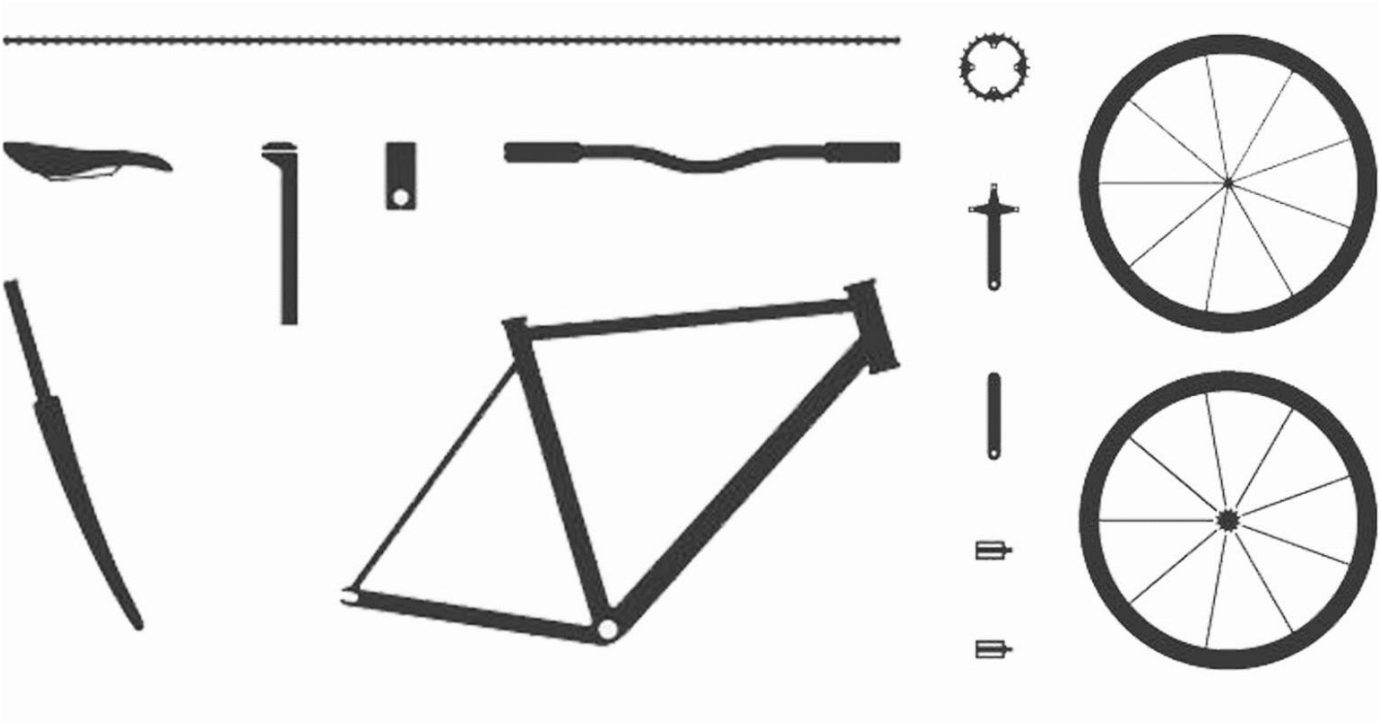
CYCLING STUTTGART

a practice theory approach of
conditions, challenges and requirements
of confident cyclists



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PREFACE

This master thesis was conducted in the study program MSc. Sustainable Cities at Aalborg University in Copenhagen. The thesis is written in the period of 12.06.2019 to 12.09.2019 and the underlaying empirical data has likewise been collected throughout this period.

I would like to thank my supervisor Malene Freudendal-Pedersen for her useful, thoughtful and deeply motivating conversations throughout the entire project period.

ABSTRACT

The share of cyclists in Stuttgart have long been stable and account for about 5-7%. Measurements of the municipality to develop decent cycling environment have failed to motivate citizens to switch to use the bicycle. Citizens who are confident enough to cycle anyway do not feel appreciated by the city and require a change in city planning and distribution of space. By using practice theory as an approach, this research will analyse the conditions and challenges which need to be managed when performing the practice of cycling in Stuttgart and the requirements of confident cyclists on the urban cycling environment.

The cycling infrastructure network in Stuttgart is the major issue of discussion among cyclists, and cyclists are not satisfied with the situation. Even for confident cyclists, cycling in Stuttgart can be nerve-racking and mentally exhausting as they need to cycle constantly concentrated, foresighted and they need to pay attention to the traffic. However, they express to generally enjoy cycling and prefer it to other modes of travel. The main reasons to use the bicycle are rather practical (time, flexibility and money) and reasons such as health benefits, sustainability or used space play a minor role. Cycling in busy traffic can be demanding and it is required to navigate the bicycle focused and carefully through the urban environment. In order to cope with traffic, cyclists need to be able to evaluate upcoming traffic situations and predict how other road users will behave. This should be promoted by the infrastructure design, especially to motivate other types of cyclists where these aspects play an important role. Establishing designated infrastructure for cyclists is one of the most desired requirements in Stuttgart. Furthermore, do cyclists not feel appreciated by the municipality nor from the other road users. An established cycling culture can help to increase awareness and visibility of cyclists in the city scape and can have positive effects on the willingness of people to cycle.

Since, most studies about cycling focus on engineering solutions, this master thesis also considers sociological aspects and seeks to contribute to a holistic approach and a discussion of the notion of cycling in Stuttgart.

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1. INTRODUCTION

1.1. PROBLEM FORMULATION AND RESEARCH CONTEXT

“Street-fight: rebellion of cyclists”, “bicycle vs. car”, “Cycling war”. These are often used cache phrases in the media in German articles or documentaries when talking about the traffic situation in Germany. Although, they are phrased to get the reader’s attention there lies a certain truth in it. In most articles the “fight” between cyclists and car-drivers is often the main topic, and it is also the most problematic (NDR, 2017; FAZ, 2019; ZDF, 2019). Cycling has the lowest proportion at the modal split in German cities (BMVI, 2014), and does often share the road with car. Therefore, cyclists are in greater risk of accidents in opposite to public transport or walking. One reason is missing infrastructure dedicated for cyclist (Greenpeace e.V. & Marion Tiemann, 2018). Cyclists are often seen as aggressive riders who are bending the rules as they want and do not care about the other transport users. The former German Minister of Transport, Peter Ramsauer, said in 2012 that the so called “Kampf-Radler” (engl. “fighting cyclist”) must be stemmed, which arouse a discussion about ‘bad behaving cyclists’ which is still going on and continue to have an negative effect to the image of cyclists (Süddeutsche, 2012). But why is there such a tension between the different modes of travel on German streets? Many cities in Germany where built (or better say re-built) to favour the needs of automobile mobility, whereas other forms of transportation, namely bicycles, walking or public transportation had to subordinate to the domination of the car. The practice of the ‘car-oriented city planning’ awoke in the 1920s, and had its peak after World War II, where many cities were partly destroyed and had to be reconstructed. The car was seen as the future of mobility and had an extensive influence on society and culture. Therefore, city planners subordinated the other modes of travel (e.g. cycling, walking, public transport) under the needs of cars. This domination has led to the situation that other modes of travel where displaced by cars and the infrastructure they needed (Kingsley & Urry, 2013).

Like many other cities in Germany, the city of Stuttgart started to build major highways crossing the city centre and around town after much of the city was damaged during World War II. Most of these infrastructures still exist and serve mainly the needs of cars. Roads with up to 4 lanes are leading into the city as well as crossing the city and they are also linked to the surrounding highways. Stuttgart has a well-established public transport system which was built in the 70s, including several subway, tram and bus lines, and since 2018 one fast track bus line. Nowadays, most of the city centre is reserved for pedestrians and cars and bicycles are not allowed to enter the main shopping streets. Since the 90s the city of Stuttgart works on developing the cycle network which consists currently of 194 km cycling lanes, whereas the quality of the tracks is not consistent.

Nowadays, Stuttgart has massive problems due to years of favouring car-oriented city planning. As in other cities, traffic as whole accounts for 28% of CO2 emissions, triggers

congestions and causes noise pollution. Additionally, Stuttgart has problems with air pollution as the city exceeds constantly the EU rules for particulate matter, leading to the first ban of diesel cars in 2018 in a German city (LUBW, 2016). Traffic account for 35% of used space in Stuttgart, whereas cars causing the biggest share (Statistisches Landesamt Baden-Württemberg, 2015). A cars needs around 65 m^2 per person for driving with a speed of 30 km/h and140 m^2 with a speed of 50 km/h. For parking only 13,5 m^2 of space per person is required. In contrast a bicycle needs 41 m^2 to cycle with a speed of 30 km/h and 1,2 m^2 for parking. This means that a car needs ten-times more space for parking than a bicycle (Zukunft Mobilität, 2014). Other than that, Stuttgart is rated as the most dangerous city to cycle in Germany with the highest accidents risk based on number of citizens (Greenpeace e.V. & Marion Tiemann, 2018). Due to these negative effects Stuttgart is pressured to change and improve the current transport system. The expansion of a coherent and attractive cycling infrastructure together with new policies and promotion of bicycle could be one part of the solution.

Cycling in Stuttgart was for a long time on a low level. Since 1995 the share of cyclist stayed more or less at about 5-7% of all road users (VVS, 2010). When looking at the modal split of Stuttgart from 2010, the picture is not different: from all journeys 45% are done by car, 24% with public transport, 26% by foot and 5% by bicycle (Landeshauptstadt Stuttgart, 2015). Also, Stuttgart does not come off well in comparison to other major cities in Germany. Stuttgart is one of the poorest performers in the promotion of cycling. Bremen has by far the strongest modal split cycling wise with a share of bicycle use of 25%, other cities range between 10-20 % (BMVI, 2014).

In 2003, the municipal council approved to a position paper in order to promote cycling. This led to the first bicycle concept published in 2010, which entails plans for a large cycling infrastructure network (Landeshauptstadt Stuttgart, 2010). Until today, the network is just partly developed and the share of cyclists has only increase to 7% (BMVI & Infas, 2019).

However, since more and more citizens who are annoyed by the traffic situation pressure the municipality to improve the cycling network (and other modes), the municipality claimed in 2019 that they want to increase the share of cyclists to 25% by 2030. Especially in regard to the poor development of cycling in the recent years, the target of an increase of cyclists by 18% in ten years' time is quite ambitious and it would require a massive change in the mobility behaviour of Stuttgart's citizens. So far there are now specific plans how this change shall happen. The municipality refers mainly to the bicycle concept from 2010 and added a few infrastructure measurements which are going to be implemented (Gemeinderat Stuttgart, 2019).

As studies have shown, that the focus on the development of cycling infrastructure without considering how cycling is practiced in a specific context, will struggle to attract new cyclists. Moreover, it is crucial to investigate all aspects related to the practice of cycling in order to understand how new designs and policies can be most effective to promote cycling (Larsen, 2017).

To illustrate this with a simple example: If you want to motivate someone to play soccer, he would not simply start playing just because you built the best football stadium in front of his house. He also needs to learn how to kick, run or dripple. Moreover, does he need to get excited by the sport, develop a connection to it and needs a reason why he wants to play. It is the same issue for other practices, also for cycling. If we want to motivate people to cycle, we need to provide them with a proper infrastructure, they need to learn how to cycle in traffic situations and they need to see a benefit or reason why they should use the bicycle instead of any other transport mode.

We can only achieve this by analyzing the current conditions, which challenges cyclists face in these circumstances and what their requirements and demands to an urban cycling environment are. Based on that knowledge we can then further design infrastructures, policies and promotions that fit the needs of cyclists.

So far, the discussion of how to promote cycling in Stuttgart is mainly about the infrastructure and distribution of space. In order to realize a change in mobility patterns towards a higher share of cyclists in Stuttgart, infrastructure plays certainly an important part, however we also need to investigate other aspects related to cycling. This includes among others the reasons, motivation and mindset why people start cycling (or refuse to), the capabilities of different types of cyclists and what they require to successfully perform cycling as well as the social and built environment in which cycling is performed. Therefore, we need to take into account all elements that the practice of cycling entails.

FOUR TYPES OF CYCLISTS

The bicycle coordinator of Portland, Roger Geller, proposed a typology that characterized people as one of four following types, with respect to their attitudes towards cycling.

- Strong and Fearless: Cycling is a strong part of their identity, will ride regardless of conditions
- Enthused and Confident: attracted to cycling, are comfortable sharing the road with automotive traffic, but prefer designated cycle paths.
- Interested but Concerned: curious about cycling, like to ride a bicycle and want to do it more often. But are afraid to cycle along automotive traffic.
- No way, No how: currently not interested in bicycling at all (Geller, 2009)

This master thesis will tackle this problem by analysis the practice of cycling of “confident cyclists”. My intention is the following: Stuttgart as so far a poor share of cyclists, developing a cycling environment is a process where at first the “enthused and confident” cyclists need to be attracted in order to function as role models for others. With increasing share of cyclists, other types of cyclists, namely the “interested but concerned” will follow the trend (Geller, 2009). Therefore, this research asks:

Which conditions and challenges need to be managed when performing the practice of cycling in Stuttgart and what are the requirements of confident cyclists on the urban cycling environment?

1.2. STATE OF THE ART AND CONTRIBUTION

The notion of cycling has been studied in several ways. According to Spinney, 2009), there is a tendency in the research field of cycling towards one of the following aims. Either, researchers intend to answer the question why people move, so what drives them to undertake a journey in a particular way. Or they seek to understand how people move in a particular space. Here the studies mainly focus on the (physical) system and tries to predict and standardise movement to design a consistent infrastructure. On this latter matter studies about interventions to promote cycling were carried out, despite others, by Ogilvie *et al.*, 2004; Pucher *et al.*, 2010) and Yang *et al.*, 2010). Their objective was to examine which interventions are most effective to promote cycling. Interventions involved "infrastructure (e.g., bike lanes and parking), integration with public transport, education and marketing programs, bicycle access programs, and legal issues" (Pucher *et al.*, 2010, p. 106). All three studies agreed on the statement that a package of various complementary interventions, such as infrastructure improvement together with promotion strategies and policy changes to favour cycling are most effective to shift more people to use the bicycle. Also individualised promotion activities for specific cases led to positive effects on cycling behaviour, especially in cities where cycling culture was at a low level (Ogilvie *et al.*, 2004; Pucher *et al.*, 2010; Yang *et al.*, 2010).

Other studies focus more on the social practice of cycling. Larsen (2017) studied the practice of cycling in Copenhagen using practice theory as an approach. He analyses how "everyday cycling in Copenhagen is routinized and popularized by planners and planning policies on the one hand, and cyclists and their embodied practices of cycling and inhabiting the city more generally on the other" (Larsen, 2017, p. 888). Practice theory considers various elements related to the practice rather than target the individual practitioners or only one aspect of the practice. These are grouped into materials, meanings and competencies. By considering all elements related to the practice, practice theory can help to explore "how meanings and values are related to social institutions and technical infrastructures" (Aldred & Jungnickel, 2014, p. 79). In terms of promoting cycling Aldred (2014), as well as (Larsen, 2017), argue that it is not simply possible to reproduce a cycling concept from, for example, Copenhagen and establish it in another city. The meaning and place of cycling can have huge differences between nations or even cities within the same nation. As (Shove *et al.*, 2012, p. 368) writes, "exactly what cycling represents depends, at any one moment, on the cohorts of cyclists who keep the practice alive, and on their relation to non-cyclists in terms of whom the meaning of the practice is also defined". Studies of cycling and practice theory emphasize that it takes more than simply building bike lanes to get people on bicycles and make a behavioral change in mobility patters.

In the context of Stuttgart, most studies who handle the topic of cycling focus on the infrastructure, the traffic development or statistical investigations (Landeshauptstadt Stuttgart, 2010; BMVI, 2014; Landeshauptstadt Stuttgart, 2017; BMVI & Infas, 2018). The research for this master thesis did not disclose any studies about the social practice of cycling or the cycling culture in Stuttgart. Further was no holistic approach found which entails the various aspects and elements related to the practice of cycling. However, in

2017 a documentary called “Kesselrollen” (the German word “Kessel” refers to the valley basin Stuttgart is located) about the cycling culture, critical mass movement and the practice of cycling in Stuttgart was launched. The documentary provides a good impression of the struggles and wishes of cyclist in Stuttgart as well as the sub-cultural solidarity among them (Högerle *et al.*, 2017).

Following other studies on cycling and practice theory (Aldred & Jungnickel, 2014; Spotswood *et al.*, 2015; Larsen, 2017) this master thesis shall approach how the practice of cycling in Stuttgart is characterised, esteemed and established. Since, most studies about cycling in Stuttgart focus on engineering solutions this master thesis also considers sociological aspects and seeks to contribute to a holistic approach and a discussion of the notion of cycling in Stuttgart. It shall further contribute to a better understanding of the practice of cycling in Stuttgart with all its facets.

1.3. RESEARCH QUESTION

This master thesis will be designed along practice theory, in particular the approach by Shove *et al.*, 2012). The analysis is therefore split into the parts materials, competencies and meanings.

