social practice

	- How do you understand the integrating of the commuters from and to outside of Copenhagen? - Do you think intermodal means could be enhanced? If so, how?	

Competence	- Are there new challenges regarding the accommodation of a key public for cycling increase?
	  o Feel free to talk about any possible difficulties regarding groups that may have different knowledge or skills to adopt cycling (e.g. children, elderly, new residents).
	  o What are options in encompassing these audiences to choosing the bicycle, in your opinion?
	- Are there challenges regarding cyclists' road manners with other cyclists, pedestrians and/or motorized vehicles? If so, what could be possible solutions for this?
		Understand the possible barriers and solutions within the competence element of social practice

Meaning	- In your opinion, what are the main meanings or reasons for not choosing the bicycle?
	- A study by Freudendal-Pedersen (2015) identified two main arguments for choosing the car over the bicycle (or for not choosing the bicycle). They were: "It's too dangerous for kids" and "Cyclists are too egotistical".
	  o Do you think these arguments are results of any of the challenges that you identified?
	  o What do you think could be done to address these arguments?
	- Do you think the relative affordability of bicycles should be further increased?
	  o If so, what is hindering these charges from taking place?
	- How do you feel about taxes, congestion charging and parking fees influencing modal choice?
		Understand the possible barriers and solutions within the meaning element of social practice

General	- Do you think the strategies the municipality has for the following years encompasses the issues we've talked about?	Understanding their perspective on the adequacy of the municipality's plans

Appendix C

Interviewed actors

Actor groups	Name	Position
Københavns Kommune	M1	Technical and Environmental Administration, Project

(Copenhagen Municipality)		Manager; Plan Manager on green mobility	
	M2	Technical and Environmental Administration, Head of Unit	
Region Hovedstaden (Capital Region)	R1	Chief consultant; member of steering group of cycle superhighways; responsible for the contract between the cycle superhighways secratariat and the Capital Region.	
Vejdirektoratet (Danish Road Directorate)	N1	Planning department, office of Safety and Cycling, Project Manager	
	N2	Planning department, office of Safety and Cycling, Engineer and Project Manager	
Scholars	Malene Freudendal-Pedersen	Msc. Technology, Environment and Social Science; PhD in Social Science; Associate Professor in Sustainable Mobilities at Roskilde University; Researcher in Mobility	
	Till Koglin	PhD in Transport Planning; Associate Senior Lecturer Lund University, Department of Technology and Society; Researcher in cycling, planning, mobility and urban space	
Cycling Embassy of Denmark (CED) – transport consultants	Name	Company/Group	Background and position
	Erik Kjærgaard	Kjærgaard Advice	CEO; experience in the municipality with planning, strategy and product development in public transportation (busses and trains) and bicycle integration; experience working with bicycle infrastructure; experience as independent consultant (public and private); experience as board member of DCF
	Lasse Medegaard Schelde	Moving Spaces IVS	CEO; executive member of CED; board member of Bicycle Innovation Lab; has worked in projects on intermodal transport in the outskirts of Copehagen
	Mikael Colville-Andersen	Copenhagenize Design Co.	CEO; Urban design and mobility expert – head of the intersection

			desire lines study in Copenhagen
	Niels Hoe	HOE360	CEO; experience working within railway-bike connections for the Danish State Railways and bicycle parking (2007-2010) in Coenhagen municipality; currently consultant for Copenhagen and other municipalities and cities
Civil Society Groups	Pernille Bussone	Cycling Without Age (NGO)	Global community captain

Appendix D

Interview information (in order of date)

Name	Date	Duration	Nature		Sampling
Erik Kjærgaard	13/03/18	65min	Face-to-face	Follow-up questions email	Purposive
Malene Freudendal-Pedersen	16/03/18	63min	Face-to-face		Purposive
Till Koglin	21/03/18	67min	Face-to-face		Purposive
Lasse Medegaard Schelde	22/03/18	76min	Face-to-face		Purposive
M1	23/03/18	44min	Face-to-face		Snowball
Pernille Bussone	26/03/18	95min	Face-to-face		Purposive
Mikael Colville-Andersen	28/03/18	91min	Face-to-face		Purposive
Niels Hoe	05/04/18	58min	Video call	Follow-up questions email	Snowball

R1[12]	05/04/18	35min	Video call (interrupted)	Questions via email	Purposive
M2	13/04/18	73min	Face-to-face		Purposive
N1 and N2	19/04/18	92min	Video call		Purposive
	13/03/18 - 19/04/18	759min	Face-to-face, video call, email		Purposive and snowball

[12] Due to technical difficulties with the video call, only the first questions were asked via video call. Most of the questions were then sent via email and responded in the same way.