Parking for People

Radboud Universiteit

A research about the behavior and perception of people in Nijmegen-Oost concerning parking and its transformation to other forms of public space

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Preface

Here in front of you lies my master thesis *"parking for people: a research about the behavior and perception of people in Nijmegen-Oost concerning parking and its transformation to other forms of public space"*. This thesis is has been written as a required fulfillment for the master program *Spatial Planning* at the Radboud University Nijmegen, but is above all a product of personal curiosity and interest, as a professional planner and academic. Throughout my educative career I have always been intrigued by the thought of how things could be when they would deviate from the norm and current paradigms. This combined with a big interest in improving living environments with small scale interventions, possible with limited supplies or budgets, guided me towards this topic. For this process I would like to thank my supervisor Ary Samsura; where I at first I thought this topic was unworthy for a master thesis, he convinced me, with the right guidelines, that it was in fact very possible to do so. Furthermore, I would like to thank Ary for our valuable meetings. These meetings did not feel hierarchical for me, but more as two colleagues sparring to retrieve the best results, which was very valuable for me as it suits my personal style of work.

The thesis has been written in strange times, in a process with ups and downs. The situation with Covid-19 virus could not be predicted in the beginning, but worked both as a curse and a blessing for this thesis. Where the wished long working days at university had to be swapped for a working environment at home, with all additional inevitable distractions and a crashed laptop resulted in a tough delay, the virus worked as an advantage for the sample size of the survey, which was enormous, as people worked from home during the distribution of it and where arguably longing for some distraction. When I walked through Nijmegen-Oost for two weeks straight, to individually distribute the thousands of survey invitations, I got a sense that the topic really appealed to the people in Nijmegen-Oost, from discussions on the street to a lot of phone calls and E-mails. I would also like to thank my girlfriend, Luka, not only for helping with the distribution of the invitations but above all for creating a warm and productive working environment, with good lunches, motivation and well working breaks, either with a good cup of coffee, or a recharging visit to the Waalstrand.

In a way it feels weird to write these words, as they potentially are the last words I'm writing as part of my educative career, which strikes 4/5th of my life. But learning never stops, and I'm looking forward to that.

D. Sanders

Abstract

With cities becoming denser and a global goal of limiting the emission of greenhouse gasses, an urgent need to rethink urban mobility and the space use of the car exists. Where cars are in a stationary mode for 95% of the time, this thesis provides answers for this matter. Mainly in the USA, the transformation of parking space into other forms of public space grew popular in the last decade. It is however yet unclear how this concept would work out in countries with a different attitude- and planning system. In this thesis, the perception of people in the neighborhood Nijmegen-Oost - a predominantly pre-war residential area in the city of Nijmegen in the Netherlands - concerning the transformation of parking space into other forms of public space is researched and accounted for. The aim of the research is to identify current parking- and car driving behavior and relate it to the eventual transformation of parking space in the neighborhood, for which reasoning behind perceptions and attitudes will be determined. This knowledge has the goal to contribute to the low amount of academic knowledge about the possible future of parking in relation to public land-use in residential neighborhoods in the Netherlands.

To do so, the following main research question has been formulated *"what are the most important factors that influence the perception of people in Nijmegen-Oost on parking space and its eventual transformation to other forms of public space and how can this perception be explained?".* The research questions are answered with the help of a short literature review and three empirical theories as a framework. The main data input comes from a survey (N = 934) which has been distributed in all streets of the research area, in which different influential factors on the perception are tested, along with other relevant information. More data is derived from focus group discussions, which function as a qualitative elaboration of the quantitative survey data.

The data shows a very mixed population group, with a wide range of perceptions and attitudes. The general attitude towards the concept of transforming parking space into other forms of public space is more to the positive side of the spectrum, but is heavily influenced by personal circumstances. From these personal circumstances, the current perceived pressure on the parking availability in people's direct living environment has the strongest influence on the perception concerning transformation, as most people who currently experience a parking problem are expecting the problem to deteriorate when parking space will be transformed. The most influential factor, derived from the empirical theories, that influence people's perception is motivation, which shows that people who have a high motivation in thinking about- and improving their neighborhood, generally have a positive perception about the potential transformation. Although the transformation of parking space into other forms of public space in Nijmegen-Oost seems to hold a lot of potentials, this potential is highly locational as many areas in the neighborhood currently experience a parking problem. The demographics, motivation and general attitude of people in other parts of Nijmegen-Oost, however, give the neighborhood a promising character for the possibility of transformation in the (nearby) future.

Table of contents

1. Introduction

1.1 Research problem

Technology is developing itself in a pace like never before, but the transport modes which are used nowadays in our cities are essentially still products of the 19th century – the tram, the train and especially the car (Newman, Kosonen, & Kenworthy, 2016). With an ever-increasing urbanization and cities becoming denser, combined with a global challenge to limit global warming, it is essential to rethink the way in which we use space and use fossil fuels within the urban realm. The city of the future will need to be built around a different transport- and urban paradigm (Glazebrook & Newman, 2018). With major developments in the field of transportation in the urban context, like AV's (autonomous vehicles) and car-sharing-services, a mobility transformation in our cities seems inevitable (Carlin & Rucks, 2015). But, a change of transport modes also invites us to rethink one of the most space-demanding activities in cities: parking. Cars are parked 95% of the time and it is believed that for each car at least 3 parking spaces are necessary: one at home and two at other destinations (Shoup, 2014). In Europe alone, approximately 10,800 square kilometers of – mainly urban – land is dedicated to parking. This is approximately one-third of the Netherlands or four times Luxembourg (Mingardo, 2016). With this knowledge, why is valuable space in residential neighborhoods still occupied by stationary vehicles instead of used for public space or public utilities, and how can we use this space to create better living environments for residents?

1.2 Research area

The research is conducted in the neighborhood of Nijmegen-Oost in Nijmegen, the Netherlands. The neighborhood is bordering the city center of Nijmegen (blue circle in figure 1, where red represents the research area and yellow other parts of Nijmegen-Oost) and can be characterized as a 19th century and pre-war neighborhood (Nijmegen, 2014). Traditionally these type of neighborhoods have the biggest problems when it comes to car parking, mainly because they are built at the time when there were no, or only a few cars. Also, there can only be parked on the side of the streets, while the housing density is relatively high (Coevering et al., 2008). These type of neighborhoods are typical for cities in the Netherlands with a historic city centre (Lopez at al., 2009), so it is very plausible that outcomes of this research can be applied to other cities with similar characteristics in the Netherlands. Besides problems with parking, this kind of neighborhood is often also characterized by a lack of public space and greenery, which can be related back to the space use of the car (Harbers, 2009). The combination of these characteristics makes Nijmegen-Oost a suitable location to conduct this research, besides it being in the hometown of the researcher, which proved to be very pragmatic in times of Covid-19 . Nijmegen-Oost consists of a total of eight sub-districts (see figure 1): Ooyse Schependom (1), Hunnerberg (2), Altrade (3), Bottendaal (4), Galgenveld (5), Hengstdal (6), Kwakkenberg (7) and Groenewoud (8) (AlleCijfers, 2020). The research area consists out of five of these eight districts. Ooyse Schependom, Kwakkenberg and Groenwoud are not included because they do not reflect the characteristics of a 19th century or pre-war neighborhood, as they are located on the edges of the city, near rural areas.