In order to accomplish a straightforward approach, the analysis will be undertaken along the following sub-questions inspired by practice theory.

Materials: What are the ‘materials’ cyclists use in Stuttgart? How do they use the materials, such as infrastructure, bicycles, or facilities? How do the ‘materials’ shape the practice of cycling? How does cyclists shape the materials (e.g. build environment)?

Competencies: How is the practice of cycling performed? What competencies are required for cycling in Stuttgart? How did the practitioners learn these competencies?

Meanings: Why do people in Stuttgart use the bicycle as transport mode? What kind of meaning does it have to them? How is it connected to other practices, lifestyle or culture? How do they see themselves in the mobility system?

The analysis will answer the overall research question:

> Which conditions and challenges need to be managed when performing the practice of cycling in Stuttgart and what are the requirements of confident cyclists on the urban cycling environment?

Herby, 'conditions' refer to current situations of, for example, the infrastructure, the traffic situation, interaction among road users or social standing of cycling. The 'challenges' describe the obstacle, problems and struggles cyclists are facing at the moment when performing the practice, but also strains of the city as a whole. The 'requirements' investigate the demands, wishes and needs of cyclists.

1.4. RESEARCH STRUCTURE AND SCOPE

This master thesis discusses the practice of cycling in Stuttgart which will likewise form the main scope of the analysis. A holistic approach was chosen in order to display the various elements which are related to cycling. The analysis is based on practice theory and follows in particular the approach by Shove *et al.*, 2012). Accordingly, the practice of cycling in Stuttgart will be investigated along the materials, competencies and meaning the practice entails and the links between them.

In chapter 1. a brief introduction to the research topic is given. The problem cities are facing nowadays in regards to traffic planning, the impacts of traffic in general and the battle of space is described. The context of this analysis will be the city of Stuttgart and the practice of cycling. Therefore, it is further described what plans the city of Stuttgart has to promote cycling and where the notion of problems in current city planning lays. The state of the art of research in this particular field is discussed and how this master thesis shall contribute to it. Afterwards the research question is presented.

Chapter 2. explains the research design as well as the theories and methods which will be used in this approach. At first will be described how the research will be conducted and the different theories, methods and tools will be used. It will further be explained why the theories and methods were chosen and how they complement each other. It follows a deeper description of practice theory, autoethnography and the methods (literature research, interviews and video recording).

Chapter 3. forms the main part of the analysis. The analysis part begins with the subchapter's materials, competencies and meanings in accordance with the approach of practice theory. The chapter 3.1 deals with the materials, in this respect the city of Stuttgart and the existing urban landscape will be presented. Digging deeper into the required materials to perform the practice of cycling the used bicycles and infrastructure will be discussed as well as their effect on cycling performance. Chapter 3.2 follows with a discussion of the competencies related to cycling in Stuttgart. How people become cyclists, how they learn the required competencies and how they change and interfere with the prevailing conditions will be the focus. Chapter 3.3 dedicated to the meaning of cycling.

What are the motivation, reasons and purposes for people to use the bicycle as a transport mode or how do cyclists see themselves in the mobility system are questions which will be answered. Chapter 3. will conclude with an interim conclusion in form of a 'ride through Stuttgart'. Here, the reader receives an impression about the practice of cycling in Stuttgart.

Chapter 4. will discuss the gathered knowledge and findings. A comparison of the city of Stuttgart with the city of Copenhagen will be held to investigate the main differences between an established and an emerging cycling city. Afterwards a conclusion will follow to identify and summarize the main results of the analysis. In the end of the report I will present the limitations of the conducted research as well as a proposal for further research.

DELIMITATIONS

Regarding the scope of the thesis a few aspects related to the topic are not covered completely or even considered at all. This means that some aspects are excluded by purpose in order to focus more deeply on the core of the approach. However, at this point I would like to present a few of my consideration.

I did not include a deeper discussion of theories and methods I used in this report. The reason is that I wanted to apply the theories and methods in a straightforward approach rather than discussing theoretical concept and comparing different theories. Clearly, the practice of cycling could also be analyzed by using other theories such as behavioral change theory, multi-level-perspective or other approaches of practice theory. However, (Shove *et al.*, 2012) approach of practice theory seemed to me the most appropriate to the field I wanted to cover as it takes into account all aspects related to cycling without emphasizing one or the other. Moreover, enables the approach to investigate all elements individually.

The topic of city development and planning or even traffic development and mobility change is an extensive area. There are certainly other forms of mobility which can foster a sustainable city development and would be worth analyzing. New developments in so-called smart technologies could help to improve the public transport system (e.g. mobility-as-a-service), the electric mobility marked gains ground and compact city planning could (to a certain extend) reduce the mere need to travel.

Nonetheless, my personal belief is that this 200-years-old invention of the bicycle still bears great possibilities for our transport system and furthermore for our society and culture. Therefore, I decided that I wanted to deeply analyze this topic which led to the exclusion of others.

2. THEORIES AND METHODS

2.1. RESEARCH DESIGN

The theoretical basis of the master thesis is built on practice theory, in particular the approach by (Shove *et al.*, 2012), which will be explained more precisely in chapter 2.2.. Practice theory assumes that a practice can be understood by the interplay of materials, competencies and meanings and the links between them. To answer the research question, practice theory is used to analyse the materials (e.g. roads, parking, bicycles, city scape), meanings (e.g. place and importance in society, culture, habits) and competencies (e.g. skills, know-how, body fitness) which are connected to the practice of cycling in Stuttgart. This enables to analyse cycling in Stuttgart in all its facets without favouring one element of the practice.

The empirical data used in this thesis exists of a mixture of different sources, which will be presented as following from most relevant to supplementary. The main data set consists of interviews with a specific focus group. Questions about their cycling behaviour, experiences, wishes and demands as well as their opinion about the conditions to cycle in Stuttgart were asked. A further qualitative research method used is autoethnography. Since I fulfil the requirements of the focus group myself and I am part of the social and urban environment I want to study, I can use autoethnography to provide the analysis with a special depth. On the contrary, do the interviews prevent the autoethnographic studies from the risk of false self-perception. Additional empirical data is based on a bicycle ride through Stuttgart which was recorded with a GoPro camera. Subsequently the video material will be sighted and analyzed. As cycling is obviously a practice where the subject is always on the move, video recording has two main benefits: firstly, it can provide the reader with some insights of how it feels like being out there cycling. Secondly, by revising the video material at a later point it can help the researcher discover things he would have missed if he just cycles the route trying to capture what he sees. Supplementary to the empirical data collection a literature research establishes a wider body of knowledge in the research field. This enables to select the theory and methods used in this report and narrowing down the research topic.

A discussion about the findings of the analysis concludes the master thesis. In line with the autoethnographic approach the discussion is based on my experience of living and cycling in Stuttgart and Copenhagen. In this regard, the practice of cycling can be compared with two contrary urban environments. One being known as one of the best cities for cyclists, the other more for its car industry and poorly developed cycling culture and infrastructure.

2.2. PRACTICE THEORY

Practice theory is a type of social theory which started to be developed in the1970s and formed a conceptual alternative to classically modern and high-modern types of social theories (Reckwitz, 2002). There is no unified approach to practice theory and various interpretations developed over time. However, the approaches have in common that social practice theory puts the practice itself as the core of the analysis, rather than the individuals who perform them. This is contrary to behavioural change approaches which rather look to individuals' beliefs, attitudes and values (Hargreaves, 2011). Reckwitz, 2002, p. 249) defined "a 'practice' is a routinized type of behaviour which consists of several elements, interconnected to one another: forms of bodily activities, forms of mental activities, 'things' and their use, a background knowledge in the form of understanding, know-how, states of emotion and motivational knowledge".

Practice theory is studied and applied by various researchers to the field of cycling or behavioural change (Hargreaves, 2011; Shove *et al.*, 2012; Spotswood *et al.*, 2015; Larsen, 2017). Different approaches of practice theory were established, however the model which appears to be most helpful for a systematic analysis of practices is (Shove *et al.*, 2012) three element model, due to its straightforward concept. According to Shove *et al.*, 2012) a practice can be understood by the interplay of materials, competencies and meanings and the links between them.

'Materials' are described as encompassing objects, infrastructures, technology, tools, hardware and the body itself. However, these materials alone have no value as they need to interplay with other elements to perform a practice. 'Competencies' account for the background knowledge and understanding of the practice. This element contains also the cultivated skills, know-how and rules for the specific practice. 'Meanings' refers to the emotion and motivational knowledge, the social and symbolic significance and mental activities related to the practice. Groups often share a common understanding of the significance of a practice and what it entails. When a common meaning and value of the practice is not shared among a significant number of practitioners and the practice does not engage other people, a practice can easily die out (Shove *et al.*, 2012; Spotswood *et al.*, 2015). So, a practice needs to be repeated regularly and reproduced by skilled practitioners in order to be established (Hargreaves, 2011).

(Shove *et al.*, 2012) approach is explained by (Hargreaves, 2011) in a simple way, again using the practice of playing football as an example. For playing football we do not need just a ball, a field and two goals as materials, it also involves specific meanings, such as the aim of the game or level of emotional engagement, as well as the competencies to kick or dribbling and knowing the rules. Consequently, if the links between these elements are broken the practice cannot be performed. For example, if there is no ball (materials) or if a practitioner does not know what to do with it (competencies) the practice of playing football will not be doable.

In this master thesis the described practice theory approach by Shove *et al.*, 2012) will be used to analyse the practice of cycling in the context of the city of Stuttgart, Germany. The analysis shall shade light on the current situation of cycling in Stuttgart. The following Figure 1 will give an overview of preliminary considerations on the components related to the practice of cycling grouped into the three elements: materials, competencies and meanings.

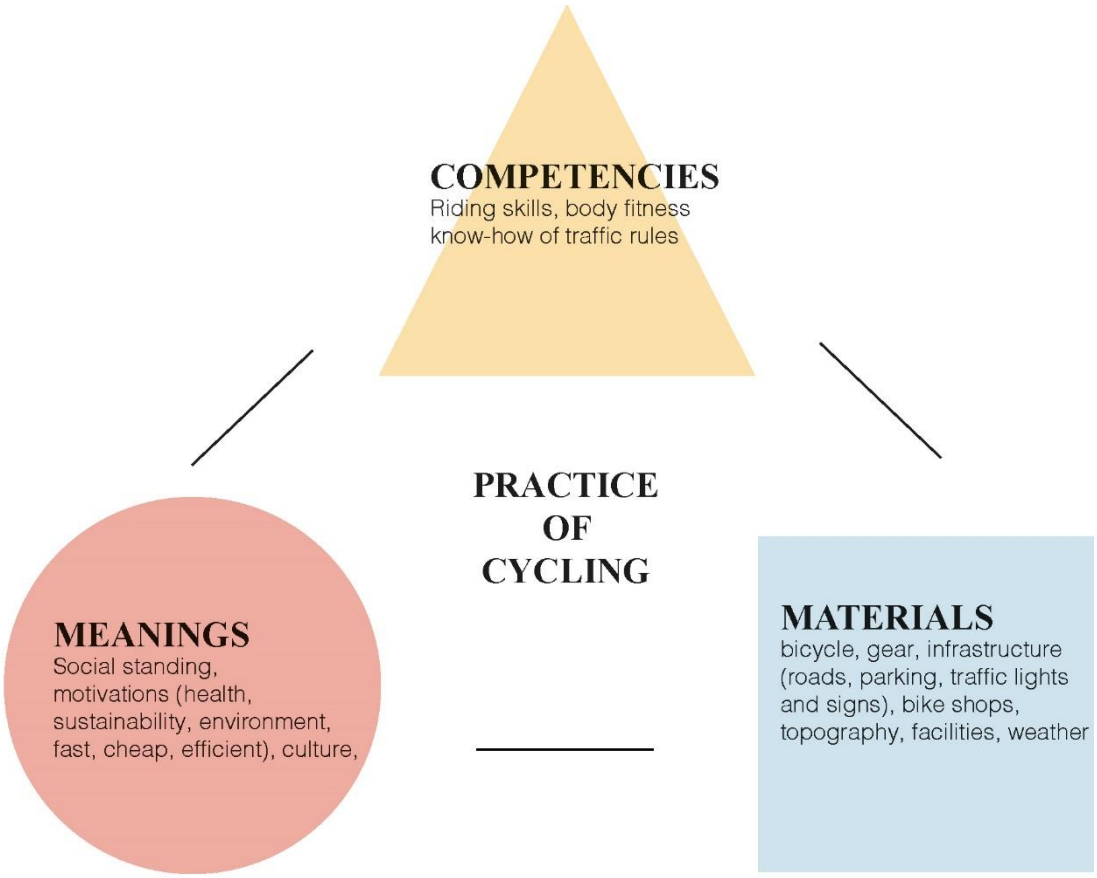


Figure 1: The practice of cycling and its elements (own illustration, inspired by to Shove *et al.*, 2012)

Besides the different element of the practice, Figure 1 intends to further illustrate the interplay and links between them. The elements of material, meaning and competence of a practice are linked together and transform though the process of doing. This also means that a practice can "emerge, persist and disappear as links between their defining elements are made and broken" (Shove *et al.*, 2012, p. 21). Therefore, practice can only exist if the elements are bound together. Changes of one element influences simultaneously the others, this indicates that the elements shape each other as well. The linkage between the elements is crucial, if circumstances are changing, connections between defining elements must be renewed time and again, otherwise the practice may die out (Shove *et al.*, 2012).

2.3. METHOD AND TOOLS

2.3.1. INTERVIEWS

In order to gain a better insight into the practice of cycling in Stuttgart, semi-structured interviews were conducted with six cyclists from Stuttgart and are part of the empirical data used in this report. Interview partners were searched over social platforms or webpages, where active cyclists are participating as well as in my personal environment. The interview partners were only from a specific focus group which will be described later on followed by a presentation of my the interviewees. The interviews followed a guideline of questions, however, questions and structure of the interview was designed in order to give the respondents the opportunity to speak freely and provide outspokenness. The interviews took between 20-40 minutes, were recorded (voice) and afterwards partly transcribed. In a next step the various statements were categorized and linked to the three elements from practice theory: materials, competencies and meanings. However, a clear distinction was not always possible, as boarders between the elements are sometimes blurring. Interviews are a great method to complement the autoethnographic analysis of cycling practice in Stuttgart, in order to make the analysis more feasible and to avoid the risk of self-indulgence and false self-assessment the autoethnographic method might entail.

FOCUS GROUP

The group I will analyse refers to the "Enthused and Confident" type of cyclists according to the approach by Geller, 2009, p. 2), which are "comfortable sharing the roadway with automotive traffic, but they prefer to do so operating on their own facilities". The focus group in this thesis will be male and female cyclists at the age of 20-40 years who are actively cycling in Stuttgart, meaning several times a week and lived at least one year in Stuttgart. In this manner, it will be ensured that the respondents have gattered enough experience with cycling in Stuttgart to provide decent statements. Further, I have chosen this focus group in order eliminate obstacles such as weak fitness level or safety issues. Conversely, they have good riding skills and other competencies in regards to cycling in a city. The focus group shall have an average income (around 30,000 – 50,000 €) in order to eliminate that they have merely monetary reasons to use or not to use a bicycle as mean of transport. A further requirement is that the respondents use the bicycle as a mean of transportation, rather than for sport or leisure. The participants shall also preferably work and live in central Stuttgart (districts Mitte, Süd, Nord, Ost, West) so that their workplace is not more than 15 km away from their home. This is set in order to avoid distance obstacles not to use a bicycle. My argument for this focus group is that I wanted to interview the 'best' cyclist in Stuttgart, with the least individual obstacles to use a bicycle (e.g. age, income, fitness, competencies, distance). I wanted to have a focus group for which using the bicycle is rather easy, and then figure out what challenges they are still facing and emphasis what this would mean for people with higher individual obstacles.