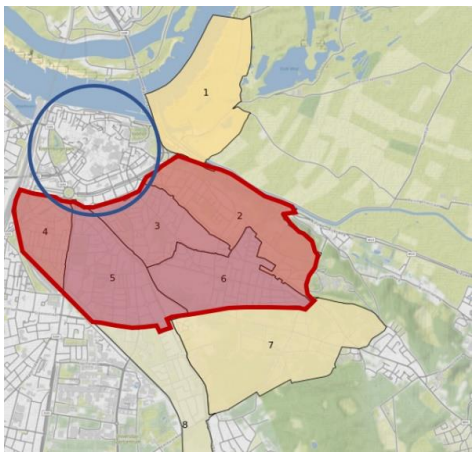


Figure 1 The research area and the city center of Nijmegen (Sanders, 2020)

1.3 Research aim

This research aims to identify what determines parking behavior and why parking space is preferred over extra public space and how this possibly can be changed. Furthermore it tries to identify the perception of residents concerning eventual transformation from parking- to public space in the future in Nijmegen-Oost and determine how this repurposed space can or should be used. More specifically the aim of this thesis is twofold:

a) To find out what currently influences the resident's perception and behavior on car use, parking and public space.

b) To explain the perception of residents concerning the eventual transformation of parking space into other forms of public space.

1.4 Research questions

Main question

"What are the most important factors that influence the perception of people in Nijmegen-Oost on parking space and its eventual transformation to other forms of public space and how can this perception be explained?"

Sub-questions

The main research question is divided into sub-questions where each question answers a part of the main research question

1. "What factors influence the choices of people regarding parking and car use?"
   a. *This question searches for an answer to what reasoning is behind the choices people make concerning parking in the residential neighborhoods of Nijmegen-Oost.*

2. "How can parking demand and car ownership in Nijmegen-Oost be decreased?"
   b. *This question is focused on possible measures to decrease the need for car use and on-street parking and explores the possibilities and aims to find out which measures have the most potential in Nijmegen-Oost.*

3. "What barriers are in the way for repurposing parking space into other forms of public space?"
   c. *This question tries to identify current barriers - from behavioral, spatial, social and policy sources – which are in the way of successfully transforming parking space into other forms of public space.*

1.5 Scientific relevance

Though in the last 5-10 years the literature on parking, or shifting away from parking, has enormously grown, there are still many questions for policy makers and planners that have not been answered yet. By far the largest academic contribution to parking concerns the economics of parking. As recently suggested by Inci (2015), the economic literature has focused mainly on cruising for parking, spatial competition, parking requirements and pricing. Research on the spatial qualitative impact of parking is still missing in the academic field. Furthermore, the existing literature on parking is almost exclusively focusing on situations for new developments. Which makes the academic knowledge on transformation of parking space in existing urban areas almost non-existing. The same goes for downtown areas or parking at the destination versus parking in residential neighborhoods, where knowledge on downtown areas is the sole ruler and knowledge on residential neighborhoods is missing (Christiansen et al., 2017). Moreover, existing scientific literature is mainly based on the North American planning experience and the associated infrastructure, which results in a knowledge-gap on what causes can explain the parking behavior and perception of people in the Netherlands and also how the transformation of parking space would be received. Lastly, there is currently no academic knowledge about the perception of parking when people are exposed to alternatives, or the discourse of 'experiential futures' (Candy & Dunagan, 2017).

1.6 Practical and societal relevance

Residential parking is an upcoming issue in many towns and cities (Marsden, 2014). Whilst cities becoming denser and the pressure on public space and urban green is becoming higher, car parking still receives priority over these utilities. Currently it's hard to imagine the city and the urban system without cars, but continuing with building and using cities according to the principles that emerged over the 20th century on the other hand, with a dominant role for automobility and all the CO2 emissions which are a result of this car dependency, should also be unimaginable (Hajer & Versteeg, 2018). With figures showing that car-dependency is receding due to changing trends and demographics (Carlin & Rucks, 2015). It is likely to think that in the future there will be an oversupply of parking spaces in existing neighborhoods, which were built during the time of the car being the general paradigm in urban developments. Besides trends in travel behavior, technologies – like car-sharing services and AV's – also predict a change in the need for parking (Duarte, 2018). This offers the opportunity to planners to use this space, which can be found all over urban areas, for improving neighborhoods efficiently and creatively. Turning parking space into public space is a practice which is (yet) barely done in the Netherlands. With the need for parking being reduced in the future and the pressure on public space increasing, more academic literature and knowledge is needed to make this transformation successful in the future and to create better living environments for people. Furthermore, it is these neighborhoods themselves where the challenges of continued progress in parking policy are greatest—and where it can be difficult to communicate the value of a new, more stringent approach to parking (Rosenblum, Hudson & Joseph, 2020).

2. Literature review & Theoretical framework

The existing academic literature can be divided into different segments and subjects that will be discussed in the next section. The literature regards different aspects which all contribute to answering the questions in this thesis. It concerns literature on parking and car-use, repurposing of parking space, public space and theories on behavioral change and innovation.

2.1 Literature review on parking and public space

2.1.1. Parking demand

The last decennium, parking as a 'static form' got more attention from scholars and academics (Liu et al., 2017). Not only literature on better parking management got attention, but also evidence-based literature on ways to decrease the need for parking, or decrease the pressure on parking infrastructure became more popular (Mingardo, 2016). The most attention in academic literature within this topic is given towards the elimination of (minimum) parking requirements. Although most literature concerns new developments, the literature proves that neighborhoods can function with less parking space than is currently standardized (Shoup, 2004). Gou & Ren (2013) reported that there is an average decrease of 52% of developed parking space when parking minimum requirements are eliminated. For existing neighborhoods this can mean that residents have the choice for an unbundled parking space (parking space that is rented separately from building space) in relation to their homes (Gabbe & Pierce, 2017), so that households without cars don't pay for expensive parking space. The second most discussed issue related to parking in literature is concerning the right pricing of parking. Free parking is often seen as a public good, although parking is in fact very expensive (Shoup, 1997) and under-pricing a resource leads to its exploitation (Moore, Thorsnes & Appleyard 2007). Furthermore, the need for parking space can be effectively reduced by promoting and facilitating walking (an average reduction of 5-15%), cycling (10-20%), use of private parking lots and garages (15-20%), public transport accessibility (10-20%), ridesharing and carsharing options (5-10%, or 4-8 parking spaces per shared vehicle) (Litman, 2006; Martin et al., 2010; Litman 2017). Also demographic factors like age, income and type of household can heavily influence the need for parking space (20-40%) (Tasi & Chou, 2012). While all these technologies and measures are already available, there are also some future developments which can decrease parking demand, mainly the development of Autonomous Vehicles. For every AV in a shared system, eleven to twenty parking spots can be taken out of the system (Zhang & Guhathakurta, 2017; Segal & Kockelman, 2019). Besides technical and practical interventions, parking demand can also be decreased by changing the discourse or paradigm on parking and car-use within a certain population (Glazebrook & Newman, 2018).

2.1.2 Transformation of parking space

With many studies explaining the spatial pressure of parking space and an increasing attention for public- and green space within living environments of the future city (Carmona, 2019), the transformation of on-street parking into other space usages got attention in literature the last few years. Streets are the quintessential social public spaces of cities (Mehta, 2013). But while the multiplicity of functions of streets has been researched thoroughly, urban planning still struggles with its incorporation (Schönfeld & Bertolini, 2016). The most literature on the topic of repurposing parking space concerns the use of parking spaces for parklets. Parklets are permanent or temporary installations with different purposes, which occupy one or more parking spaces (Littke, 2016) or a strategy to *"convert curb-side parking spaces into new spaces for seating, greenery, and places to gather and stop"* (SF Pavement to Parks 2012). Studies find that parklets do not significantly decrease neighborhood parking availability (Dai, 2013; Loukaitou-Sideris et al., 2016), but do positively influence pedestrian- and public activity (Prat, 2011). Another form of repurposing parking-space is flexible on-street parking, where parking space is used for different purposes throughout the day (Mingardo, 2016). Concerning the Netherlands, the transformation of parking space remains a speculative practice and has not been brought to relevant practice yet, which results in no relevant literature being available.

2.1.3 Public space & streets

Traditionally seen, public space has always been one of the main pillars in the field of urban planning, both practically and scientifically (Amin, 2008). With a renewed interest in urban living over the last decades, high quality and inclusive public space are getting higher on the city's agendas all over the world (Mehta & Bosson, 2018). In the global north, more and more cities have been identifying, claiming, and making space public in locations and in ways unexplored in the past (Anderson et al., 2017). Literature provides evidence for the importance of attractive public space in supporting a sense of safety, pleasurable experiences (Childs, 2004; Cooper Marcus & Francis, 1998), public life (Gehl, 2004), or what is referred to as 'city moments', where strangers enjoy a shared experience (Whyte, 1980). Furthermore, it is stated that the support of high quality urban spaces may extend to the promotion of social and psychological health in modern communities (Mehta, 2007). At a neighborhood scale, public space might simply be somewhere to rest, hang out, or play whilst providing a visual pause in the flow of streets and traffic (Carmona, 2018). Streets have always been a central part within this public space and city life, especially since the widely recognized work of Jane Jacobs. For people who live in cities, it is the streets that represent the outdoors (Jacobs, 1993) and is the place for social and informal contact, outside of commercial areas. Streets that support stationary activities such as standing, sitting and talking provide opportunities for short-term, low-intensity contacts that constitute easy interactions with other people in a relaxed and relatively undemanding way (Jacobs, 1961; Gehl, 1987), which is found to be an essential part for livability and wellbeing in residential neighborhoods (Huppert & So, 2013). Some academics have tried to frame public space into some key qualities, of whom the best known is William H. Whyte. Whyte describes successful, or high quality public spaces as those that address issues of accessibility, activity and use, comfort and image, and sociability (Francis et al., 2012). Another and more recent framework states that successful public spaces are evolving, diverse, free, delineated, engaging, meaningful, social and balanced (Carmona, 2018).

2.2 Theoretical framework

In the theoretical framework, three theories are used. Two of them concern theories on behavior change and one theory concerns the adaptation of innovation. The theories are used to gain more understanding about the topic and to find factors that influence the perception of transforming parking space into other forms of public space, which can be considered a form of behavioral change as a change in behavior is needed to make transformation possible. For these factors, the two theories about behavior change will be used. Subsequently, the theory on the adaptation of innovation will be used to find an explanation and framework on how people in Nijmegen-Oost can adopt the concept of transforming parking space to other forms of public space.

2.2.1 Theory of Planned Behavior

The Theory of Planned Behavior (TPB) is one of the most frequently cited and influential models for the prediction of human social behavior (Azjen, 2011). It is a theory that focuses on a cognitive approach to explaining behavior and focuses on the attitudes of individuals and their beliefs. The Theory of Planned Behavior (Ajzen & Madden,1986) suggests that intention to act, or the effort people will make to perform a behavior, is the most proximal determinant of behavior (Ajzen, 1991).The TPB originated from the Theory of Reasoned Action (Ajzen & Fishbein, 1975). The Theory assumes that the intention to display behavior is influenced by the factors attitude, subjective norm and perceived behavioral control.

Attitude refers to the approach or belief regarding the behavior. It can be seen as an evaluation of the behavior (i.e. positive or negative) and the associated consequences that the behavior causes. Strong correlations have been observed between behavior and the attitude that a person displays (Nisbet & Gick, 2008). For example, more conscious, open-minded and forward-looking people display more behavior where a sort of change or transformation is necessary (Ebreo & Vining, 2001). *Subjective Norm* refers to the social pressure that is put on a person and which they feel from relevant others, which causes an individual to perform behavior that is socially accepted. *Perceived behavioral control* explains the subjective perception of how easy or difficult the behavior will be to carry out.

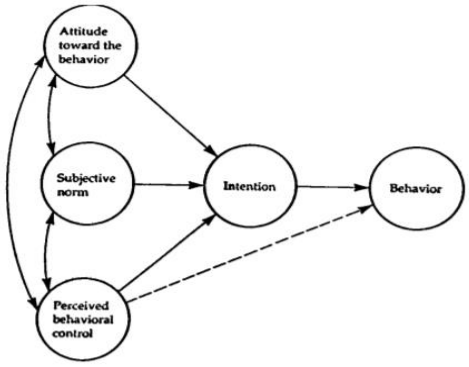


Figure 2 The theory of planned behavior (Azjen, 1991)

Besides the three main factors *attitude*, *subjective norm* and *perceived behavioral control*. The TPB is based around another central concept, namely *intention,* which in the theory is seen as a result of the aforementioned factors. Intentions are assumed to capture the motivational factors that influence a behavior; for example how hard people are willing to try or how much of an effort they are trying to exert, in order to perform the behavior. The stronger the intention to engage in a behavior, the more likely should be its performance (Azjen, 1991).

A strength of the TPB is that its approach provides a framework for discerning and understanding the reasons or beliefs that motivate a behavior of interest for each particular population of interest. With use of the theory, possible interventions can be designed to target or change certain believes or values, leading to changes in intentions and behaviors (Glanz, Rimer & Viswanath, 2008). The main criticism on the TPB concerns its sufficiency or inquire into its limiting conditions to fully explain behavior in complex systems, but the theory's assumptions on basic reasoned action are widely accepted, even by critics of the theory.

2.2.2 Behavior model of Fogg

The behavior model of Fogg is a relatively new (2007) model which tries to explain and understand behavior and behavioral change. The model is based on three main elements: Motivation, Ability and Triggers (Metz, 2013). When all these elements are present, behavior is more likely to change and if planned change of behavior by certain measures is not happening, at least one of these elements is often missing. *Motivation* concerns the degree to which someone is motivated to display the targeted behavior. *Ability* refers to what extent someone is able to display the targeted behavior. For a specific behavior, motivation and ability can range from high to low. But these two elements alone are not enough: the behavior must also be triggered. The *trigger* is often lacking. Even if the motivation is high and it is easily doable, a trigger is still needed. You don't do many things that you enjoy doing. Simply because you don't think about it at the right time (Fogg, 2019). The FBM categorizes people into four groups based on motivation and ability and posits that those with high motivation and high ability will adopt a behavior when prompted (Agha et. al, 2019). With the use of the FBM it can be hypothesized that a person with high motivation for a certain behavior and who finds it easy to practice the behavior, when prompted or triggered, will adopt the behavior. When these factors are adopted into a graph, were the four groups based on motivation and ability will become present (see figure 3). The person with high motivation and high ability will occupy the upper right quadrant of the graph. A person with low motivation and low ability for the behavior will not adopt it when prompted and will occupy the lower left quadrant of the graph. A person with high motivation for the behavior but with a low ability to adopt the behavior, will occupy the upper left quadrant of the graph. Finally, a person with high ability to adopt the behavior but low motivation towards it, will fall in the lower right quadrant of the graph. Fogg conceptualizes a threshold (the "action line") above which persons with a combination of sufficient motivation and ability, when prompted, will adopt the behavior. A person with a combination of motivation and ability below this line, will not change their behavior, even when they are triggered (Fogg, 2009). The FBM furthermore proposes that three core elements influence a person's behavior: anticipation, sensation and belonging. Ability is compromised out of five elements: physical effort, money, time, mental effort and routine. The model defines the trigger to be the message or stimulus that catalyzes behavior change.