Profession:	project manager
Cycling regularity:	daily
Daily distance:	6 km
Purpose:	commute

“It’s really fun to commute to work and it keeps me fit and sporty”

“My bicycle is one of my favorite items”

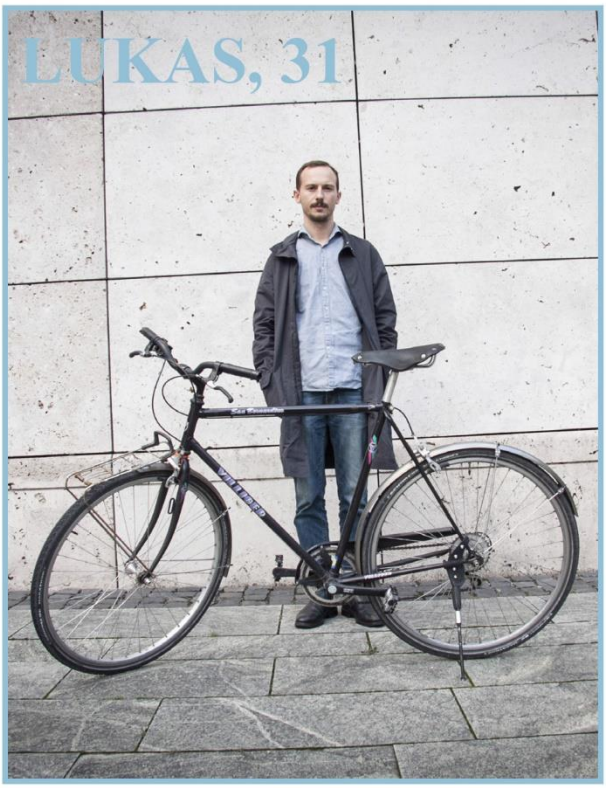
Profession:	interior architect
Cycling regularity:	daily
Daily distance:	8 – 12 km
Purpose:	commute, leisure

Profession:	architect
Cycling regularity:	5-6 times / week
Daily commute:	7 km
Purpose:	commute, meet-up

“I simply love my bicycle, therefore I love to use it”

“I always considered the bicycle as a flexible and fast mode of travel, which gave me a lot of independence”

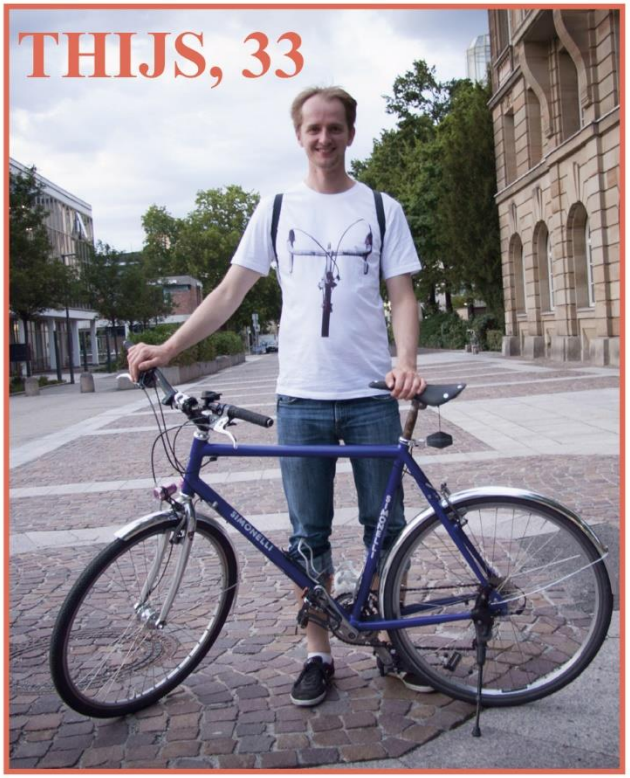
Profession:	teacher
Cycling regularity:	daily
Daily distance:	4 - 12 km
Purpose:	commute, leisure



Profession:	product designer
Cycling regularity:	5 times / week
Daily distance:	10 km
Purpose:	commute

“I was always a fixed gear fan, but that’s over. In Stuttgart, you cycle with gears”

“I cycle because it’s faster… and there is always a chance to meet someone when cycling through the city”



Profession:	mechanical engineer
Cycling regularity:	4-7 times / week
Daily distance:	very different
Purpose:	leisure, meet-up

2.3.2. AUTOETHNOGRAPHY

In autoethnography, the researcher puts itself into the field of study and is a full member of the research group or setting he or she is analyzing. In this regard, the researcher refers to his own experiences, observations, thoughts and discoveries. Autoethnography can provide the analysis with a special dept, since I am part of the focus group and social world I want to study. Cycling practice happens on-site: on the streets and in the city, when it is performed. Therefore, a researcher needs to be on the move to study its full holistic nature (Larsen, 2014). As Larsen, 2014, p. 60) describes it: “Through such mobile, co-present, participatory immersion in the rhythms and flows of movement, researchers examine the sociality and multisensoriality of movement. They also explore how movement is a place-making activity emplaced within a particular environment of specific affordances, cultural codes and media representations”. In this manner the researcher, as part of the studied practice, “has another cultural identity” and purpose to act within the social environment. Unlike other researchers, the autoethnographer must simultaneously document and analyze its action as well as actively engaging in it (Anderson, 2006, p. 380). In this manner, they explore how “movement is a place-making activity” which occurs “within a particular environment of specific affordances, cultural codes and media representations”. By actively participating in the practice itself the researcher can understand the relations to the environments which are multisensorial and not “just social, material and technological”. This holds particularly true for cycling where emotions, fitness, energy, weather and (urban) environment influences the practice in a special manner. In autoethnography, the researcher itself and its participation in the studied area accounts for the empirical material and features as the main protagonist in the analysis. This enables the researcher to write about his own “bodily responses, emotions and feelings” and write in a “passionate and emotional, even literary, fashion” to get the readers intention (Larsen, 2014, p. 60). Ellingson & Ellis, 2008, p. 450) states that autoethnography is a critical “response to the alienating effect on both researchers and audiences of impersonal, passionless abstract claims of truth generated by such research practices and clothed in exclusionary scientific discourse”. So, according to Larsen, 2014, p. 60), the active participation of the ethnographer emphasizes the “embodiment and subjectivity, that than limits it”. However, Anderson claims that with autoethnography there is a risk of self-indulgence and false self-assessment. Hence, he distinguishes between ‘evocative’ and ‘analytical’ ethnography. In analytical autoethnography interviews with and observations of other participants is used in order to avoid the issues of self-indulgence (Larsen, 2014).

As being a cyclist my whole life, living in different cities and studying first ‘infrastructure management’ and afterwards ‘sustainable cities’ I would claim to have certain expertise on the topic. For this report mainly my experience of living and cycling in Stuttgart (around five years) and Copenhagen (one and a half years) will contribute to the autoethnographic approach.

2.3.3. VIDEOS RECORDING AND OBSERVATION

One of the problems with analysing mobility patterns is, that mobility is obviously a practice where subjects are always on the move. It is therefore difficult to capture the experiences, contexts and significances related to mobility and its practitioners. Traditional transport measure instruments like traffic counts or preferences surveys can tell us about the rational push and pull factors of cyclists, but rather less about the non-rational meaning of cycling. In order to understand the experiences and movements of cyclist's researchers try to capture the 'doing' element with ethnographic research. This allows a deeper insight into the situated and contextual nature of the practices (Spinney, 2011).

Videos of mountain bikers filming themselves how they are racing down a hill, doing jumps and wriggle through the woods, can be found numerously on social media channels. Often, they are filmed from a viewer perspective by attaching a camera to the bicycle or helmet of the cyclist. But why are they so popular? Certainly, they are full of speed and action, but the fascinating part is the viewers' perspective which provides the audience with a feeling of being there and it makes the ride perceptible. So why not use this opportunity to analyse (normal) cycling and provide the audience with a feeling of how cycling is experienced in an urban landscape?

According to Spinney (2011) video recording of cyclist, especially if the viewer perspective is used, has the opportunity to contribute to a better analysis and putting the cyclist in context of movement. Video can provide the viewer with some insight what it is like to be there (Spinney, 2011). Studies using this method were among others conducted by Freudendal-Pedersen (2015) who analysed cycling practice in Copenhagen together with the concept of 'structural stories, Spinney (2011) studying cycling and the use of video ethnography or Pink, 2007) who used a walk-with technique to show how people sense their surroundings.

In a similar way as Freudendal-Pedersen (2015) I will use video recording to analyse the materials and competencies of cycling practice in Stuttgart. This shall be done by cycling specific routes which are typical for the urban landscape in Stuttgart and record it with three GoPro cameras attached to my helmet, handlebar and rear of my bicycle. Afterwards the video material will be evaluated, along the following statements or questions.

- What's the existing infrastructure and how does it look like? (Selecting examples).
- What are other materials, like bikes, parking, traffic light?
- Which specific competencies do I need or use while cycling in Stuttgart?
- How does the urban landscape influence my riding skills and style?
- How do other road users react to my presence?

Impressions of the video recording will be placed into the report in context of different traffic situations and issues. Firstly, the goal is to give the reader of this report some experience of how it is perceived to cycle in Stuttgart and secondly to provide me as a researcher with additional data to better analyse the practice of cycling in Stuttgart.

2.3.4. LITERATURE REVIEW

Supplementary to the empirical data which was collected through the above presented methods a variety of data sources and information were used. Sources ranged from scientific literature, including articles and books, to public documents, media articles and documentaries. Scientific articles and books were only used from relevant domains and were selected by considering the criteria of information quality and validity. Public documents were mainly used for obtaining information about the traffic situation, developments and plans in the research area (Stuttgart, Germany). Since, cycling and traffic development is constantly under discussion in society media reports were used to identify trends and different statements.

This review of relevant literature and other data sources was firstly conducted to establish a wider body of knowledge in the research field. This involved mainly social theory including practice theory, various topics related to cycling and city planning and information about different methods and tools I could use for my research. With this in mind, I was able to select the theory and methods I used in my report and narrowing down the research topic.

Afterwards, a deeper research of the selected topics followed this first approach. The goal was to acquire further knowledge about practice theory in general, the practice of cycling and its related aspects, how to use interviews, autoethnography and video recordings as well as my research area, the city of Stuttgart. This provided me with a sufficient understanding of the theory, methods and the research field to undertake a profound analysis of the practice of cycling in Stuttgart. By analysing the state of the art in the respective research field I could verify the credibility of my master thesis and the contribution to the research problem.

3. ANALYSIS

3.1. MATERIALS

The following part will look at the materials for the practice of cycling in Stuttgart. Based on the assumption that cycling infrastructure needs always be seen in the context of a city (or better in view of the citizens), the infrastructure shall be analysed based on qualitative interviews with cyclists from Stuttgart, video observation of Stuttgart but also knowledge from literature research.

3.1.1. THE CITY OF STUTTGART

Stuttgart is the state capital of Baden-Württemberg in South-West Germany. Baden-Württemberg is one of the richest states in Germany, and so is the city of Stuttgart. Many well-known companies are located in the area such as Daimler, Bosch, Porsche or Siemens. The city is spread over an area of 207 km^2 and forms with 590,000 citizens the centre of a surrounding area of nearly 3 million people. The citys' population density is with 2,850 citizens per km^2 higher than in most other German cities. The inner city is situated in a valley basin and is surrounded by hills, which open up in north-east direction where the river Neckar builds a valley. This topography has maximal altitude difference of 350 m. The region is characterised by agriculture, especially vine and fruit growing, industrial areas from larger companies and urban areas. The river Neckar is function as a federal waterway, which influences the area around and lead to the industrialization of the riverbank.

The city is linked to Germany and the rest of the World by a larger airport and highways. Moreover, various main roads are leading into the inner city which were further extended especially in the 1960s in line with the trend of car-friendly city planning at that time. Streets like the *Hauptstätter-Straße* or *Theodor-Heuss-Straße* literally splitting the inner city. Beginning from the 1970s light rail lines and pedestrian areas (in the inner city) were built as well as tunnels for private motorised traffic, trains and light rails. The public transport systems consist of 16 light rail lines, 56 bus lines and 6 tram lines and has a total route length of 1,162 km (Landeshauptstadt Stuttgart, 2015). Since 1990 Stuttgart is developing its cycling network. According to the city, the current network consists of 194 km cycling tracks (Landeshauptstadt Stuttgart, 2019c).

A Germany-wide study from 2017, commissioned by the Federal Ministry of Transport and Digital Infrastructure of Germany, examined the mobility development and patterns in cities and rural areas and, besides others, a study was also conducted in the city of Stuttgart. One part of the study measured the satisfaction of people with the traffic situation and offers in the metropolitan area and the city of Stuttgart. Recognizable is a clear distinction between the metropolitan area and the city itself. Looking first on the car as a transport mode: in the metropolitan area 63% agree that the traffic situation for cars is good to very good, whereas

only 33% would agree to the same statement for the city of Stuttgart. A similar picture is seen with the traffic situation for bicycles: here, half of the people say that the traffic situation is good to very good in the metropolitan area but only 31% think the same about the city of Stuttgart. Only the public transportation receives a better rating in the city of Stuttgart (57% good/very good) than in the metropolitan area (41% good/very good) and walking ranges between 73% (city) to 80% (metropolitan area) satisfaction (BMVI & Infas, 2019).

When looking at the modal split of Stuttgart, the place of cycling in Stuttgart becomes clear: from all journeys of citizens in Stuttgart 45% are done by car, 24% with public transport, 26% by foot and only 5% by bicycle (Landeshauptstadt Stuttgart, 2015).

The topography is an often-claimed issue, why Stuttgart's share of cyclists is weak (Landeshauptstadt Stuttgart, 2010). However, most of my respondent did not see the altitude as a reason not to use a bicycle and for them "the thing with the hills is just an excuse and easy to cope with. You just need some gears and cycle a bit slower or an e-bike" (Otto, 25.07.19). More likely, a reason why people don't use the bicycle is "that there are so many cars and people don't want to cycle because it's too nerve-racking and emotional exhausting for them" (Patricia, 25.07.19). And in fact, Stuttgart is rated as the most dangerous city to cycle in Germany with the highest accidents risk based on number of citizens (Greenpeace e.V. & Marion Tiemann, 2018).

Cyclists in Stuttgart don't see themselves acknowledge by the city's municipality, which is notable by looking at the several activist groups (Radentscheid Stuttgart, Zweirat, Stuttgarter Radforum, Stadtlücken), media reports or the monthly critical mass movements (Högerle *et al.*, 2017) as well as in the statements of my interviewees:

> "There is this constant struggling for power between all road users. Everyone wants to protect his space and feels right about it. But the cyclists actually have no space which belongs to them and where they can cycle. The car driver things he's the king of the road, the pedestrians have their pavement and the cyclist is somehow everywhere out of place" (Juliane, 05.08.19).

3.1.2. THE BICYCLES OF STUTTGART

In Stuttgart almost 70% of all households have one or more bicycles available and also about the same percentage of persons in Stuttgart own a bicycle, among students it is 87%. In comparison, 52% of all households in Stuttgart own a car, which is slightly above average car ownership rate in Germany, and for 66% a car is always accessible. However, the bicycle ownership rate in Stuttgart shows that still one third of the citizens do not own a bicycle. We can also see a correlation between bicycle ownership and economic status: Whereas 78% of people with high income own a bicycle this number falls to 63% for people with low to medium income (BMVI & Infas, 2018, 2019).

Nevertheless, from my conducted interviews most respondents said that in their opinion it is rather easy to get access to a bicycle, even if your financial situation is weak. But, it needs to be noted that all of them have a medium to high income.

> "It's rather easy to get a bike. I mean a private bike you have to buy, but there are also rental bikes" (Otto, 25.07.19).
>
> "I think it's easy to get a bicycle in Stuttgart, you have rental bikes and to own one yourself there are enough platforms where you can buy one. If you don't care that much about the look, you can get a good and affordable bicycle" (Franziska, 14.08.19).

Surprisingly, four out of six respondents received their bicycle as a gift, most of them because the previous owner did not use it anymore. All my interviewees ride rather cheaper bicycles (50€ – 200€) and where mostly consistent with the statement, that it is important to have a good bicycle, meaning a well-functioning bicycle with gears and good breaks, especially to climb the hills, because "otherwise it's not fun" (Franziska, 14.08.2019). But for them this does not necessarily mean that it must be expensive.

"I simply love my bicycle, so I love to use it. It makes me somehow happy"

(Patricia, 25.07.19)

The respondents had mostly some sort of personal bonding with their bicycle. So, nevertheless they used the bicycle more for practical reasons ("I use my bicycle (…) to get from A to B." (Patricia, 31.07.19). However, they did not look at it as a mere object, they rather start telling stories about it or enthusing how much they like it.

In Stuttgart you can find all sorts of bicycles, it is not classified to a certain type of bicycles like you may find in Amsterdam or Copenhagen, where most people use upright, heavy, one-gear bicycles (Larsen, 2017). In Stuttgart you find the elderly people with electric bicycles, the students with chic old racing bikes, the mountain bikers or downhill bikes, the family with cargo bikes, the practical's with trekking bikes, the hardcore riders with fixed gear bikes, the typical MAMIL (middle aged man in Lycra) with a pro racing bike or even the cycling activists on a tall bike built by themselves.

The type and quality of a bicycle you 'need' depends on where you are live and work, as one interviewee claims:

> "If you are living and working in the 'Kessel' (valley basin, inner city), a simple bike with 3 gears is enough. But commuters need a proper road bike or electrical support, because you can't avoid the hills" (Thijs, 31.07.19).

However, still it is noteable that there is a trend towards older chic racing bikes, especially beneath students, whereas the plus 40 generation uses more functional trekking bikes or e-bikes (bicycle with electric support). In the opinion of one respondent "there are a lot of beautiful bicycles in Stuttgart". And he thinks that for many Stuttgarter's it is important to "show what you have [and] many people want a bicycle with a statement" (Thijs, 31.07.19).