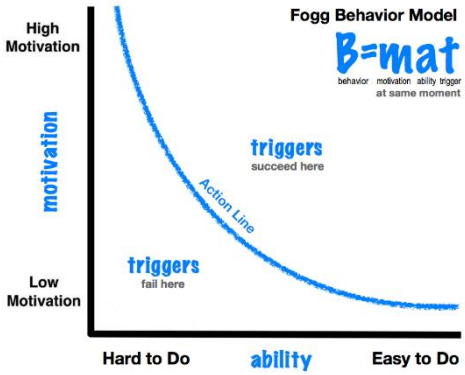


Figure 3 Behavior model of Fogg (Fogg, 2007)

2.2.3 Diffusion of innovation theory

The Diffusion of Innovation (DOI) Theory, popularized by E.M. Rogers in 1962, is one of the oldest social science theories. It was developed to explain how a new idea or product (innovation) gains momentum over time and diffuses or spreads through a specific population or social system (Rogers, 2003). The theory has been studied and applied in a large area of academic disciplines, mainly communication, marketing, geography and public health (Moseley, 2004). DOI can be used to better understand and guide the implementation of a new idea, a new pattern of behavior, or a new technology (Kincaid, 2004) and as a framework to guide the implementation of change (Cummins et al, 2013) . DOI explains that innovation diffusion is "a general process, not bound by the type of innovation studied, by who the adopters are, or by the place of culture" (Rogers, 2003, p.16). It thus states that the process through which an innovation becomes diffused has universal applications for all imaginable fields. According to the theory, there are five elements that influence if adoption or diffusion of a new innovation or behavior will occur:

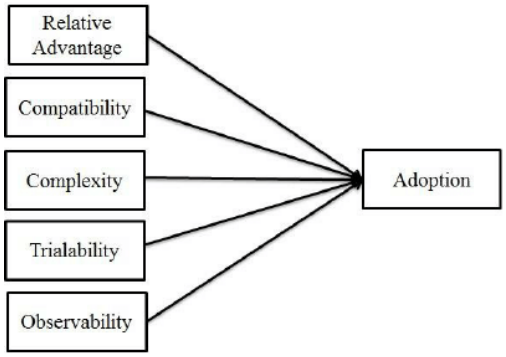


Figure 4 The five elements that influence adaptation in the DOI (Rogers, 1962)

1. Relative Advantage -The degree to which an innovation is perceived as better than the idea it replaces.
2. Compatibility - How consistent the innovation is with the values, experiences, and needs of the potential adopters.
3. Complexity - How difficult the innovation is to understand and/or use.
4. Trialability - The extent to which the innovation can be tested or experimented with before a commitment to adopt is made.
5. Observability - The extent to which the innovation provides tangible results and is visible to others.

As individuals vary in their willingness and ability to accept new ideas and change (Valente, 1996), DOI identifies several personality types of adaption within a population, namely: innovators (the first 2.5% to adopt the innovation), early adopters (the following 13.5%), early majority (the following 34%), late majority (the following 34%) & laggards (the final 16%), who all represent a different pace of adoption. DOI suggest that the diffusion process takes off once approximately 10% to 20% of the members of a population have adopted an innovation (Rogers, 2003).

Conceptual framework

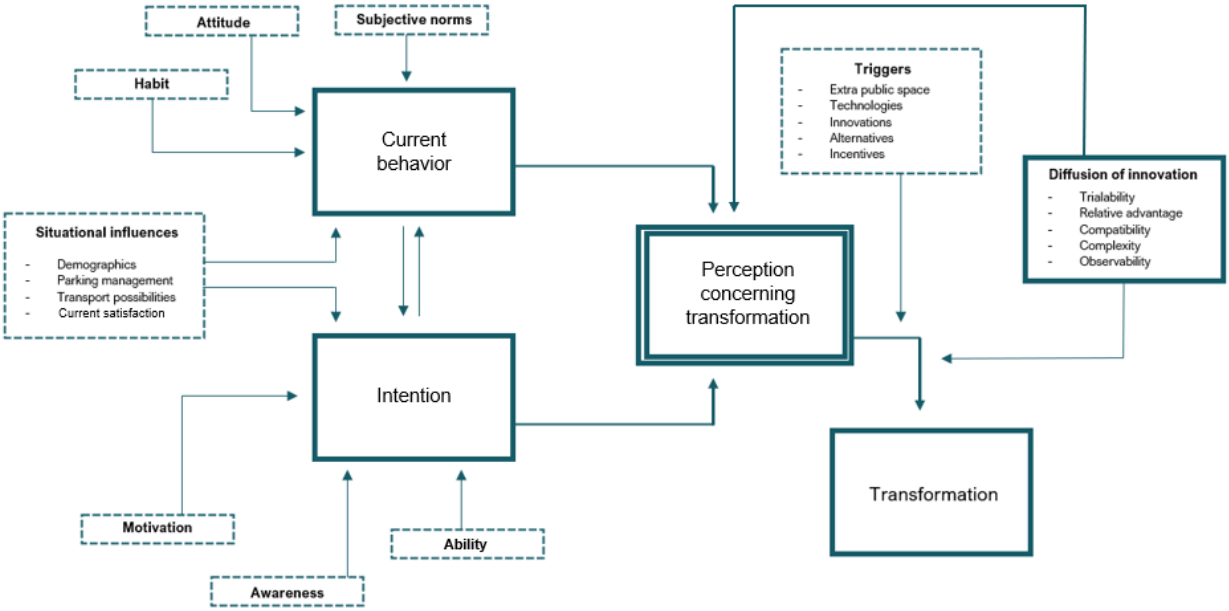


Figure 5 Conceptual framework (Sanders, 2020)

The conceptual framework combines the input from the literature review and the relevant theories. These two main sources of knowledge are combined into one framework for understanding and researching what determines and can possibly change people's behavior on parking in relation to public space and it is trying to answer both the main- and sub questions. It combines relevant parts of the Theory of Planned Behavior, Fogg's Behavior Model and the Diffusion of Innovation Theory and contextual literature, which is translated it into a new framework which is highly applicable to the research. The framework will be used in the rest of the research to design the content of the methodology by focusing on the individual factors in the model. When the data is collected and analyzed, the model will be compared to the results found in the data in order to make eventual adjustments concerning factors, concepts or relationships. From these results it can be determined which factors are the most influential and the next step in the research process can be taken, namely the creation of focus groups. In the model it is visible that the perception concerning transformation, which will be used as the dependent variable in the analysis, is likely to be influenced by two main components, current behavior and intention. There are two main components that are expected to have a minor influence on this perception, being the situational influences and the factors from the Diffusion of innovation theory. As described in the theories from the theoretical framework, current behavior is mainly influenced by people's habit, their attitude and the subjective norms surrounding people. Intention on the other hand, which can be in line with the current behavior but can also deviate, is mainly made up out people's motivation, their awareness about a certain subject and people's ability to make their intention a reality. The situational influences can affect both current behavior and intention as these influences can be very different. The perception that people have about the concept of parking space transformation is expected to have a big influence on eventual transformation, but this is accompanied by possible triggers, mainly to decrease car ownership and parking demand and is streamlined by factors from the Diffusion of innovation theory.