E-bikes follow the recent trend of electrification of the mobility sector. In 2017 e-bikes were owned by only 5% of Stuttgart citizens (BMVI & Infas, 2018). However, when driving through

the city you sense a different image. It feels like there are e-bikes everywhere, you see old lady's climbing the hills like nothing, sporty mountain bikers with electric support or parents with their kids in an electric cargo bike. The electric bicycle market is actually booming at the moment (Stuttgarter Zeitung, 2018). In Stuttgart more people own an e-bike compared to other major cities in Germany and its used more often from elderly people. Notable is as well the greater share of e-bikes in households with high income (BMVI & Infas, 2019). For Stuttgart e-bikes can really make a difference, as they have the ability to cope easily with the altitude in Stuttgart and to foster cycling for all sorts of fitness level. For one interviewee "e-bikes are the best thing that could happen to Stuttgart" (Thijs, 31.07.19). However, there is also a rising concern about it, as they drive much faster than usual bikes and "seems to form a separate group of cyclists". Some respondent sees a minor conflict between regular bikes and electric bikes, due to the different speed level and they are "feeling kind of scared when e-bikes overtake" them (Lukas, 19.08.19).

Except of e-bikes, cargo bikes became more popular in Stuttgart, most likely due to a subsidy program for cargo bikes from the city of Stuttgart first launched in 2018. For the first round of grant funds around 300 applications were received. Also, in 2019 a new funding of 500,000 € was allocated. However, only families with at least one child could apply, the maximum funding per cargo bike is 1,700 € (Landeshauptstadt Stuttgart, 2019a; Stuttgarter Zeitung, 2019). Cargo bikes gain attention from all road users when they pass by and "its possible for everyone to witness people carrying their children or groceries in it". This contributes to their visibility in city traffic "and it also creates a visibility for other (normal) cyclists even among people who don't cycle" (Thijs, 31.07.19)

3.1.3. THE PATHS OF STUTTGART

To better understand the issue we have to take a look at the cityscape, topography, surrounding area and the shape of infrastructure. Stuttgart consists of 23 city districts: the five districts Mitte, Nord, Süd, Ost, West build the former city and are located in the valley basin which opens up to the north-east. The other 18 districts were developed originally as self-contained settlements but were integrated into the city boarders as Stuttgart has expanded over time. Additionally, Stuttgart forms the urban, industrial and economic centre of a greater metropolitan area. Consequently, this causes much traffic from commuting.

Figure 2. illustrate the basic city structure of Stuttgart. We see that the city has a concentric structure with the biggest districts in the centre surrounded by smaller settlements. In such city structures, the infrastructure is usually shaped towards the centre, like a star with multiple ring roads. Due to the topographic situation and the location of the main city the in valley basin, building a ring road around the city centre was not feasible, unlike as in other cities with a concentric settlement expansion. To master the traffic flow city planners in the 60s saw no other option than building huge highways crossing the middle of the city, as it was the spirit in that time to design cities to favour automobile traffic (Landeshauptstadt Stuttgart, 2015). Two highways (A8, A81), passing the city's boarders in the west and

south, from where main roads are leading into the city centre as well as from the Neckar valley. The subway is mainly in tunnels and the railways are coming from north-west and south-east into a terminus station. This creates a bottleneck right in the middle of the city where all transport infrastructure must pass through.

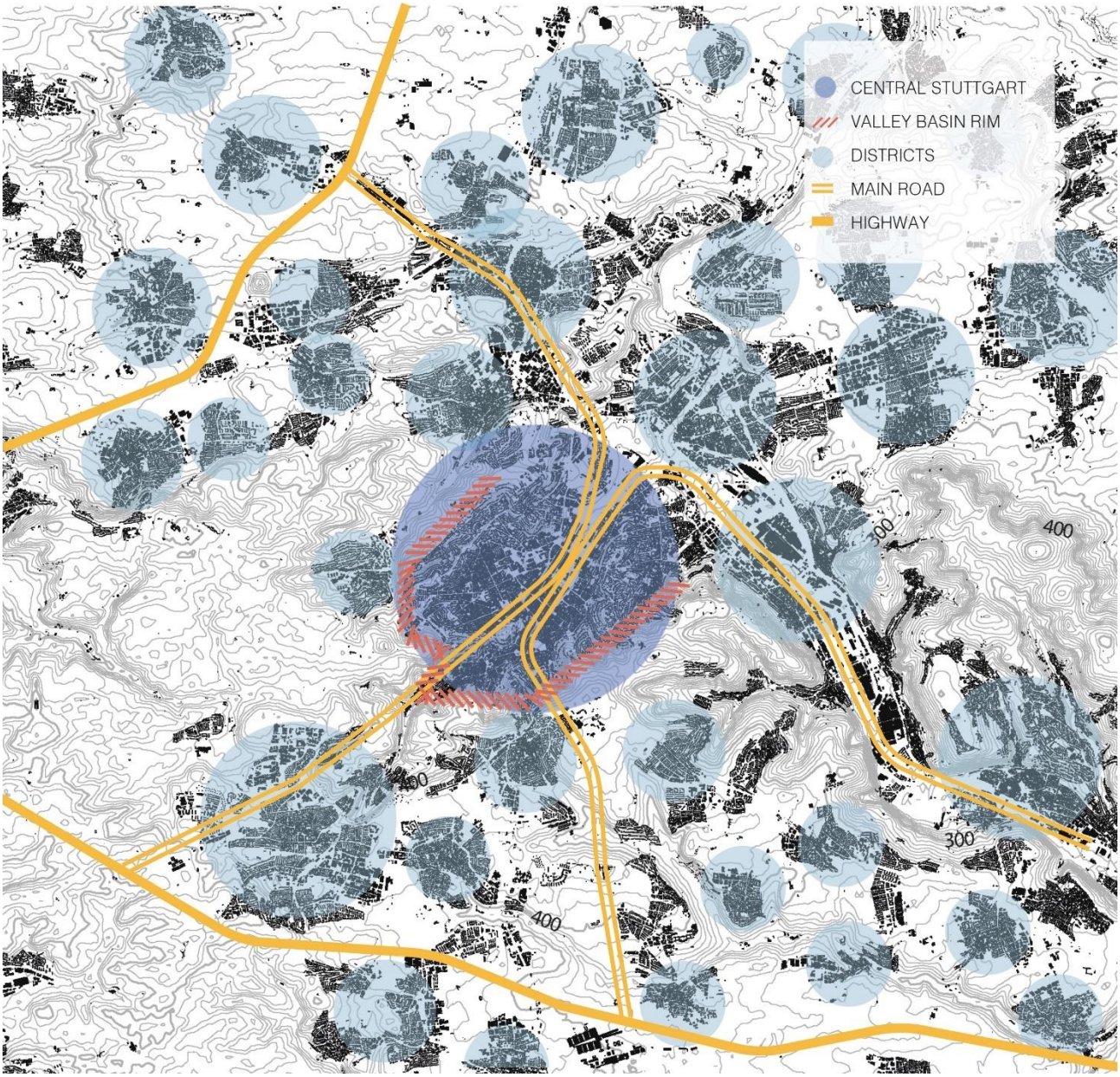


Figure 2. City structure of Stuttgart (own illustration)

Obviously, space is a scarce resource in the city centre and is underlying as the (wicked) problem to build a prober infrastructure for every transport mode. However, if you cycle along a main road with three lanes in each direction but only a 1,5 – 2 m wide pavement you come to the conclusion that space is not the problem, rather the distribution of space between the different transport modes. For one respondent the “redistribution of space (…) [and] to create space, where everyone feels comfortable” was the most important thing city

planners should change (Thijs, 31.07.19). When major developments in the 60s occured, cycling infrastructure tended to be forgotten in the city planner's mindset and some would argue that this keeps on going til today.

> "A lot of people don't have a connection to cycling. Stuttgart is a city for cars and that was mediated for many years. For many people the bicycle is just something for leisure activity, but there are also people for whom the bicycle is a transport mode. However, Stuttgart will not turn into a bicycle city in the near future, which is mainly due to its dominant infrastructure for cars" (Lukas, 19.08.19).

This quote resembles the view of all my respondents and indicates that the problem with space is rather a problem of distribution and favouring than just the lack of space. When cycling in Stuttgart, the domination of cars and their dedicated infrastructure is obvious. You often find yourself surrounded by cars while waiting on a traffic island for green light, wriggle your way through parked cars on the one side and heavy traffic on big roads on the other or searching for a way to cross the street.

CYCLING PLANS AND POLITICS

To investigate what was done in recent years to support cycling as a competitive transport mode and to provide cyclist with more room, the following part will provide a short summary of plans, concepts and initiatives which have been carried out. The municipality of Stuttgart has several plans to promote cycling and to build a decent cycling infrastructure. The most important one is the 'bicycle traffic concept' published in 2010 by the municipality of Stuttgart with the objective to increase the share of cyclists to 12% in a medium-term and 20% in a long-term perspective. Different scenarios, with different aims about the share of cyclists were developed. The minimum objective of the bicycle concept of 2010 was to have a 10% share of cyclists by 2015 and 12% by 2020 (Landeshauptstadt Stuttgart, 2010). By looking at the current (from 2017) share of 7% its very clear that these targets were not achieved (BMVI & Infas, 2019). The core of the bicycle traffic concept builds the development of the 'main cycle route network' (ger. Hauptradroutennetz), the following Figure 3. shows a section of the network. It shall provide the cyclist with a direct, safe and comfortable cycle path. The network concept will help to develop required actions and will be considered in future city planning initiatives. The cycling network is divided into two hierarchy orders: the first order (red) intends to connect high density districts with supply centres and consists of 140 km cycle paths, the second order (green) includes further districts into the network and consists of 100 km cycle paths, and additionally some supplement routes (yellow) are identified. The network consists of 12 main cycle routes of the first order (Landeshauptstadt Stuttgart, 2010). So far, only one route is considered as finished. However, many cyclists still complain about the quality, directness, lacking consistency and safety of the so called 'main cycle route 1' (ger. Hauptradroute 1), which leads from Vahingen in the south-west through the city centre to Bad Cannstatt in the north-east. But this is not to say that other routes of the first order do not exist, rather do they partly provide a cycling infrastructure but are not considered as a coherent route. In the

definition of coherent being ‘one type of cycle path with the same quality along the whole route’ the ‘main cycle route 1’ is also not notable as a coherent route, it is rather a connected route with different types and qualities of cycle paths.

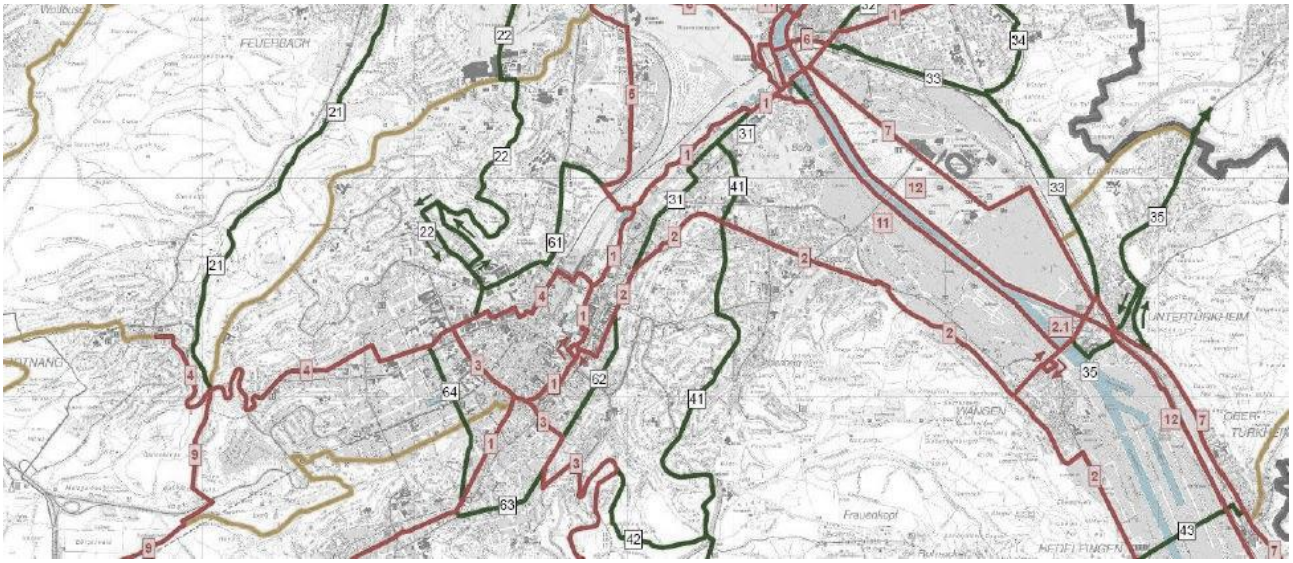


Figure 3: Main cycle route network, Stuttgart (Landeshauptstadt Stuttgart, 2010)

Another important tool in Stuttgarts city development is the ‘traffic development concept 2030’ (ger. Verkehrsentwicklungskonzept 2030) published by the municipality in 2015. It includes a framework for actions and strategies for the traffic development in Stuttgart over the next 20 years and was developed from 2005 to 2014. In contrast to the ‘bicycle traffic concept’ covers the ‘traffic development concept 2030’ all modes of transportation. Moreover, does it pursue an integrated approach, which considers traffic in the context of the environment, urban design and compatibility for the city. The last published holistic traffic concept for Stuttgart was the ‘general traffic plan’ from 1975 (ger. Generalverkehrsplan), which handled mainly the construction of the subway and bypasses.

The concept 2030 deals with the current traffic situation, future developments (environment, settlement, demographic change i.a.), developments in traffic planning such as car-sharing and electromobility, planning perspectives as well as actions for the various transport modes. Hence, besides automobile and public transportation, walking and logistics, the development of cycling is being considered. In regard to promote cycling the ‘traffic development concept 2030’ entails large parts of the ‘bicycle traffic concept’, as well as the same scenarios, targets and framework for action. This implies that since the publishing of the ‘bicycle traffic concept’ in 2010 not much further development had taken place (Landeshauptstadt Stuttgart, 2015).

Since, politics and the municipality worked quite slowly on the topic of cycling, a citizen initiative awoke in 2018 to crank up the development of cycling infrastructure in Stuttgart, called *Radentscheid Stuttgart* (engl. cycling decision, cycling referendum). To this point there are so far nine similar initiatives in Germany trying to force municipalities to promote

cycling (Radentscheid Stuttgart, 2019). The legal background is the democratic right for a public petition, which will lead to a local referendum, usually about 7% of all citizens support the petition and proof it with their signature. If these requirements are met, a local referendum will take place where all citizens are allowed to vote for or against the initiative (Beteiligungsportal BaWü, 2019). In the case of Stuttgart, the municipality demanded that the *Radentscheid* initiative has to collect 20.000 signatures, in the end they collected over 35.000. The team of *Radentscheid* formulated eleven targets or actions to develop a cycling friendly city. If the citizens of Stuttgart vote for the referendum, the municipality would be forced to put the actions into practice. Although, the *Radentscheid* initiative collected the required number of supporters, the referendum was declined, as an official assessment determined that the referendum was not legally feasible due to formalities (Radentscheid Stuttgart, 2019).

Shortly after this backlash for the *Radentscheid*, the major of Stuttgart announced that he wants to make Stuttgart a "real bicycle city" and that the city supports the targets of the initiative (Stuttgarter Nachrichten, 2019). Thereupon, a consortium of different parties submitted a petition to promote cycling which entailed most of the targets from the petition by the *Radentscheid.* In February 2019 the municipal council of Stuttgart consent to this petition. The most decisive factors are the following:

- Increase of budget to promote cycling to 20€ per citizens for the next two decades. In the long-term budget shall rise to 40€ per citizen.
- Establishing new position to promote cycling
- Share of cyclists at the modal split shall increase to 25% by 2030
- The construction of the main cycle route network shall be finished by 2030
- In all city neighborhood shall be at least one cycle street
- Further development of safe and protected parking spaces for cyclists
- Yearly monitoring to document the state of the art of development and public acceptance
- Quick implementation of safe and convenient cycling infrastructure at every crossing (Gemeinderat Stuttgart, 2019)

These measures look good on paper, however the future development will show how serious the municipality is with undertaking real action and development of a bicycle friendly Stuttgart. To increase the share of cyclists to 25% in about 10 years is a challenging goal, especially if you consider that the share of cyclist stayed more or less at the same level since 1995 (VVS, 2010).

CYCLE TRACK / PAVEMENT (SHARED)
117km

CYCLE LANE
33km

ADVISORY CYCLE LANE
20km

CYCLE TRACK / PAVEMENT (SEPARATED)
15km

CYCLE TRACK
5km

CYCLINGSTREETS
1km

CYCLING INFRASTRUCTURE

As said before, the city states that the cycling network consist of 194 km cycling paths. However, as the following Figure 4. will show the cycling infrastructure is not consistent and has different qualities. Most of the cycling infrastructure consists of shared pavements for cyclists and pedestrians (length 117 km), which are separated by curb from the road. Whether you can characterize this as a cycling path or not will be argued at a later point. The second longest type are cycle lanes followed by advisory cycle lanes which accounts together for 53 km of all cycle paths. Both are at the same level as the road, are marked by a (mostly white) line and go along next to the motorised traffic. Cycling lanes are often a bit wider (1,5 m – 2,0 m) and are marked by a solid line, which indicates that cars are not allowed to cross. In contrast, advisory cycle lanes are marked by a dashed line, so cars are allowed to cross and drive on the cycle lane. 15 km of the cycling infrastructure are cycle tracks which are separated from the road by a curb and separated by a solid line from the pavement which is however on the same level. Cycle tracks which are separated by the road completely or by a curb and are only dedicated for cyclist make up 5 km of all cycle paths. The often-discussed cycling streets in Stuttgart (*Eberhardstraße, Tübingerstraße*) only accounts for 1km of the cycling network.