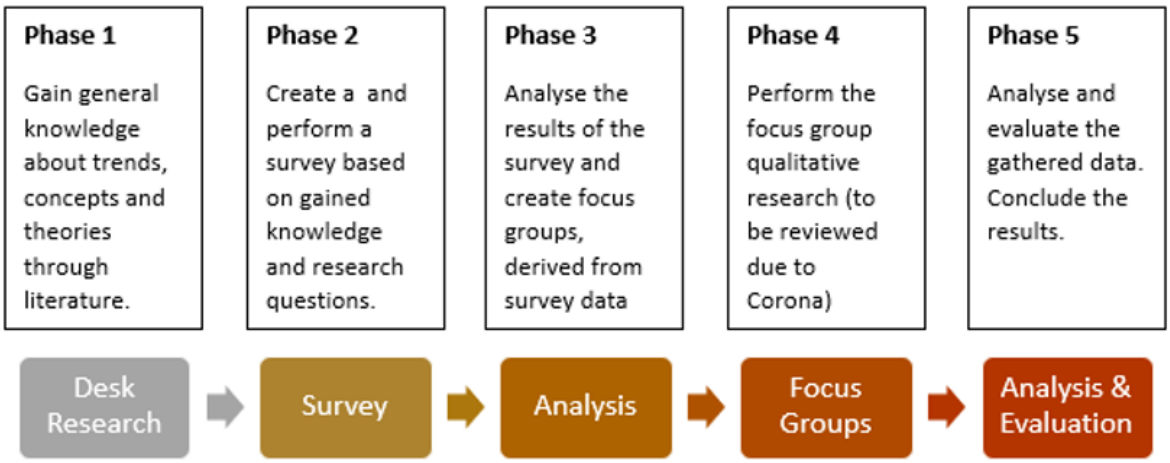
3. Methodology

3.1 Research strategy

The research paradigm which will be applied in this thesis will be interpretivism. The interpretivists believe in socially constructed multiple realities. It states that external reality cannot be directly accessible to observers without being contaminated by their worldviews, concepts, backgrounds (Rehman & Alharti, 2016). This paradigm fits the research because the research searches for answers in a population pool with different characteristics and tries to identify why their reality is constructed in a certain way. It tries to discover different perspectives on the same issue.

The research design for this thesis is mostly related to an explanatory research design. Explanatory research design is used for problems that are not well researched before, demand priority and provide a better-researched model (Ivankova, Creswell & Stick, 2006). Explanatory research is often associated with a mix methods approach, which means integrating both quantitative and qualitative data at some stage of the research process within a single study to gain a better understanding of the research problem (Tashakkori and Teddlie 2003; Creswell 2005). With this insight the research design can be explained as a mixed-methods sequential explanatory design, where quantitative data is elaborated or explained by qualitative data. This approach is chosen because the quantitative data is expected to provide a general idea of the research problem (survey), which can be further explained and refined exploring participants' views in more depth (focus groups).

The research will be practically divided into five phases. The first phase will consist of desk research. The goal of this phase is to gain knowledge about the topic related to the concepts and theories of behavioral change and transformations, which will be used in the research. In the second phase, a survey will be created for the inhabitants of Nijmegen-Oost. This survey will be based on the research question- and aim and knowledge gained in the first phase. Surveys are usually used to create knowledge about a population, collected from a subset of this population (Schonlau, 2002). In the third phase, the results from the survey will be analyzed and focus groups will be created from the results, which are a form of group interview that capitalizes on communication between research participants in order to generate data and create a deeper understanding of social and practical issues (Kitzinger,1995; Nyumba et al., 2017). In the fourth phase, group discussions will be performed with the chosen focus groups to elaborate and enrich the data from the surveys. In the last phase, all data will be reviewed, evaluated and concluded. After this, the main- and sub-questions should be answered.



3.2 Research methods

The research is using a mixed approach of quantitative- and qualitative methods, with the main focus on two research methods: Survey and Focus Groups. The survey will be created from a framework of both literature and theories on behavioral change. Besides more basic elements like demographics this survey will explore people's perception of parking in relation to space use, together with factors that influence parking behavior and choices on travel modes. From the theories on behavioral change, different groups within the population can be created. For example, people who show a positive perception towards eventual transformation and people who show a negative perception, or car- and non-car owners. From the data of the survey, these different groups will be translated into to determine focus groups. With these focus groups, the data will be further elaborated and discussion can take place on the first steps of the eventual transformation or change of behavior.

3.2.1 Data collection

Desk research

This part of the data collection is done mainly by desk research. In this part academic, but also grey literature and policy documents are explored to gain a good body of knowledge, which is used later in the research. The literature concerns multiple subjects, mostly and the field of parking- measures, management, trends, the spatial aspect and behavior. Also, the context of Nijmegen has been explored. Furthermore the desk research concerns theories on behavioral change and transformations.

Survey

With the survey, quantitative data on demographics, car-use, parking perception- and behavior and perception of public space in Nijmegen-Oost will be collected. Also data will be collected concerning the perception of residents on public space and the relationship between parking and public space and the eventual transformation. This different kind of data will be combined to make an extensive analysis possible, which explains the different factors that influence the parking behavior of people and which is used to create focus groups. These different factors, derived from literature and empirical theories, will be tested throughout the survey. With Nijmegen-Oost having 34.355 inhabitants (CBS, 2020), the survey needs a minimum of 380 respondents to retrieve a confidence level of 95% and a margin of error of 5% (Qualtrics, n.d). The survey has been conducted in Dutch, as most inhabitants in the research area have Dutch as their native language. The surveys consist of 59 separate questions and will take around 15 minutes to complete. The invitation to the survey will be distributed in a physical matter. 4435 invitations will be printed on colored paper (see appendix 1.1) and are distributed on foot by the researcher. To create a good and even distribution, all even sides of the streets of the research area will receive an invitation to the survey. The participants will have the choice to either enter the survey by typing a link, written on the invitation, into to their internet browser or scanning a QR-code on the invitation, which directs them directly to the survey. To boost the response rate, coupons for local restaurants will be raffled. These coupons can be won by filling in one's email address at the end of the survey. With a random selection program, six email addresses were selected, and the winners were informed.

As described in the research proposal the main question and four out of five sub-question can be fully or partially answered with data from the survey, namely:

The main question: *"What are the most important factors that influence the perception of people in Nijmegen-Oost on parking space and its eventual transformation to other forms of public space?"* Which can be answered with data from survey and will be enriched with qualitative data later in the process.

The sub questions: *"What factors influence the choices of people regarding parking and car use?"* which can be fully answered by the survey data, backed by input from the literature review. *"How can parking demand and car ownership in Nijmegen-Oost be decreased?"*, which can be answered with data from the literature review and the survey and will be enriched with qualitative data later in the process. *"How can people's perception concerning eventual transformation from parking space into other forms of public space be explained?"* which will be answered with input from the survey, and will also be combined with data from the focus group discussions. Lastly, the sub question *"What barriers are in the way for repurposing parking space into public space?"* can be partially answered by open questioning in the survey, but will mainly be answered with qualitative data from the focus group discussions.

Within the survey, the different factors, as described in the conceptual framework, are being tested. These factors are *ability, habit, attitude, motivation, awareness, subjective norms, ability, triggers and situational influences.* Also three adaptational aspects from the Diffusion of Innovation (Rogers, 1962) theory are tested, being change agents, relative advantage and trialability. In the survey a seven-scaled Likert scale is used when the data is ordinal, nominal data is being tested with multiple choice questions. For the analysis of the data descriptive statistics are used, mainly for analyzing the nominal data and for the inferential analysis correlation analysis, the Cronbach's alpha test and multiple regression analysis is used.

Focus group discussions

Within the focus group discussions, the data from the surveys will be elaborated and enriched. The discussion will be held with two different focus groups, one with a negative perception towards transformation and one with a positive perception. Both focus groups will consist out of five participants and both the group discussion will last around two hours. The participants will be carefully selected to create a group of people that is as diverse as possible, selected on age, sex, education, car ownership and the independent variable. The goal of this data is to see how people with certain characteristics approach the topic and to explore possible first steps which can be used to smoothen the eventual transformation from parking space to different other types of public space or other utilities. Also, the focus group discussions will act as a way to discover underlying reasons behind certain choices, attitudes and perceptions.

3.2.2 Data analysis

The quantitative survey data will be cleaned, transformed and analyzed in SPSS, for which correlation- and multiple regression analysis will be executed, together with some supporting tests. In this way the data becomes comprehensive and interpretable. For the qualitative data of the focus groups, no special software will be used as the data will be an elaboration of the quantitative data and don't need to be analyzed with special tools or methods.

3.3 Validity and reliability

Validity

The internal validity is increased by using multiple relevant scientific sources, through which information is justified and confirmed. When using sources outside the academic world, like policy documents or contextual reports, it is important to review its implications in the light of academic evidence. The validity is further increased by using input from the survey, combined with academic theories, to choose the group characteristics of the focus groups. The focus groups will be structurally examined, so it is possible to think about the relationship between certain aspects, which strengthens the internal validity (van Thiel, 2007).

The external validity is warranted be generalizing the findings of the research (Onwuegbuzie, 2000). The findings of the research can be used as a framework for other cities in the Netherlands, or other cities in the global north, with similar demographics and spatial characteristics. Although the exact findings can be slightly different, the sampled population will be of such a size that the results should be generalizable. The choice for interpretivism as research paradigm may be disadvantage for the generalization, because it studies individual perceptions, which makes it difficult to determine whether the knowledge acquired will be valid for similar cases (Williams, 2000).

Reliability

Reliability concerns the repeatability of the research (van Thiel, 2007; Bryman, 2012). Important in this process is that the steps and phases which are performed in the researched are documented and used in a sufficient way. The different steps in the research all have different reliability, desk research and quantitative research have a relatively high reliability. But, qualitative methods in research is less reliable, as the analysis of qualitative data places most of the time in the researcher's mind. However, because the qualitative research has grounded from quantitative results, the reliability will be higher than when just qualitative methods are used.

4. Results & Analysis

4.1 Survey

After leaving the survey available for a period of three weeks, 1058 participants started the survey, of which 934 finished the survey, which make the completion rate 88.28% and the total respondents N=934. The average completion time was 13 minutes and 36 seconds. N=943 on a population size of 34.355 gives the survey a confidence level of 99% and a margin of error of 4%. The survey consists out of 59 separate questions (see appendix 1.3), which can be separated into five main components: demographics (question 1-6), car ownership, use and transport (question 7-21), car parking (question 22-34), public space (question 35-41) and the relationship between parking space and public space and transformation (42-59). Because of the sections *car ownership, use and transport* and *car parking* being irrelevant for non-car owners, these sections are only executed by people who do own a car. Which explains the lower N=769 in these sections.

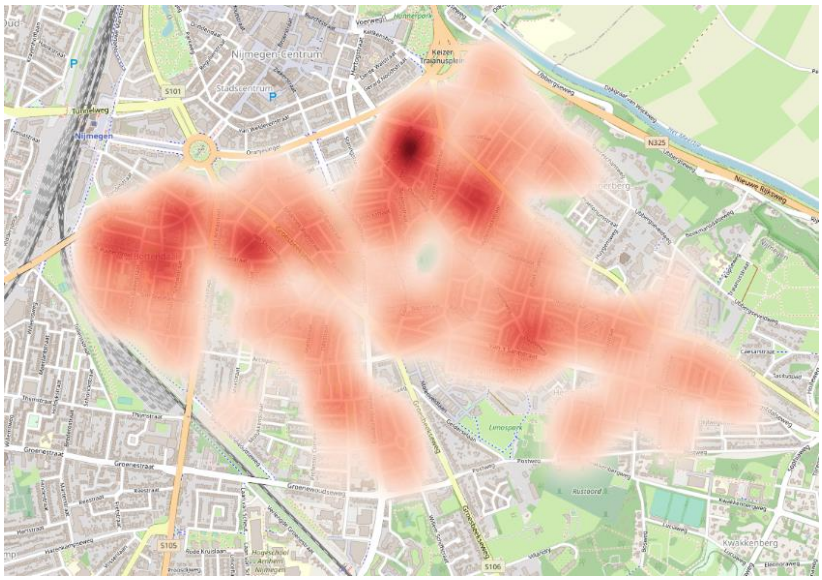


Figure 6 Heatmap of the respondents in the research area. (Sanders, 2020)

4.1.1 Descriptives

To get a sufficient overview of the data, a descriptive analysis has been executed. This descriptive analysis consists of descriptive statistics (N, Mean, Std. Error, Std. Deviation and Variance) off all survey questions, frequency tables (Frequency, Percent, Valid Percent and Cumulative Percent) off all survey questions and lastly frequency bar charts of all survey questions. An extensive overview of all this data can be found in the appendix (see appendix 1.3), while the frequencies are discussed in this chapter. The descriptive analysis has for most questions just been used as a practical guide and overview, but in the case of some questions, it is used to draw conclusions.

As described earlier, the survey has been completed by 943 respondents, which results in a response rate 21.06%. Among the respondents, 49.1% is male and 50.9% is female. All descriptive bar charts can be found in the appendix (1.3). The three most occurring age groups are 18-29 with 24.5%, 50-59 with 20.9% and 60-69 with also 20.7%. Furthermore the level of education within the respondents is remarkably high; 89.8% did graduate either as a bachelor or master (University of applied science or academic university). From the respondents 54.9% lives within a radius of 5 kilometers from their work or education. Although many people live nearby their work or education, 78.4% of the households do own a car. In the age group 30+, where most students are excluded, even 84% of the households do own a car. Within the total respondents 16.1% of the households own more than one car, which translates into 23.4% of the car-owners owning more than one car. From the people who currently do not own a car, 47.3% say they will likely never personally own a car in the future.

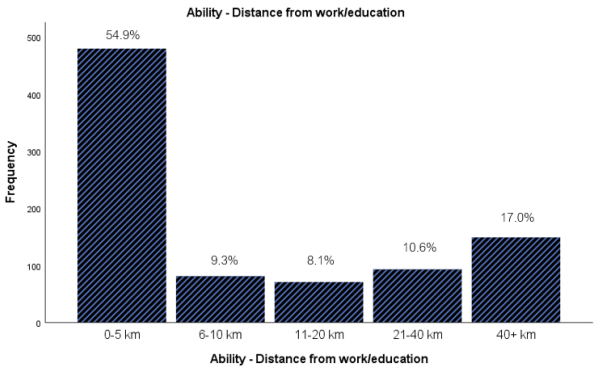


Figure 7 Distance from work or education (Sanders, 2020)

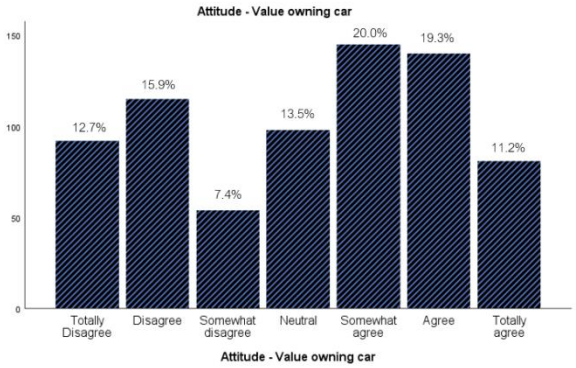


Figure 8 Attitude towards owning a car (Sanders, 2020)

A remarkable fact is that from the car owners, only 35.9% of the respondents use the car for more than one trip per day, with the one trip mostly being driving to work. When we take a look at the reasons why people take the car, distance/time, ease/comfort and the weather conditions seem to play the biggest role regarding this choice. It is interesting to see that the car owners are very mixed when evaluating their habit in car driving and in the value they attach to owning a car; 41.7% (the cumulative of totally disagree, disagree and somewhat disagree) of the car owners tend to say that car driving is not in their routine, while 44.1% says it is. A mix is also visible in the value attached to owning car, where 36.0% is saying they are not (very) attached to their car, while 50.5% is saying they are. When people were asked which triggers could make them deposit their car, it becomes clear that the people in Nijmegen-Oost are not really fond of this idea; all possible triggers are answered with a predominantly disagreeing tendency. The trigger that can count on the most agreeing tendency (the cumulative of somewhat agree, agree and totally agree) is car sharing systems with 34.1%, followed by a financial subsidy and extra public space with 27.2%, and 20.8% correspondently. When openly asked about what other triggers could make people

abolish their car, the two most mentioned triggers were better public transport with 22.5%, and a changed working situation with 21.4%. When it comes to travel modes used by the inhabitants of Nijmegen-Oost to go to either work and public utilities it is visible that most respondents are traveling to their work by bicycle with 39.8%, closely followed by the car with 35.5%. Public transport only accounts for 12.2% of all work related travels. When people are travelling to public utilities, the numbers are vastly different; 53.5% of the respondents are traveling by bicycle, while 31.6% is going on foot. Only 13.6% is using a car to travel to public utilities. These numbers seem relatable to Nijmegen-Oost being a neighborhood in proximity of the city center, where the density of public utilities is generally higher (de Coevering et. Al, 2008).