Figure 4. Type and length of cycle paths in Stuttgart (own illustration, based on (Landeshauptstadt Stuttgart, 2019c))

The different qualities and types of the cycling network make it hard for a cyclist to rely on the infrastructure and you often find yourself clueless where you are actually allowed to cycle. From my own experience I know that it took me a while to figure out the best ways around the city, in order to find a decent route where cycling is pleasant, fast and in some ways even possible. The lack in consistency is as well an often-claimed issue from my respondents. They did, like me, struggle to find a decent route and saw it as an important competence to know your way around.

> "If you just start cycling in Stuttgart (without a specific route in mind), you will quickly lose fun, because you always come to a point where you don't know where you are able cycle" (Thijs, 31.07.19).

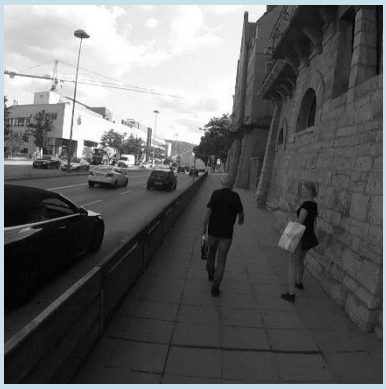
When I asked my interviewees about what they see as the perfect cycle path many said that "the best would be to have a consistent bicycle path, where I know that I am allowed to cycle" or that it is crucial "to provide every road user with its own space. Cyclist need a protected bike lane which is elevated from the street level and separated from pedestrians" (Juliane, 05.08.19). The latter argument is specifically important when considering that most of the cycle paths (60%) are shared pavements used by cyclists and pedestrians at the same time. Therefore, this type of cycle path shall be reflected upon more deeply and discussed in the following part.

3.1.4. MATERIALS AND CYLISTS

The following part shall analyse how the materials for the practice of cycling in Stuttgart interfere with the other elements connected to cycling. This shall be done by presenting different situation I captured while I was recording a bicycle ride through Stuttgart with three GoPro cameras attached to my helmet, handlebar and rear of my bicycle. In this manner I could analyse the infrastructure, behaviour of cyclists and other road users and identify issues while cycling. I split this part in three cases with three situations respectively. First, I describe conflicts with pedestrians, secondly conflicts with cars and their respective infrastructure and lastly the issue of space and prioritization of transport modes.

CASE 1: SHARING IS NOT ALWAYS CARING

Before the analysis of the video material I did not consciously realized how often conflicts with pedestrians happen and hinder your cycle flow. Certainly, I was aware of the issue but it was a rather smaller disturbance. There are three types of conflict to identify which correlates with the corresponding type of infrastructure.



Situation 1. The picture shows a typical situation where pedestrians and cyclists use the same pavement, but the path serves simply not enough space that the two user groups can pass each other without conflict. Cyclists need to slow down and pedestrians have to give way to the cyclists. That's neither a pleasant situation for the cyclist nor for the pedestrian. Conflicts are predetermined as none of the users have the ability to switch to another space.

Situation 2. In this traffic situation the given infrastructure would serve enough space for pedestrians and cyclists. However, the space is designed for shared use. The issue here is two-fold: firstly, no physical separation was built, therefore the user tends to assume that he's allowed to use the whole space. Secondly, pedestrians are not aware of the presence of cyclists and have therefore no cause why they should not use the whole space. The street design influences the behaviour of pedestrians insofar that they have no intention why they should pay attention to other road users.

Situation 3. This situation shows a clear designed infrastructure, were the cycle track and the pavement are separated. Nevertheless, pedestrians use the cycle track as well, also when they see a cyclist approaching. This is rather a behavioural or awareness issues than an issues of the infrastructure itself. Since cycling only accounts for 5% of the model split, cyclists and their according infrastructure is not visible for most people. As a result, they do not sense that this path is dedicated for cyclists only.

CASE 2: BETWEEN CARS AND SIGNALS

Cycling through Stuttgart the dominance of cars is clearly noticeable. In many occasions pedestrians and cyclists have to step back and make space for cars. The consequence is that cyclists often have to stop at traffic light with long waiting times. Following, three situations will be described tackling this issue.

Situation 1. What we can see on the picture is a classic situation where pedestrians and cyclists must subordinate to the predominant infrastructure of cars. The street needs to be crossed in two phases and pedestrians and cyclists need to wait on a small traffic island in between two four-lane streets on each side. This is not an attractive infrastructure for pedestrians and cyclists, and it creates a feeling of being cramped between cars. Moreover, can it be dangerous especially for kids.

Situation 2. On the picture we see another example of dominant infrastructure for cars. The situation is recorded with a camera attached to the back of the bicycle. As a cyclist you have the possibility to cycle on the pavement (which is quite inconvenient at this place) or cycle on the road. Drivers can choose from one of the three lanes in each direction. As a confident cyclist I personally have no problem cycling in front and between cars, however, this applies for only the smaller group of confidents cyclists and discourage others to use the bicycle.

Situation 3. Here, we see a section of the 33 km network of cycle lanes. Cyclists have their own designated space and drivers mostly respect that, however parked cars on the cycle lane occur from time to time. Even though cyclists have their own lane they must cycle in between driving cars on the left and parked cars on the right sight. The cycle lane is right in the door zone of the parked car and conflicts may occur when drivers alight their car. Cyclist need to pay attention on the passing, crossing and parking cars, which causes mental stress. Therefore, even though cyclists have their own lane, cycling here is not convenient.

CASE 3: DISTRUBUTION OF (COMMON) SPACE

The battle of space in cities is one of the most problematic, however as already argued this is not always due to scarcity of space, rather is it an issue of distribution. The design of the urban environment has direct influence on how we sense a city.

Situation 1. At this situation the cycle lane just ends without a further guidance where cyclist should continue. This interruption hinders the cycling flow and cyclists need to carefully cycle either on the street or on the pavement. Constantly being interrupted is an issue my respondents often claimed. Further, this creates the image that cycling infrastructure is only built where it fits and as a cyclist you do not feel encouraged.

Situation 2. The picture shows a typical street you find in the central districts of Stuttgart, here in S-West. Both sides of the streets are lined with parked cars. Mostly traffic is calm in this type of streets and cycling is pleasurable. However, the parked cars hinder the visibility of pedestrians crossing the street or cars drive out from a garage. Still if we observe the street the clear main transport mode are cars and cyclist feel like being a guest on the street.

Situation 3. The picture shows a section of the 5 km network of cycle tracks, which are completely separated from the road (by a curb) and the pavement. This is a good example of clearly separated infrastructure which makes cycling here is pleasurable, relaxing and flowing. However, the cyclists need to pay attention on the oncoming traffic since it is two-way track. Due to the dedication only for cyclists encouragement is created.

The previous situations are examples how the elements related to the practice of cycling interact with each other and influence the practice itself.

CASE 1. shows that if the material (infrastructure) to perform the practice of cycling is weak, it hinders the practitioner to perform the practice properly and causes conflicts with pedestrians. That in turn leads to effects on the image of cyclists or inversely how cyclists sense pedestrians. Such an infrastructure intensifies the tension between the road users and leads to a negative social mindset and views, like the media report mentioned in the introduction. One respondent expresses his relationship with pedestrians:

> "I often have the feeling that pedestrian don't pay much attention on the surrounding, I don't think that this is the case for example in the Netherlands. As they are the weakest mode, they think that they must use the whole space. I would say I have more trouble with pedestrians than with cars" (Lukas, 19.08.19).

CASE 2. Has show the domination of cars in the urban landscape. Merely the infrastructure design already influence how we sense the city. It is not really an environment where pedestrians and cyclists are feeling welcome and appreciated. This causes that people sense the city as being made for cars and accordingly using cars. In comparison I want to exemplify this with a story from Copenhagen:

> When I moved their I observed that every international student who came to Copenhagen immediately started to use the bicycle as a transport mode. Most of them did not have used the bicycle often before, however they had the basic competencies to cycle. But it just came naturally that they started to cycle. This might have various reasons, but one is clearly the bicycle-friendly and environment which invites people to use the bicycle.

CASE 3. The distribution of space is one of the major issues is Stuttgart. Urban planners need to rethink the prioritization of automotive traffic. When I ask my respondent about their requirements most of them demanded and designated area just for cyclists. The following statements express the need of space in the most suitable way:

> "Cyclists would need more space and separated cycle tracks" (Otto). "You must build visible cycling infrastructure" (Thijs). "I want to have a cycle track where I don't have to worry about cars and where pedestrians also know that there is a cycle track" (Franziska). "The most important thing to change in Stuttgart would be to provide every road user with its own space. Cyclist need a protected bike lane which is elevated from the street level and separated from pedestrians" (Juliane, 05.08.19).

3.2. COMPETENCIES

In this part we want to look at the competencies people need and learn in the context of cycling in Stuttgart. Most findings will be based on the conducted interviews, knowledge from literature will be added supplementary as well as my own experiences from cycling in Stuttgart and Copenhagen. In a first step, I want to analyze how the social and familial background influences the behaviour, use and attitude to cycling. Where, when and how people learn to cycle are questions to be answered and how this is supported by the state or municipality. Afterwards we will look on the fitness level and physical requirements needed to cycle in Stuttgart. Further the focus will be set on the rules and regulations for cycling in Stuttgart and the handling and compliances of such. Also, it shall be reflected upon what special competencies you need to cycle in Stuttgart. The last part concludes how materials like the infrastructure or type of bicycle influence the required competencies.

3.2.1. HOW TO BECOME A CYCLIST

Let's start at the very beginning: most people learn to cycle when they are two to four years old. So, in the time they enter or are in kindergarten, that means before they go to school, they have already some experience and practice in cycling. Most of my respondents did actually remember very well when and how they learned to cycle. All of them learned it from their parents or some other family member and mostly on some quite road in front of their house, in the backyard or on a remote field track outside town. When the respondents told me about how they learned to cycle I noticed that for half of them it was a happy and joyful experience, whereas the other half talked more about how often they fell off the bike and got slightly injured, however that did not prevent them to practice until they got it. Most used the bicycle in early days obviously for leisure like, cycling around with the neighbor's kids, going to the local swimming pool or making small tours with their parents. However, two respondents already "commuted" to kindergarten accompanied by their parents. In the early years, young cyclists learn rules and how to behave mostly by copying what their parents do or say. Learning the basic traffic rules and behaviour as a kid can be compared to other rules and forms of behavior, like table manners. For example, I still remember that my dad told me to keep the same distance to the pavement as the width of the drains at the side, and I still do this today. As a kid, you learn already the basic traffic rules: stop at red light, cycle on the side of the road or on the pavement, cycle in a row and watch out if you cross the street. However, most kids do not cycle in traffic (alone) until they go to school, as it would be too dangerous for them. But of course, one reason is their immature physical ability compared to an adult. Kids have a narrowed field of view, limited directional hearing, a none fully developed sense of balance, they cannot estimate distances properly and other physical constraints as their bodies are still developing.

> "We always cycled behind my dad and my mom was at the end of the line. When I went to school, we had class with the police and practiced at the traffic training centre"
>
> (Otto, 25.07.2019).

When the young cyclists get older, they often start cycling more frequently in traffic and might also use the bicycle to go to school. In the region of Baden-Württemberg, and in similar ways in whole Germany, all pupils must undertake a cycling proficiency training in the fourth grade in primary school, in order to prepare young road users to the traffic situation they face as a cyclist. The teaching is carried out in cooperation of the local traffic police and the education authority. At first, kids learn in class the for them most important traffic rules and train to recognize risks in traffic situation. Next, the young cyclists train together with the police at their traffic training centre how to handle the bicycle and how to cycle safe and cautious. The new knowledge will be put into practice outside the training field in real traffic situations afterwards. An exam will form the final part of the class and acknowledge that the young cyclists are ready to hit the streets (Landeshauptstadt Stuttgart, 2019b).

Wrapping this up we can argue, that after the fourth grade most children are trained cyclist who can handle their bicycle and also know how to behave in traffic. Looking back at the availability of bicycles among students, we saw that 87% own a bicycle by themselves, but only 11% use it on a daily basis, 39% even state that they never or almost never use it (BMVI & Infas, 2018).

"For me it was one of the greatest things to cycle with my friends to school"

(Thijs, 31.07.2019)

From my own experience and on the basis of my conducted interviews, I assume that especially children have actually much pleasure performing the practice of cycling. So why is there just a small proportion using the bicycle to ride to school?

A certain kind of behaviour is the result of continues social experiences during which a person learns the concept and meaning of the behaviour, as well as judging and perceiving different situations in which an activity or practice is possible and desirable. This means that the motivation of participating in an activity is built up on a leaning process of how to engage in it, which is influenced by the social environment we interact with (Becker, 1953). Therefore, my assumption is, that mobility behaviour (e.g. use of car vs. us of bicycle) is highly influenced by habits, attitude and reproduction of how you are accustomed to move in traffic. What I mean is for example: if your parents drive you to school every morning, it is more likely that you get used to take the car and will acquire this habit later on. Considering only myself, I could justify this assumption. My parents did not have a car for many years, I cycled to school since I remember, we used the train to go on vacation or elsewhere and if needed my parents got a sharing car. And my mobility behaviour is pretty much the same ever since. But it has to be considered that I grow up in a smaller town, close to the city centre, train station, school or other facilities and this mobility behaviour was easy to handle.

To get further evidence about my assumption I asked my interviewees about the mobility behaviour of their parents durring the time they (the interviewees) went to school. The statements where mixed: three respondents (all male) stated that their parents used the bicycle on a daily basis, for example to commute or do grocery shopping. This group of

respondents also used the bicycle for their daily life, such as going to school or to a sport club and they pretty much shave the same mobility behaviour today. For this group, using the bicycle as a transport mode comes naturally, they used it their whole life and it is not something they needed to get used to or learn when they were grown up. In case of the other three respondents (all female) the picture was a bit different. One stated that their parent never used the bicycle, however she did cycle around with her siblings but went to school by bus as it was too far to cycle. The other two said that they used the bicycle together with their parents for leisure activity but not in daily life. One went to school by bus as well, as it was too far, the other walked as it was so near. What's worth mentioning is that the first group lived in a city or nearby, whereas the second group grew up in smaller villages.

The knowledge I gathered from my respondents does not certainly proof that there is a correlation between mobility habits you grow up with and the mobility habit of a person today. However, there is tendency that for people who used the bicycle as a child, using it today is easier and comes more naturally. Speaking for myself, if I have to travel somewhere further it is the simplest thing to cycle to the train station, take my bike with me and travel where I want to go, whereas for others, who are more used to taking the car, this would be a whole adventure. Therefore, I would argue that the habits we have influence much our way we move.

3.2.2. SKILLS TO CYCLE STUTTGART

In order to perform the practice of cycling one need some basic skills which are universal, no matter where to cycle. These are at first the ability to ride a bicycle, meaning keeping balance and pedal, additionally breaking and shifting gears is good knowledge. In order to cycle in traffic knowing the rules and how to behave in different situations is necessary. There are many other competencies one need in order to have a pleasant cycling experience. However, this might differ from place to place, as there are various rules and regulations, challenges and conditions which are unique to a specific country, region, area, city or town. In the context of Copenhagen for example, when I started cycling there, I had to learn that you make a left turn in two phases: first, you cross the street straight on, than you stop at the crossing, wait until the traffic light turns green and go straight again. Or another unique thing is that when you want to stop you raise your hand. If I do the same in Stuttgart, no one would understand what I intend to signalize them. But apparently, in Copenhagen they need this extras sign to better organize the cycling traffic. I also needed to get used to cycle in a bulk of 20 or more cyclists. The other way around, would a cyclist from Copenhagen probably be totally overstrained to cope with traffic in Stuttgart.

The following part will reflect upon some competencies which are, to a certain extent, unique in the context of Stuttgart. It will further discuss, how these competencies are affected and shaped by the environment the cyclists perform the practice.

FITNESS LEVEL AND THE HILLS

"The thing with the hills is just an excuse and easy to cope with. You just need some gears and cycle a bit slower or an e-bike"

(Otto, 25.07.19).

Cycling is first of all a physical activity, where some basic competencies are required in order to perform the practice.. Keeping balance, pedal, breaking and shifting gears are the most basic. Unlike in other cities which are flat and do not demand a high fitness level, like Copenhagen for instance (Larsen, 2017), Stuttgart has a partly hilly city scape and is therefore physical more challenging. However, most people in Stuttgart live in the centre which is mostly flat. As in other regions of Germany the demographic change is notable and for elderly people cycling is especially demanding due to regressing in body fitness. For my respondents, coping with the hills is not a big issue, they considered that the problem is not the fitness level, it rather depends on the bicycle (or material) you use. But some anyway try to avoid climbing a hill when possible, in order not to get exhausted too much and turn up sweaty at their destination. In Stuttgart 62% of all travelled distances (with any mode) are less than 5 km long, so to say an easy doable distance by bicycle, almost 80% of travelled ways are under 10 km (BMVI & Infas, 2018). However, many people have the opinion that cycling is to exhausting to use it as a transport mode, which is rather a question of their believes than their fitness level.

HANDLING RULES, REGULATIONS AND INFRASTRUCTURES

As said before most children learn the basic traffic rules already in early age from their parents or later in school at a training. Additionally, most adults (88%) in Stuttgart have a driving license where they undertake a deeper study of traffic rules and get experience how to handle different traffic situations. One respondent was however concerned that "there is a share of car drivers who simply don't know how to react in the presence of a cyclist" (Thijs, 31.07.2019). He claimed that due to the low share of cyclists, some drivers "pass driving school without ever having a situation or conflict with a cyclists". Apart from that cyclists and other road users know the most rules and regulations they have to follow, if they comply with them is another question which will be discussed later on. Still there are some situation where you do not know how to behave as a cyclist. The most problems with regulations appear when no cycling infrastructure is given and it is unclear where you are allowed to cycle. Cyclists could find help in the rulebook *Straßenverkehrsordnung* (engl. road traffic regulations) which regulates traffic in Germany, but who wants to study a rulebook when he or she just wants to get from A to B.

How cyclists use an infrastructure depends on the infrastructure design itself. Cyclists do often search their own way through traffic, because cycling infrastructure is poorly developed, inconvenient or simply not existent. Pedestrians do this in the same manner, as the example of so-called 'elephant paths' or 'desire paths' show. This are beaten paths formed by pedestrians, and they appear mostly to make a shortcut or at places where no

official way is constructed but needed. People are lazy (you could also say they think efficient) and so they always try to search for the shortest and most convenient way. In the same way as pedestrian will walk over a lawn when no track is built a cyclist will make use of the all urban infrastructures when no cycle track is available.

> "If there is no cycle track, I use whatever is the most convenient in the situation. I know that I cycle sometime a bit reckless, but that's the only way I'm able to cycle in a certain flow. That's also the reason why I am running a red light sometimes, otherwise I would need to stop all the time" (Patricia, 25.07.19).

They are well aware that they are breaking the rules, but they do not take it so serious, because in their opinion they do not harm anyone. In fact, can you witness many cyclists in Stuttgart who constantly change between cycling on the street and on the pavement. Personally, I do exactly the same. But cyclists do not behave like this to provoke drivers or pedestrians, it is rather because they often do not have their own space or do not want to cut off their cycling flow. Also, it is often allowed to cycle on the pavement, but not everyone knows that. As we saw in chapter 3.1.3 shared pavements account for the longest part of the cycling infrastructure.

"In Stuttgart prevails a mentality among cyclist saying that traffic rules are just an advice".

(Thijs, 31.07.2019)

Based on my own experience, I argue that the inconsistent, inconvenient or none existing cycling infrastructure cause the behaviour that cyclists interpret and bend the rules as they like. I lived and cycled in Stuttgart for more than five years and at the beginning I was a bit overstrained to cope with the traffic and existing infrastructure. But little by little I learned how I can make the best out off what I got. At my daily commute to university I definitely broke a couple of traffic rules every day. This included running red lights, cycling on forbidden paths (e.g. pavement, pedestrian zone), cycling against the direction and more. But I did not behave in this manner because I was a rebellious young student. I cycled like this because otherwise I would have been constantly interrupted, I did not want to make detours and I wished to cycle in a certain flow and speed. If you cycle in Stuttgart you can witness many cyclists, but also pedestrians, who behave in the exact same manner.

THE SOFT SKILLS OF CYCLING

The ability to cycle and knowing the rules in traffic are competencies cyclists definitely need in an urban environment. But I argue that there is much more going on behind curtains, which cyclists are not aware of at first. There are abilities most cyclists have, which are not obvious and differ from cyclist and experience he has, especially the one who cycle frequently. I refer to them as 'the soft skills of cycling'. When I asked my interviewees about competencies or skills they need as a cyclist, they often had to think about it for a moment. That you need to be able to ride a bicycle was obvious for them, that was why they did not understand what I tried to find out in the first place.

One ability all of the respondents considered as very important is to know your way around the city. It is obvious that you have to know how to get from your home to work, but what they intended was more than simply check out the route on google maps. In their opinion it is a crucial ability to know where you can cycle safe, fast and convenient. When they want to get to any place in the city, they consider the altitude difference (hill vs. distance of detour), the quality of the path (cycle path vs. road), the traffic situation (busy vs. qualm) or the enjoyment of the route (urban vs. park). One respondent told me that she is constantly optimizing her routes through Stuttgart in order to have better cycling experience.

Being aware of the urban environment was for all the most important competence and the most exhausting. In order to cycle safely through Stuttgart is necessary "to sense your environment, keep an eye on everything and constantly be alert. You always have to check: where are cars, where are pedestrians, where is my cycle path" (Thijs, 31.07.2019). Others said that if you want to cycle in Stuttgart you need to be able to evaluate traffic situations before they happen. Having a driver license helps "to understand car drivers, how they will act, knowing what there viewing filed is and on what a cyclist needs to pay attention to" (Otto, 25.07.19).

One interviewee wraps it all up:

> "In General, it's a bit exhausting for me to cycle in Stuttgart, but just because you have to be highly concentrated all the time and have to cycle extremely foresighted. You cannot cycle relaxed with headphones listening to a good song or when you're still a bit tired in the morning. You must pay attention to the traffic all the time, be concentrated, cycle anticipatory and respect the other road users" (Juliane, 05.08.19).

What this looks like in real traffic situations will be illustrated with the following two cases I recorded during a cycle trip through Stuttgart. The first situation takes place in central Stuttgart (S-West) on a typical street for this district. The street is lined with cars on both sides and it is difficult to see pedestrians crossing the street. Moreover, is the pedestrian in this case not aware of the cyclist. It is a typical situation where the cyclist needs to predict what the pedestrian is about to do.

As we cycle along the street, we mainly witness the parked cars along the side

A pedestrian occurs between the parked cars but it is difficult to notice her.

The pedestrian is not paying attention towards the cyclist and is only witnessing the approaching car.

The second case takes place a bit outside central Stuttgart at a busier road which connects two districts (Bad Cannstatt and Feuerbach). The path mostly goes along on a shared pavement for cyclists and pedestrians with a few junctions, like the one below. Cars are driving next to the pavement on two lanes with 50 km/h and at junctions' cars are crossing the cycle path. The case below shows on of these crossings. Here, the cyclist will go straight and just in front a car crossed the cycle path. Other cars are approaching from behind. The issues here is that cars a driving much fast as the cyclist and it is difficult to tell if they make a right turn or going straight. As a cyclist you cannot rely on the driver to see you and wait until you cross the street. You need to be prepared that he will make a right turn and crosses your line.

Cycling along a busy street, cars crossing cycle path.

Difficult to tell if the car goes straight or makes a right turn. Driver might not see the cyclist

Cyclist needs to be constantly prepared to stop if car pulls over

3.3. MEANINGS

In this chapter the focus will be set on the meanings behind cycling. In practice theory, meaning is described by Shove *et al.*, 2012, p. 22) as "a term we use to represent the social and symbolic significance of participation at any one moment". This includes purpose, beliefs, feelings, moods and social and material interactions in the context of the practice (Shove *et al.*, 2012).

3.3.1. REASONS TO CYCLE

At first, I want to look at the reason why people choose to use the bicycle as a transport mode. Here, their motivations, reasons and purposes will be revealed and discussed.

"Cycling is just simple, flexible and fast".

(Juliane, 05.08.19)

For all respondents the bicycle is their preferred mode of travel and they use it several days a week up to everyday. Most stated that for them it is the simplest and fastest way to move around town and therefore their favourite choice. Budget plays and important role in choosing a transport mode, which is also a reason why many prefer the bicycle as costs are relatively low, "only walking would be cheaper" (Juliane, 05.08.19). Every respondent uses the bicycle as a transport mode, and half of them use it additionally for leisure activity, like doing smaller bicycle tours with friends or family. Quickly summarized could be said that the main reason to use the bicycle is for all respondent to commute to work fast and cheap. However, every respondent added various other reasons why he or she chooses the bicycle as his / her transport mode. Moreover, when I asked if they would prefer public transport over the bicycle when public transport would be for free, running frequently and accessible, all stick with the bicycle, at least if conditions (mostly weather) are fine. This indicates that there is something more about cycling than just to save time and money.

"I just cycle it out of egoism, because its cheap and fast. But also, I know that it is an ecological transport mode and has as well a healthy aspect".

(Otto, 25.07.19).

The physical activity cycling entails brings advantages to the practitioner. That cycling has a positive effect on one's health is common sense. So, without surprise that was also a reason my respondent considered. They like the fact, to have a transport mode which brings you "fast to work while [you] have a bit of exercise and sport" (Franziska, 14.08.19). Another benefit mentioned was that if you cycle in the morning the physical activity and the fresh air will wake up your body and you are a lot more active throughout the day. A few said that it simply makes them happy when they cycle and that they just love to use their bicycle. Only two respondents brought up that they also cycle due to environmental or ecological reasons, but it seemed that it was more a nice benefit for them, than an actual reason to use the bicycle.

Clearly my respondents were all from a group of bicycle enthusiasts and they do not need to be convinced and for them it is a clear and easy choice to cycle. So, I asked them where

they see obstacles for non-cyclists or bicycle sympathisers to jump up the saddle. Most answers were material vice, like building separate cycle lanes. Related to the separate cycle lane, one respondent expressed his reasonable opinion

> "If you want to enable cycling for all people, they have to be without fear. Most people don't want to think about anything, they just want to cycle or better said they just want to get around. But if they consider "do I have to be scared on this route by bike" they quickly make their decision and use the car instead of the bicycle" (Thijs, 31.07.2019).

Another aspect which came up was the visibility and awareness of cycling in Stuttgart. Some of my respondent have the feeling that they are not being noticed by other road users when they are on the bicycle. Moreover, it is sometimes hard to sense any cycling infrastructure in the city. One believed: "when people notice that there is space to cycle safely more people would use the bicycle" (Lukas, 19.08.19).

3.3.2. BEING A CYCLIST IN STUTTGART

I want to explore now how cyclists see themselves in the mobility system, how cyclists are perceived from other road users and how the general interaction among road users in Stuttgart is handled.

In the previous chapter the feeling while cycling was already mentioned, however at this point I want to dick a bit deeper into the topic and analyze what influences the feeling of cyclists when they perform the practice. The statements of my respondents about their feelings while cycling were sometimes contradictory. Whereas they mentioned how happy, relaxing and joyful cycling could be others or even the same person told me about the stress, mental strain and anger they witness while cycling. Statements like the following two are characteristically: "Actually, I am always happy when riding my bicycle, it is really fun. I am just in a bad mood when I do not have any space at all to cycle" (Otto, 25.07.19). "It's simply fun to cycle to work in the morning, it makes me somehow happy" and she continuous later: "It really stresses me out when I have to go to the city at midday and need to cycle through traffic" (Franziska, 14.08.19). These two comments are related to the urban environment they cycle through, the lack of space and the dense traffic are triggers for negative feelings and stress. However, also other circumstances can affect the temper of the cyclist: "My feelings about cycling vary. Sometimes I totally love it to cycle to work while listening to a good song. But occasionally it's a lot of effort because I'm so tightly in the morning and I rather like to take a train or drive by car. However, I look at it as enrichment because it wakes me up in the morning and vitalize my body" (Lukas, 19.08.19).

"I think we need more tolerance towards cyclists, I miss that sometimes".

(Patricia, 25.07.19)

Another aspect which affects the identity of cyclists in Stuttgart is the interactions between the different road users. But first, let's focus on how cyclists see themselves perceived by other road users. According to my respondents the picture does not look that good. They have the feeling that they are just sensed as disturbance and they feel like they do not belong in the city. Conflicts with pedestrians and car drivers appear often, as shown in chapter 3.1.4, but it is not only the conflict of space also attitude and mindset play an important role. Some respondents feel attacked and disturbed by car drivers or constantly interrupted and stopped by the infrastructure. They think "that the bicycle is the biggest opponent for most other transport users in Stuttgart [and that] most transport users frown upon cyclists" (Patricia, 25.07.19). They see the reason in the battle of space, where the car drivers claim a lot space for themselves. One respondent expresses her dilemma:

> "I think nobody likes me as a cyclist. The car drivers don't like me, because I'm to slow. The pedestrians don't like me, when I cycle on the pavement to get out of the way from the cars. I don't belief that the other road users appreciate me as a cyclist, I'm rather a constant risk or a hinderance. For the pedestrians its dangerous when I cycle on the pavement but for me it is dangerous to cycle on the street" (Franziska, 14.08.19).

This issue about how much space is attributed to the different mobility forms, shows again the interference of the different elements in practice theory. What seems to be an infrastructure (material) problem has impact on the mobility behaviour (competencies) as well as on social interactions between the road users and the mentality in traffic generally (meaning). This creates a culture of combat behaviour where everyone just pays attention to themselves. "I don't see a de-escalation in Stuttgart. It's really a fight", one expresses his concerns (Thijs, 31.07.2019). This creates constant struggle between the different road users on the common good of space.

3.3.3. CYCLING CULTURE AND VALUE

This chapter will address how cycling is perceived in society, culture, politics and city development in the context of Stuttgart.

As presented in previous chapters, that the main reason for my respondents to cycle, was mostly out of mere practical aspects: getting around town in a cheap, fast and simple way. However, simultaneously they expressed how much they enjoy cycling, that it makes them happy, or how the activity vitalizes or also relaxes their body. Also, their mentioned how stressful and nerve-racking cycling can be, because you need to be concentrated and pay much attention on the traffic. When they talked about their bicycles and related stories you could witness that they have a personal attachment to it and that it is not just any object. This shows that cycling is not only about going from A to B. It is a form of mobility which is experienced rather than consumed. It is comparable with the social standing of the car. Many would agree that the car is not simply a transport mode but rather has a certain value

and significance in our society. In comparison, public transportation is a consumed form of mobility where few people have any sort of personal attachment, for example to a bus line or subway.

According to Aldred & Jungnickel (2014) is the culture around cycling much stronger and visible in cities with 'emerging' cycling cultures in comparison to 'established' cycling cultures. In the latter, citizens see cycling as a normalize practice and the meaning of cycling loses its importance for the individual, because "when everyone cycles, no one is 'a cyclist'; it is not who you are but simply what you do" (Aldred & Jungnickel, 2014, p. 80). This could even provoke that cycling can become culturally invisible. Again, the opposite happens with cities where cycling is emerging, meaning where cycling is still under development, has poorly available materials or requires higher level of competencies. Here, "cycling demands much more work from the practitioners", which however, creates a deeper bonding with the practice and "may be more likely to coalesce into an identity (i.e., an expression of a perceived group affiliation)" (Aldred & Jungnickel, 2014, pp. 80–85). Cycling in Stuttgart is certainly not a normalized practice, which is already indicated by the model spilt with 7% share of cyclists. Stuttgart has no wider background is cycling culture and is more seen as a city for cars, as one respondents points out:

> "I lot of people don't have a connection to cycling. Stuttgart is a city for cars and that was mediated for many years. For many people the bicycle is just something for leisure activity, but there are also people for whom the bicycle is a transport mode, or even more, for whom the bicycle is something cultural and an goes along with a certain attitude. However, Stuttgart will not turn into a bicycle city in the near future, which is mainly due to its dominant infrastructure for cars" (Lukas, 19.08.19).

The findings of the analysis by Aldred & Jungnickel (2014) seems to be applicable to the cycling culture in Stuttgart as well. As shown does Stuttgart have an emerging cycling trend and the cycling culture consist of strong bounds between numerous groups and smaller organisations and initiatives.

There was no studies found which investigate the cycling culture in Stuttgart, however the documentary "Kesselrollen" from 2017 provides a good impression. The box below shall provide a brief insight into the cycling culture of Stuttgart by pointing out a few projects, representatives, initiatives and movements which I consider as being one of the most crucial in Stuttgart. All of them are as well presented in the documentary "Kesselrollen".