Overall, people in Nijmegen-Oost seem to be quite satisfied with the parking utilities in their street, with a mean rating of a 6.75 out of 10. Although the mean can be seen as a sufficient score, 29.5% of the people rewards their satisfaction with a rating of 5 or lower. The satisfaction with parking in the neighborhood does not differ relevantly from the satisfaction based on the people's own street, with a mean rating of 6.63 out of 10. It is clearly visible that people in Nijmegen-Oost are experiencing parking in their own street as being in their routine; 8.6% somewhat agrees, 35.6% agrees and 29.5% totally agrees, a cumulative of 73.7%. This is also reflected back to the value people attach to parking in their own street; 13.9% somewhat agrees, 30.0% agrees and 30.9% totally agrees, a cumulative of 74.8%. It is interesting to see that the difficulty of finding a parking spot is experienced very differently within the respondents (see figure 9). Possibly as a result of this, 55.8% of the people do not have a big problem with walking more than 100m, or one minute, to or from their parked car; 35.6% is willing to walk 100-200m and 22.1% 200-500m. Only a negligible proportion of the population is willing to walk more than 500m. When the same triggers are re-introduced which were used earlier in the survey, but now for parking the car somewhere else than in people's own street, the tendency is a bit more to the 'agreeing side' than it was with abolishing the car. Here the most agreeing tendency is towards extra public space as a trigger, with 35.1%, closely followed by a financial subsidy with 34.8%.

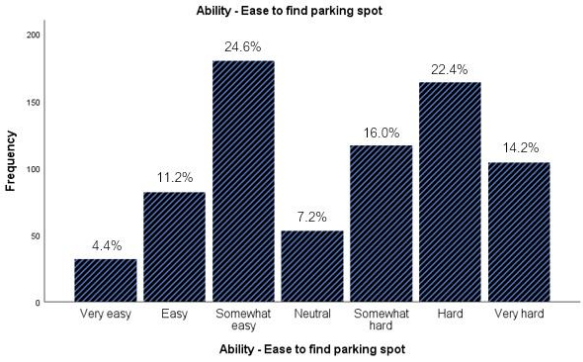


Figure 9 Ease to find a parking spot (Sanders, 2020)

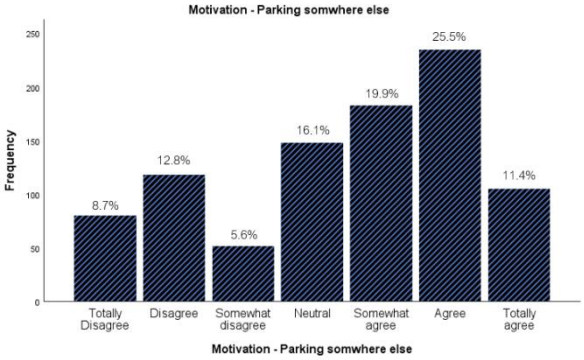


Figure 10 Motivation to park somewhere else (Sanders, 2020)

The same thing which was visible with the satisfaction of parking utilities within Nijmegen-Oost, is present with the satisfaction of public space in the respondent's streets; a mean score of 6.63 out of ten, where 26.0% of the people reward their satisfaction with a rating of 5 or lower. The score for the satisfaction of public space in the neighborhood is a bit higher with 7.13. Here only 17.0% of the people reward their satisfaction with a score of 5 or lower. People in Nijmegen-Oost acknowledge the importance of this public space, as 90.4% agrees with good public space being important for their neighborhood and 78.0% thinks they understand the added value of it. When people are asked if they would find it interesting to think along with public space design in their neighborhood, more people are positive towards this idea than they are negative, 46.0% of the

people are positive while 23.2% are negative. Also a big proportion of the population is neutral about this topic, 30.8%.

When people were showed two different street images; the same street with one street image with transformed parking spaces and one street image where this space was still occupied by parked cars, and people were asked to their preference, a clear preference for the street image with less parked cars came to the light. In example 1 85.8% of the people choose for the version with fewer cars, in example 2 80.7% and in example 3 68.7%. When asked if people were willing to put personal effort into reaching the street image of their choice, 42.9% of the people said they were agreeing with this statement, with again a big proportion being neutral, 32.1%. It is important to note that, while this relatively big proportion agreed with the statement, the majority tends towards the more neutral side of the spectrum; 21.2% somewhat agrees, 15.6% agrees and 6.2% totally agrees. To reach the street image of their choice, the respondents don't seem very fond on the idea of disposing their car in order to reach this street image, only 19.0% agrees with this statement, 51.4% of the respondents either totally disagree or disagree. Parking somewhere else than people's own street to reach the preferred street image can count on more support; 56.8% agrees with this statement. People in Nijmegen-Oost seem to be quite aware of the space use of parked cars, 77.0% of the people indicates that they are aware of this. While people are aware of the topic, only 34.7% of the people are actually bothered by parked cars in their street image. 41.1% thinks that public space is more important for their neighborhood of street than parking space. When people are asked about their attitude towards the eventual transformation of a number of parking spots in their streets the results are very mixed. 9.2% of the people have a very negative attitude towards it, 14.0% a negative attitude, 9.3% somewhat negative, 14.3% is neutral, 20.5% is somewhat positive, 20.7% positive and 11.8% is very positive. Generally, the overall tendency seems positive with a cumulative positive attitude of 53.1% and a cumulative negative attitude of 32.6%. When people are asked if they would like to engage actively in the improvement of their street, the most popular answer is neutral with 32.9%. So people don't seem to be very highly motivated to actively engage in this process, although 38.5% agrees with the statement. People are far more agreeing when they are asked towards their eagerness towards change, 79.8 says there are eager towards change, of which 23.2% somewhat agrees, 44.0% agrees and 12.6% totally agrees. To the question whether people would find it interesting or not to experiment with the relationship between parking space and public space in their street, only a small proportion of the respondents is disagreeing with this statement, 18.3%. 42.8% is neutral and 35.7% agrees with the statement.