CYCLING CULTURE IN STUTTGART: A BRIEF INSIGHT

Heaven & Hell Cycling Club is a fixed-gear-crew established from a few friends who love cycling their 'fixies'. Firstly, it's a group who organize cycle rides for sport or leisure, but they developed to a representative of cycling culture in Stuttgart. They do organise various events around cycling culture from races and alley-cats to bike polo or meet-ups for cyclists. Radwerkstatt is a bicycle workshop who tries to prolong the life of bicycles by recycle, upcycle and repairing all sorts of bicycles. They mainly repair bicycles by reusing old parts. Additionally, they have a small café in their workshop and are always open for a chat. Basis is another iconic workshop dedicated for fixed gear bikes, racing bikes and trendy cycling apparel. The also participating in promoting cycling culture in Stuttgart. Bicycles for Africa is a non-profit association who collects and repairs old bicycles and ship them afterwards to Africa, where they have a substantial value for people's mobility. In an area where the next school is kilometres away possessing a bicycle has a massive positive impact. The little-parking-space-wonder, is a carriage pulled by hand and functions as a moveable public space. You can find the carriage around town always staying at another parking lot. It is equipped with benches to sit on and enjoy the space where usually a car would be parking. Critical Mass is a movement to raise awareness for cycling and the lack of infrastructure which exists in various cities in Germany. They use a loophole in the traffic law which says that a group of more than 15 cyclists forms a collective. This gives them the right to stick always together as a collective, which means that even when a traffic light turns red while crossing the whole collective is allowed to pass the junction. They meet every month to cycle around town, in summer up to 2000 cyclists participate. For a while, cyclists are the dominate traffic mode on the street and cars have to subordinate to the mass of cyclists. Stuttgart is the only city in Germany where the meeting needs to be approved by the municipality and is accompanied by the police. In all other cities it is more a self-determined organisation.

Stuttgart's cycling culture is rather small, hence a single initiative or even a special bicycle workshop really stands out and can have great impact on the image of cycling in the city. The smallness and sub-cultural atmosphere fosters however a strong network and solidarity among cyclists. The different action going on, are not supported or encouraged by the municipality, it is all initiated by cyclist who want to strengthen the cycling culture. I argue that municipalities and city planners could make great use of this energy and potential. Cooperation's between cyclists and the municipality could achieve to design targeted measurements to promote cycling in Stuttgart.

The willingness of people to cycle is certainly limited if cycling infrastructure is poorly developed, this is further intensified in areas without an established cycling culture. Nevertheless, "cultural interventions are not an alternative to improving cycling environments, but should be seen as complementary, with the potential to multiply or reduce the impacts of other interventions" (Aldred & Jungnickel, 2014, p. 86).

3.4. A RIDE THROUGH STUTTGART

In order to observe the infrastructure, I took a roundtrip through Stuttgart while recording with three GoPro cameras attached to my helmet, handlebar and the rear of my bicycle. The following timeline will provide an insight to specific situations you face as a cyclist in Stuttgart. Moreover, it seeks to draw a picture of what it feels like to cycle in Stuttgart. Figure 5. shows a map of the route I cycled with the locations of the different traffic situations.

Figure 5. Ride through Stuttgart (own illustration)

A RIDE THROUGH STUTTGART

1

We start our journey in Stuttgart West, where most streets look similar. Cycling is fairly good on most streets, as traffic is calm. However, cars are parked along the streets which hinders visibility of pedestrians crossing or cars exit their parking space.

Still in S-West, we enter one of the busier and main roads, *Silberburgstraße*. The situation shown is after a crossing, where sometimes shorter cycle lanes shall protect the cyclists. The cycle lanes are about 1m wide and will lead into traffic after a few meters. Additionally the path is partly blocked.

2

3

Going north towards the centre traffic increases. Some streets do not provide acceptable cycling infrastructure and most cyclists would avoid cycle on *Schlossstraße* and take on of the parallel streets. These streets are dominated by cars and cycling is dangerous and inconvenient.

As we turn right heading to the centre, we find a cycle track separated by a curb from the road and split with a pavement. This tracks provide the cyclist with good conditions and a safe feeling. However, conflicts between pedestrians and cyclists occur as pedestrians are not always aware of the cycling track and use it as well. This will hinder cycling fluently.

4

5

As we arrive at the edge of the city centre, we need to cross one of the main roads. Cars are provided with 3 – 5 lanes in each direction. Here, the street needs to be crossed in two phases and pedestrians and cyclists need to wait in the middle of the street while cars passing on both sides. The situation is highly inconvenient for cyclists and pedestrians and create a feeling of being crumped in between cars.

Turning left we cycle on the main road towards north, passing by the centre to the right. The cycle lane passes between traffic and parked cars on street level. Cycling fast and fluently is mostly possible due to good surface and green wave. However, passing by parked cars, which could pull out or open the door hinders safety issues. The cycle lane is crossed by cars at a few junctions.

6

7

Still on *Theodor-Heuss-Straße* the cycle lane suddenly ends and the traffic situation for cyclist is unclear. Such interruptions appear at other places as well and leaving the cyclists with no real option behind. This truly lowers a positive cycling experience and the feeling of being appreciated.

Coming to the main train station conflicts with pedestrians are quite often. At several places cyclists and pedestrians share the pavement and even if space is dedicated to cyclists pedestrians use it as well. Since cycling infrastructure is so poorly developed pedestrians do not notice when a cycle path appears. Cycling is simply not visible in the city and not in the mindset of most citizens in Stuttgart.

8

9

After the train station we head towards *Bad Cannstatt*. The sight is currently under construction, but a good infrastructure for cyclists and pedestrians is provided. The example shows two pedestrian walking on the cycle lane, which substantiate the already mentioned issue in Stuttgart: many people are not aware of cyclist and their paths.

The way leads us through the *Schlosspark*. Here, nice stretches with mostly good surface makes cycling a positive experience. Still, conflicts with pedestrians, especially at weekends, happen as the infrastructure is shared.

10

11

We are heading now over the river *Neckar*. The cycling lane is separated from the pavement by a small curb, which makes it more visible and prevent pedestrians to use it. Like at many other places in Stuttgart the cycling lane is a two-way path. Bike lanes dedicated for only one direction are rare in Stuttgart. Conflicts between cyclists appear if cyclists overtake.

As we cycle back towards the city centre, the traffic situation gets quickly tense. Here, we see another example where cyclists and pedestrians have to share the same path with leads to conflicts. Coming from this direction cyclists often use the left side of the street, as on the right side a continuous cycle path or even pavement is not given. Cars dominate again the cityscape and are provided with two lanes in each direction.

12

13

We cycle now over a 600 m long cycle street towards the district S-Süd. Here, bicycles are the privileged transport mode and cars have to subordinate. To reduce traffic, the street has a dead end for cars, however the effect is just slightly notable. You witness more cyclists here than usual, but an additional reason could be that the streets leads to the popular *Marienplatz*, where people hang out in various cafes and bars. However, cycling here is enjoyable, pleasant and fluent.

Going up hill in S-Süd streets in the living areas look similar to S-West – pavement, parked cars, streets with lower traffic. In the evening it is possible to observe multiple drivers cruising around the block searching for a parking space. On bigger roads cyclists have to find their way trough traffic. You have to cycle concentrated, pay attention and witness your surrounding carefully.

14

15

Some streets in Stuttgart offer cycle lanes, where you cycle in between driving and parked cars. Car drivers do mainly respect your space and you can cycle fluently. However, it happens that obstacles (cars, construction sight, traffic signs, …) are blocking the path or that the cycle lanes suddenly ends. As a cyclist you get the feeling that cycling infrastructure is just provided, when space is available.

Going back to S-West we cycle over another main road, *Rotebühlstraße.* Also here, cycling is rather unpleasant and the infrastructure leaves the cyclist with the choice to cycle slalom through pedestrians on the pavement or cycle on the street, where one gets constantly overtaken by cars driving up to 50 km/h. A plus is being on a priority road with mostly green waves.

16

4. REFLECTION

4.1. DISCUSSION

This chapter will discuss the findings from the conducted analysis of the practice of cycling in Stuttgart. Afterwards a conclusion will follow to identify and summarize the main results of the analysis. The discussion will be carried out in form of a comparison of two cities: Stuttgart and Copenhagen, which could not be more different in case of cycling. The comparison bears the opportunity to investigate the main differences between an established and an emerging cycling city. Starting from this, we can further identify what conditions need to be present in order that a cycling environment can develop and flourish. Moreover, can we compare the materials, competencies and meaning related to the practice of cycling, which enables us to determine what measurements could be applied and what needs to be developed individually and adjusted to the specific area. So, the question is what can the city of Stuttgart learn from a pro-cycling city like Copenhagen?

Larsen, 2017) analysed the practice of cycling in Copenhagen using the practice theory approach by Shove *et al.*, 2012). In particular, he analysed "why, and how, are cycling practices continually (re)produced in Copenhagen and how can they attract so many practitioners?" (Larsen, 2017, p. 876). Therefore, the main theoretical material used for this discussion will be especially his analysis. During my one and half year stay in Copenhagen I could also gather a lot of experience of the cycling environment there. In line with the autoethnographic research of this thesis this knowledge will contribute to the discussion as well.

MATERIALS

> "Being without a bike is a bit like being without one's smart phone, it is difficult to meet up with others and to synchronize travel"
>
> (Larsen, 2017, p. 884)

In Copenhagen almost everyone owns a bicycle, and for Copenhagener it seems odd to not have a bicycle. It often causes problems when a group of friends meet up and some are without a bicycle (Larsen, 2017). That's not surprising when considering that 49 % of trips to work or education are done by bicycle and 28% of all trips to, from and in Copenhagen (City of Copenhagen, 2019). Similar to Stuttgart, Copenhagener tend to ride modestly priced bicycles, however type and handling differ. Copenhagener use mostly "upright bicycles designed for comfort and convenience". Gearshift is not a concern of Copenhageners and many cycle with just one or few gears. The same can be said about the maintenance of bicycles, as we can witness that "there are many bikes with dried-out or sloppy chains, rusty parts, semi-flat tyres and missing, broken, or bent parts" (Larsen, 2017, p. 884). In comparison, for cyclists in Stuttgart it is crucial to have a bicycle in good condition and well equipped with a gearshift and breaks. There are two aspects which account or this mismatch. First, Stuttgarter's tend

to need superior bicycles to cope with the topographic situation. Cycling uphill with a rusty 'singlespeed bicycle' is not what most people consider convenient. Secondly, Copenhageners have a different attitude to their bicycle. Cycling in Copenhagen is a rather normalized practice and much more a practice that simply serves the need for travel. Consequently, the bicycle is just the object (material) which enables to perform cycling and brings someone to his or her desired destination. Since the conditions for cycling in Copenhagen are fairly easy (flat, proper cycling infrastructure) the requirements to the bicycle are not very high. Certainly, this does not apply to everyone in both cities, Stuttgart and Copenhagen, cyclists will be found that pay much attention to the quality, type, style and look of their bicycle.

The cycling infrastructure utilised for the practice of cycling in the two cities is probably one of the biggest differences and maybe the most relevant. Copenhagen is often rated as the most bicycle friendly city in the world (Copenhagenize, 2019). A reason is the extensive network of cycle tracks of approximately 350 kilometres, where tracks are in excellent condition and separated from the road by a curb (Freudendal-Pedersen, 2015) and the design is mostly consistent. Cycling in Copenhagen is a pleasant and comfortable experience and not as nerve-racking and mentally exhausting as in Stuttgart. Whereas my respondents mainly spoke about their concerns and dissatisfaction of the cycling infrastructure in Stuttgart, the issues is marginal mentioned in Larsen's (2017) approach. This is another indicator of the normalisation of the cycle environment in Copenhagen.

When we examine the cycle infrastructure design in Copenhagen and compare it with Stuttgart, some aspects are particular notable. The most relevant is the allocation of space between the different travel modes. A clear separation between the modes is indicated by the infrastructure design and every mode as his designated area. This prevents road users to utilise the infrastructure designated to others and avoids conflicts between them concerning the 'battle of space'. The separation also contributes to an increase of safety, 77% of Copenhageners state that they feel safe cycling in traffic and studies show that Copenhagen is the city with the lowest accident risk for cyclists (City of Copenhagen, 2019). The overall satisfaction of Copenhageners with the cycling environment is another indicator for the good quality of the cycling network. Stuttgart can definitely learn from the overall approach of Copenhagen, especially in terms of distribution of space and preferencing walking and cycling over cars. There is much other evidence from cities like Amsterdam or Utrecht that the separation of different travel modes improves the infrastructure design and traffic situation. However, further research would be necessary in order to proof the possibility of building 'Copenhagen-style-cycling-tracks' in the urban landscape of Stuttgart.

Moreover, what is characterized as an appropriate infrastructure or, to speak in terms, what the appropriate material to perform the practice of cycling is, is open for discussion and hard to define. It often depends on the single user and its preferences and its personality traits. Cycling on the street alongside cars mighty be for one person no issue at all whereas another is full of fear. This points out the importance of building a cycling infrastructure for all kinds of cyclists.

COMPETENCIES

Concerning physical ability, cycling in Stuttgart is a lot more exhausting than cycling in Copenhagen, which can be again traced back to the hilly topography and lack of infrastructure in Stuttgart. The practice of cycling can be adopted more easily in the cycling-friendly environment of Copenhagen. The city is mostly flat and compact, so the typical ride is short and seldom strenuous. This suggests that cycling does not require much fitness or special skills from the practitioners, which also explains why it attracts so many people. In Stuttgart we can currently observe how a change in materiality enhancement changes the required competencies and makes cycling accessible for people with less physical abilities. Electric bicycles offer new possibilities to increase the share of cyclists, because the issue of topography will become obsolete. But still, many people are scared to cycle in traffic in Stuttgart and to compete with the cars on the same street. The road design and traffic in Copenhagen do not force cyclists to mingle with cars on the same street or pass through lines of cars to get to the front at traffic lights, which is common in Stuttgart. On the other hand, cycle tracks in Copenhagen can be busy, chaotic and sometimes an uncivilized behaviour from other cyclists can be witnessed. Therefore cyclists in Copenhagen "need to cultivate mobile competences, such as keeping calm when narrowly overtaking, or being overtaken by, slower and faster riders, respectively" (Larsen, 2017, p. 888). Being new in Copenhagen, cycling within a bulk of 20-30 cyclists needs to be learned and getting used to it is a process that takes time. But as soon as one is used to cycle in Copenhagen, cycling with the flow comes naturally and is very enjoyable. In order to navigate through the mass of cyclists Copenhageners need to adapt similar competencies in common with Stuttgarters cycling through dense traffic. Again, this entails anticipatory cycling and pay attention to the traffic around. However, there is an important difference in Copenhagen which has much impact on how mentally straining this constant attention is sensed. One of my interviewees lived in Copenhagen for a year and she expressed her experience as follows:

> "It's really easy-going to cycle in Copenhagen, you don't have to cycle so anticipatory and don't have to pay attention to traffic that much, because there are not so many threats. You simply have your route and a protected space. Even if there is as much traffic as in Stuttgart the fear of getting injured isn't that high, because there are so many cyclists. I mean when a bicycle hits you it's never that serious than getting hit by a car where you don't have any chance You feel safer with more cyclists on the street. That's the same when I cycle in Stuttgart in a bigger group of cyclists. In a group you are much more visible for other road users and therefore you feel safer" (Juliane, 05.08.19).

Also Larsen, 2017, p. 888) draws a different picture of the situation on the bike lanes than his interviewees descripted, he observed "a disciplined flow of signaling and negotiating cyclists that kept the line and did not abuse each other" and I agree with his statement. Road users in Copenhagen pay much more respect to each other than in Stuttgart. It prevails a mentality where the stronger road user esteems the weaker one and pays attention. In traffic situation this means that for example at a junction, cars are waiting until cyclists have crossed, and cyclists are waiting until pedestrians have crossed. I can

remember how confused I was when I moved to Copenhagen and observed this behaviour. It is this mutual respect among the road users which is missing in Stuttgart and causes a lot of disputes and incomprehension.

MEANINGS

The cycling culture is part of the city life in Copenhagen, however most Copenhageners "agree that cycling is a normalized practice that does not carry particularly strong – positive or negative – identities" (Larsen, 2017, p. 885). Copenhagener do not consider themselves as cool, uncool, healthy or sustainable just because they use the bicycle as a transport mode. In Copenhagen and Stuttgart, the reasons and considered advantages to use the bicycle are exactly the same: "It is all about getting from A to B" (Copenhagen, woman, 20s; Larsen, 2017, p. 885) and "it's fast to get around" (Franziska, 14.08.19). In both cities people use the bicycle mainly due to practical reasons and they are mostly concerned about time, flexibility, access and (for some) money. The same applies for factors like sustainability, sport and health effects, Copenhageners and Stuttgarters see them as additional benefits but they are not the primary motivation to cycle (Larsen, 2017). In a cycle environment such as Stuttgart, where cycling infrastructure is developed poorly, traffic is dense, and hills need to be tackled I honestly assumed that personal beliefs and healthy or a sustainable lifestyle would play a more important role. Also, nevertheless my respondents complained about the traffic situation and cycling infrastructure they always expressed how much they "like to cycle" and how much "fun" it is.

In Stuttgart, 2 m wide separated cycle paths and green waves and direct routes designated for cyclists do not exist. But still, cycling is viewed as being fast and pleasant, so what does that say about the importance of a well-established cycling infrastructure? And if all statements of my respondents are considered to be true, why does the practice of cycling in Stuttgart not attract more people?

Well, answering this question entirely would again need further research about decision making, behaviour change and (false) believes. However, a few things can be determined. Firstly, we have to consider the focus group I interviewed. They were all confident cyclists with a high stress level and good level of experience and competencies. This means that they are capable of cycling in the traffic of Stuttgart along with cars even when it is not their desire. But this cannot be applied to other types of cyclists (e.g. "Interested but Concerned" (Geller, 2009)) which need an advanced and safe infrastructure (or the feeling of safety) in order to be willing to use the bicycle. Secondly, this shows again that infrastructure measurements cannot stand out as the only approach to promote cycling and motivate people to shift to the usage of bicycles as a transport mode. Moreover, does it emphasise the importance that we need holistic measurements which include all aspects of cycling: the materials, competencies and meaning and their interplay.

4.2. CONCLUSION

In this master thesis I analysed the practice of cycling in Stuttgart and illustrated which conditions and challenges confident cyclists face and what their requirements to a decent urban cycling environment are. The thesis is based on the practice theory approach by Shove *et al.*, 2012), which states that a practice can be defined by the interplay of materials, competencies and meanings used to perform the practice and by the links between them. Furthermore, the approach is conducted by using a combination of different methods. The empirical data is primarily based on interviews with confident cyclists from Stuttgart. Additionally, autoethnography and video recordings are used to complement the empirical data, as well as a review of relevant literature, public data, media reports and documentaries.

Stuttgart is located in the centre of a larger metropolitan area and forms the economical capital of the region. The traffic situation is tense due to high commuter flows, topographic conditions, battle of space and missing appreciation between the different road users. The share of cyclists in Stuttgart has long been stable and account for about 5-7%. Measurements of the municipality to develop decent cycling environment have failed to motivate citizens to switch to the bicycle. Citizens who are confident enough to cycle anyway do not feel appreciated by the city and require a change in city planning approaches and distribution of space. A holistic approach is needed to investigate all aspects related to the practice of cycling. Based on this knowledge, targeted measurements can be designed in order to increase the willingness of people to cycle.

Cyclists in Stuttgart mainly use moderate priced bicycles but pay attention that the bicycle is in a decent condition and well equipped with a gearshift and good breaks. Electric bicycles gain attraction and the owner rate of electric bicycles is higher than in other German cities, which can be traced to the hilly topography of the city. Cargo bikes are also gaining ground as people start to realize their benefits also due to a municipal subsidy program. The cycling infrastructure network is the major issue of discussion among cyclists, and cyclists are not satisfied with the situation. The city has plans to develop a network of main cycle routes since 2010 but the development proceeding is rather slowly. From twelve planed routes only one is considered finished, whereas many cyclists complain about the quality and lacking consistency of the route. Even for confident cyclists cycling in Stuttgart can be nerve-racking and mentally exhausting as they need to cycle constantly concentrated, foresighted and they need to pay attention to the traffic. However, they express to generally enjoy cycling and prefer it to other modes of travel. The main reasons to use the bicycle are rather practical (time, flexibility and money) and reasons such as health benefits, sustainability or used space play a minor role, but are seen as ‘nice-to-have’ advantages. Most people in Stuttgart and in the rest of Germany learn to cycle between the ages of 2-4 and receive further competencies when they take part in a cycling proficiency training in the 4th grade of school together with their local traffic police. Cycling in Stuttgart requires a certain set of skills. Depending on where you live and work a certain level of fitness is required when your way often leads uphill. This requisite can be

compensated by using an electric bicycle. Cycling in busy traffic can be demanding and it is required to navigate the bicycle focused and carefully through the urban environment. In order to cope with traffic, cyclists need to be able to evaluate upcoming traffic situations and predict how other road users will behave. To enhance the enjoyment of cycling in Stuttgart, competent cyclists acquire profound knowledge of the urban environment and specific routes in the city where better cycling conditions are found. This includes for example suitable cycling infrastructure, side roads with calm traffic, flat routes or path through public parks. Such paths can also imply to bend the rules and regulations to the cyclists' needs in order to gain better flow and a comfortable ride through the city. This serves the purpose of cycling fast in order to improve travel time, which is one of the main reasons why people cycle in the first place. Still, a convenient, comfortable and joyful cycle experience is desired by all cyclists as well as feeling and being safe on the cycle path. This should be promoted by the infrastructure design, especially to motivate other types of cyclists where these aspects play an important role. An established cycling culture can have similar positive effects on the willingness of people to cycle. In Stuttgart a small cycling culture exists and gains in popularity. Numerous groups, organisations and initiatives endeavour to improve the urban cycling environment and foster a flourish cycling culture.

4.3. LIMITATIONS AND FURTHER RESEARCH

For the end of this report I want to point out some limitations and proposal for further research.

The most obvious limitation of autoethnography is the researcher itself. As an autoethnographic researcher I attend to be a neutral observer of the environment and render all my statements in a neutral and critical manner. However, no researcher is free from personal opinions, beliefs, background knowledge and judgements. The autoethnographer needs to be extremely cautious to not fall for wrong (self-)assessment in his research. Furthermore, there is a risk of high self-esteem of the researcher and overrating his own statements. In my research I conducted interviews in order to overcome this risk.

In line with the concept of Geller, 2009) "four types of cyclists" I decided to focus on one particular group of cyclists. My considerations to choose this focus group are presented in chapter 2.3.1. I conducted six interviews and certainly, a greater number of interviews would strengthen the accuracy and credibility of this research. However, the answers and opinions of the respondents from this focus group had a certain consistency, therefore I consider the number of interviews I conducted as reasonable for this report. Nevertheless, what limits the findings is the focus on only one group of cyclists. On the one hand, focusing on one group allowed me to deeply analyse this type of cyclists, but on the other hand, it excluded other opinions and aspects. In order to disclose a holistic picture of the practice of cycling in Stuttgart a fruitful next step would be to include other types of cyclists (or none-

cyclists) into the discussion. I'm convinced that this would be in the best interested to accelerate research in this field.

The interviews I conducted provided me with profound insights and knowledge about the practice of cycling in Stuttgart. During the analysis of the interview data, additional questions and issues appeared which were not covered or just partly covered during the interviews. For further research, a second interview round with the same respondents would allow to address additional subjects and render the research question more precisely. Fields where further questions appeared were for example the cycling culture and value, the identity as a cyclist and how cyclists are sensed in the urban environment.

This master thesis has the goal to address the issues cyclists face in Stuttgart, by analysing the practice of cycling itself. Since most studies as well as interventions to promote cycling focus on the materials (e.g. infrastructure improvement). This research had the goal to reveal other aspects related to cycling and present the practice of cycling as a whole. This could serve as a starting point to develop interventions to promote cycling in the city of Stuttgart taking all elements of the practice into account. The importance of developing a profound cycling culture should not be underestimated as well as acquiring new competencies. In order to foster a sustainable development in our cities it is important to rethink current systems and be open for changes.

CLOSING WORDS

Prior to my approach of the practice of cycling, my conviction was that exclusively infrastructure measurements can really promote cycling and that other initiatives are just a small supplement. Experiencing the cycling environment in Copenhagen had further strengthen this belief and I thought that building cycle tracks in the 'Copenhagen-style' is the only way to go.

The analysis of the practice of cycling made me realize that it is not that 'simple'. Cycling needs to be considered in the environment where it is performed and measurements need to be adopted to this environment. Also, they need to take into account the wide range of stuff which is related to cycling and, at first, the people they want to attract.

I do not think that Stuttgart could be 'Copenhagenized' but maybe the city will find their own approach to a bicycle-friendly urban environment and will be 'Stuttgartanized'. The energetic cycling culture and the citizens of Stuttgart can play an important role in this transition. The municipality just needs to be courageous enough to allow a change of paradigms in mobility and city patterns.

Until then I will continue to ride my bicycle.

REFERENCES

Aldred, R. & Jungnickel, K. (2014) Why culture matters for transport policy: the case of cycling in the UK, *Journal of Transport Geography,* 34, pp. 78–87. doi:10.1016/j.jtrangeo.2013.11.004.

Anderson, L. (2006) Analytic Autoethnography, *Journal of Contemporary Ethnography,* 35(4), pp. 373–395. doi:10.1177/0891241605280449.

Becker, H. (1953) Becoming a Marihuana User, *American Journal of Sociology, Vol. 59, No. 3 (Nov., 1953), pp. 235-242*. Available at https://www.jstor.org/stable/2771989.

Beteiligungsportal BaWü (2019) *Bürgerbegehren und Bürgerentscheid*. Available at https://beteiligungsportal.baden-wuerttemberg.de/de/informieren/moeglichkeiten/kommune/buergerbegehren-und-buergerentscheid/ (accessed 29 August 2019).

BMVI (2014) Radverkehr in Zahlen.

BMVI & Infas (2018) Mobilität in Deutschland 2017: Tabellarische Grundauswertung, Stadt Stuttgart.

BMVI & Infas (2019) Mobilität in Deutschland – MiD Kurzreport Europäische Metropolregion Stuttgart.

City of Copenhagen (2019) The Bicycle Account 2018: Copenhagen: City of Cyclists.

Copenhagenize (2019) *The Most Bicycle-Friendly Cities of 2019, Copenhagenize Index*. Available at https://copenhagenizeindex.eu/ (accessed 11 September 2019).

Ellingson, L. L. & Ellis, C. (2008) Autoethnography as Constructionist Project, *J. A. Holstein, & J. F. Gubrium (Eds.), Handbook of constructionist research*, pp. 445–465.

FAZ (2019) *Kampf auf der Straße: Aufstand der Radfahrer*. Available at https://www.faz.net/aktuell/gesellschaft/radfahrer-verlangen-mehr-platz-auf-den-strassen-16303834.html (accessed 6 September 2019).

Freudendal-Pedersen, M. (2015) Cyclists as Part of the City's Organism: Structural Stories on Cycling in Copenhagen, *City & Society,* 27(1), pp. 30–50. doi:10.1111/ciso.12051.

Geller, R. (2009) Four Types of Cyclists, *Portland Office of Transportation*.

Gemeinderat Stuttgart (2019) *Stuttgart zu einer fahrradfreundlichen Stadt machen Ergänzungsbeschluss zur GRDrs1120/2018*. Available at https://www.domino1.stuttgart.de/web/ksd/ksdRedSystem.nsf/0/AF487D2A96EF399FC12583A80058252C (accessed 29 August 2019).

Greenpeace e.V. & Marion Tiemann (2018) Radfahrende schützen - Klimaschutz stärken: Greenpeace-Kurzexpertise: sichere und attraktive Wege für mehr Radverkehr in Städten.

Hargreaves, T. (2011) Practice-ing behaviour change: Applying social practice theory to pro-environmental behaviour change, *Journal of Consumer Culture,* 11(1), pp. 79–99. doi:10.1177/1469540510390500.

Högerle, R., Länge, F., & Bazlen, F. (2017) *Kesselrollen - Wie rollt die Stadt von morgen?* https://vimeo.com/ondemand/kesselrollen

Kingsley, D. & Urry, J. (2013) *After the Car* (Hoboken: Wiley). Available at http://search.ebscohost.com/login.aspx?direct=true&scope=site&db=nlebk&db=nlabk&AN=571738.

Landeshauptstadt Stuttgart (2010) Radverkehrskonzept Stuttgart 2010. Available at https://www.stuttgart.de/img/mdb/item/210632/112697.pdf.

Landeshauptstadt Stuttgart (2015) VEK 2030 - Das Verkehrsentwicklungskonzept der Landeshauptstadt Stuttgart.

Landeshauptstadt Stuttgart (2017) Nachhaltig mobil in Stuttgart - Aktionsplan.

Landeshauptstadt Stuttgart (2019a) *Förderprogramm "E-Lastenräder für Stuttgarter Familien"*. Available at https://www.stuttgart.de/lastenrad (accessed 16 August 2019).

Landeshauptstadt Stuttgart (2019b) *Radfahrausbildung - Stadt Stuttgart*. Available at https://www.stuttgart.de/item/show/391215 (accessed 30 August 2019).

Landeshauptstadt Stuttgart (2019c) Radverkehrsanlagen.

Larsen, J. (2014) (Auto)Ethnography and cycling, *International Journal of Social Research Methodology,* 17(1), pp. 59–71. doi:10.1080/13645579.2014.854015.

Larsen, J. (2017) The making of a pro-cycling city: Social practices and bicycle mobilities, *Environment and Planning A,* 49(4), pp. 876–892. doi:10.1177/0308518X16682732.

LUBW (2016) *Emissions Kataster, Landesamt für Umwelt Baden Württemberg*. Available at https://www.lubw.baden-wuerttemberg.de/luft/kataster (accessed 7 September 2019).

NDR (2017) *Der Fahrradkrieg: Kampf um die Straßen*. Available at https://www.ndr.de/fernsehen/sendungen/45_min/Der-Fahrradkrieg-Kampf-um-die-Strassen,sendung631726.html (accessed 6 September 2019).

Ogilvie, D., Egan, M., Hamilton, V., & Petticrew, M. (2004) Promoting walking and cycling as an alternative to using cars: systematic review, *BMJ (Clinical research ed.),* 329(7469), p. 763. doi:10.1136/bmj.38216.714560.55.

Pink, S. (2007) Walking with video, *Visual Studies,* 22(3), pp. 240–252. doi:10.1080/14725860701657142.

Pucher, J., Dill, J., & Handy, S. (2010) Infrastructure, programs, and policies to increase bicycling: an international review, *Preventive medicine,* 50 Suppl 1, S106-25. doi:10.1016/j.ypmed.2009.07.028.

Radentscheid Stuttgart (2019) *Etappenerfolg: Radentscheid begrüßt den Beschluss des Gemeinderates | Radentscheid Stuttgart*. Available at http://radentscheid-stuttgart.de/2019/02/radentscheid-begruesst-beschluss-des-gemeinderates/ (accessed 29 August 2019).

Reckwitz, A. (2002) Toward a Theory of Social Practices: A Development in Culturalist Theorizing, *European Journal of Social Theory 5(2): 243–263*.

Shove, E., Pantzar, M., & Watson, M. (Eds) (2012) *The dynamics of social practice: Everyday life and how it changes* (Los Angeles, Calif.: SAGE).

Spinney, J. (2009) Cycling the City: Movement, Meaning and Method, *Geography Compass,* 3(2), pp. 817–835. doi:10.1111/j.1749-8198.2008.00211.x.

Spinney, J. (2011) A Chance to Catch a Breath: Using Mobile Video Ethnography in Cycling Research, *Mobilities,* 6(2), pp. 161–182. doi:10.1080/17450101.2011.552771.

Spotswood, F., Chatterton, T., Tapp, A., & Williams, D. (2015) Analysing cycling as a social practice: An empirical grounding for behaviour change, *Transportation Research Part F: Traffic Psychology and Behaviour,* 29, pp. 22–33. doi:10.1016/j.trf.2014.12.001.

Statistisches Landesamt Baden-Württemberg (2015) Flächenverbrauch in Baden-Württemberg.

Stuttgarter Nachrichten (2019) *Bürgerinitiative: OB Kuhn: Stuttgart soll „Stadt des Fahrrads" werden*. Available at https://www.stuttgarter-nachrichten.de/inhalt.radentscheid-stuttgart-ob-kuhn-stuttgart-soll-stadt-des-fahrrads-werden.7ad3e436-5565-487e-a9e3-a2918eda4caf.html (accessed 29 August 2019).

Stuttgarter Zeitung (2018) *E-Bike-Boom in Stuttgart: „Es ist wie ein Virus"*. Available at https://www.stuttgarter-zeitung.de/inhalt.e-bike-boom-in-stuttgart-es-ist-wie-ein-virus.91558380-13d7-4bf9-bf2a-d0d896a49bd3.html (accessed 16 August 2019).

Stuttgarter Zeitung (2019) *Mobilität in Stuttgart: Neuer Zuschuss für Lastenräder mit E-Motor*. Available at https://www.stuttgarter-zeitung.de/inhalt.mobilitaet-in-stuttgart-neuer-zuschuss-fuer-lastenraeder-mit-e-motor.dae830ad-85ce-4ba7-8f9f-d55af36bbcf2.html (accessed 16 August 2019).

Süddeutsche (2012) *Ramsauer schimpft auf "Kampf-Radler"*. Available at https://www.sueddeutsche.de/auto/debatte-ueber-fahrradfahrer-ramsauer-schimpft-auf-kampf-radler-1.1328781 (accessed 13 June 2019).

VVS (2010) Das Mobilitätsverhalten im Verkehrs- und Tarifverbund Stuttgart. Available at http://www.vvs.de/download/Mobilitaetsbroschuere.pdf.

Yang, L., Sahlqvist, S., McMinn, A., Griffin, S. J., & Ogilvie, D. (2010) Interventions to promote cycling: systematic review, *BMJ (Clinical research ed.),* 341, c5293. doi:10.1136/bmj.c5293.

ZDF (2019) *Auto gegen Fahrrad: Muss Radfahren so gefährlich sein?* Available at https://www.zdf.de/dokumentation/zdfzoom/zdfzoom-auto-gegen-fahrrad-100.html (accessed 6 September 2019).

Zukunft Mobilität (2014) *Vergleich unterschiedlicher Flächeninanspruchnahmen nach Verkehrsarten (pro Person)*. Available at https://www.zukunft-mobilitaet.net/78246/analyse/flaechenbedarf-pkw-fahrrad-bus-strassenbahn-stadtbahn-fussgaenger-metro-bremsverzoegerung-vergleich/ (accessed 7 September 2019).