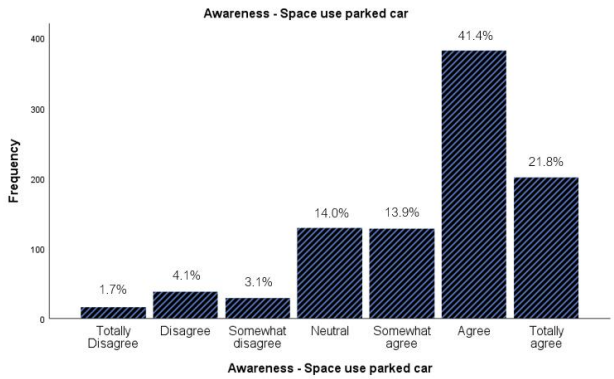


Figure 11 Awareness about the space use of the parked car (Sanders, 2020)

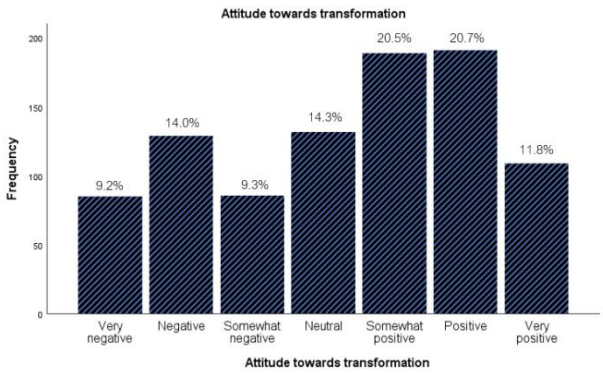


Figure 12 Attitude towards transformation (Sanders, 2020)

4.1.2 Internal consistency

In order to create new variables which can be used in both correlation- and regression analysis, the ordinal data should be transformed into continuous data. This can be done by combining different test questions into one variable and take the mean of the combined test questions as a new variable. The reliability of a scale consisting of different items will be analyzed using the Cronbach's Alpha, which is a measure for measuring the internal consistency of the separate items into one variable (Tavakol & Dennick, 2011). The aim of this Cronbach's alpha test is to see whether a number of items may form one variable together. The test can have a value between 0 and 1. Where a value closer to one indicates a high reliability or internal consistency. A value of >0.7 is normally seen as appropriate (Field, 2013). By performing the Cronbach's Alpha test the following new variables are generated:

Cronbach's Alpha	Internal Consistency
$\alpha \geq 0.9$	Excellent
$0.8 \leq \alpha < 0.9$	Good
$0.7 \leq \alpha < 0.8$	Acceptable
$0.6 \leq \alpha < 0.7$	Questionable
$0.5 \leq \alpha < 0.6$	Poor
$\alpha < 0.5$	Unacceptable

Figure 12 Cronbach's alpha values (Habidin, 2015)

To answer the main question *"What are the most important factors that influence the perception and behavior of people in Nijmegen-Oost on car parking in relation to public space?"* and the sub-question *"How can people's attitude towards eventual transformation from parking space into other utilities be explained?"* four test questions are combined to create the dependent variable for the analysis. These four questions are testing the general attitude of people towards the eventual transformation of parking spaces into public space in their street, their eagerness towards change and the trialability, which is tested by asking the respondents if they would like to experiment with the relationship between parking space and public space in their own street or neighborhood. The trialability includes both personal eagerness towards this as the expected eagerness of the neighborhood. These four test questions together form the behavior and perception towards transformation and the relationship between parking space and public space. The result of the Cronbach's Alpha test is 0.721, which makes the internal consistency of the new variable acceptable.

New dependent variable: *perception concerning transformation.*

Combination of:

Q47. Attitude – Transformation

Q48. Change agents – Eagerness towards change

Q50. Trialability – Personal

Q51. Trialability – Neighborhood

Reliability Statistics

Cronbach's Alpha	N of Items
,721	4

Also new independent variables have been created for the analysis. To start with the new variable which explains *car driving behavior.* For this variable the two questions that test the attitude towards owning a car and the habit of driving a car are combined to create one variable that represents people's behavior when it comes to driving a car. The result of the Cronbach's Alpha is 0.643, which makes the internal consistency questionable. Because of this internal consistency, within the analysis both the new variable will be used, as well as the original test questions in order to see if there are significant differences between the two.

New independent variable: *Car driving behavior*

combination of:

Q14. Attitude – Value owning a car

Q15. Habit – Driving a car

Reliability Statistics

Cronbach's Alpha	N of Items
,643	2

For the new variable that represents *parking behavior,* four test questions are combined, being the habit of parking in their own the street, the frequency of parking in their own street and the attitude of valuing to park in their own street, both personal as in a subjective norm. The result of the Cronbach's Alpha is 0.750, which makes the internal consistency of the new variable acceptable.

New independent variable: *Parking behavior*

combination of:

Q23. Habit – Parking in street

Q24. Habit – Frequency parking in street

Q28. Subjective norm – parking in own street

Q30. Attitude – Value parking in own street

Reliability Statistics

Cronbach's Alpha	N of Items
,750	4

For the new variable that represents the people's current satisfaction of parking, three test questions are combined, being the satisfaction of parking utilities in the people's street, the satisfaction in parking utilities in the people's neighborhood and the ease to what extend they normally can find a parking spot in their own street. The result of the Cronbach's Alpha test is 0.865, which makes the internal consistency good.

New independent variable: *Current satisfaction parking*

combination of:

Q21. RI – satisfaction parking street

Q22. RI – satisfaction parking neighborhood

Q29. Ability – Ease to find a parking spot

Reliability Statistics

Cronbach's Alpha	N of Items
,865	3

For the new variable that represents the people's current satisfaction of public space, two test questions are combined, being the satisfaction of public space in the people's street and in the people's neighborhood. The result of the Cronbach's Alpha test is 0.865, which makes the internal consistency good.

New independent variable: *Current satisfaction public space*

combination of:

Q33. RI – Satisfaction public space street

Q34. RI – Satisfaction public space neighborhood

Reliability Statistics

Cronbach's Alpha	N of Items
,865	2

For the new variable that represent the *awareness about public space,* two test questions are combined, being the question that tests if people think good public space is important for the quality of their street or neighborhood and the question that test if people think they understand the added value of this public space. The results of the Cronbach's Alpha test is 0.640, which makes the internal consistency questionable. Because of this internal consistency, within the analysis both the new variable will be used, as well as the original test questions in order to see if there are significant differences between the two.

New independent variable: *awareness public space*

combination of:

Q35. Awareness – Importance public space

Q36. Awareness – Understood value of public space

Reliability Statistics

Cronbach's Alpha	N of Items
,640	2

For the new variable that represents people's *motivation*, five test questions are combined, being the motivation to think about the design of public space, the effort people are willing to put in reaching the street image of their choice, the willingness of people in disposing their car in order to reach the preferred street image, the willingness to park their car somewhere in order to reach the preferred street image and the motivation in engaging actively in the improvement of their street or neighborhood. This motivation can be either towards eventual transformation, but also towards keeping things as they are, or even more parking space. The result of the Cronbach's Alpha is 0.776, which makes the internal consistency of the new variable acceptable.

New independent variable: *motivation*

combination of:

Q37. Motivation – Think about design public space

Q41. Motivation – Effort to reach street image of choice

Q42. Motivation – Dispose car for preferred street image

Q43. Motivation – Park somewhere else for preferred street image

Q48. Motivation – Active engagement

Reliability Statistics

Cronbach's Alpha	N of Items
,776	5

The last multi-item variable represents the *perceived improvement* of eventual transformation, where two test questions are combined, being if people are bothered by parked cars in the street image of their street and if they attach more value towards public space instead of parking space. The result of the Cronbach's Alpha test is 0.776, which makes the internal consistency of the new variable acceptable.

New independent variable: *perceived improvement*

combination of:

Q45. Attitude – Bothered by cars

Q46. Relative advantage – Public space vs. parking

Reliability Statistics

Cronbach's Alpha	N of Items
,762	2

All other questions from the survey will be treated as individual variables within the analysis. The reason why these variables cannot be treated as multi-item variables is listed below:

Q1. Demographics – Sex	Should not be combined (demographics)
Q2. Demographics – Age	Should not be combined (demographics)
Q3. Demographics – Education	Should not be combined (demographics)
Q4. Demographics – Household	Should not be combined (demographics)
Q5. Ability – Distances	Should not be combined (Other info)
Q6. Location – Zip Code	Should not be combined (Other info)
Q7. RI – Amount of cars in household	Cannot be combined (Other info)
Q8. RI – Car ownership	Should not be combined (Other info)
Q9. RI – Plans to buy a car	Cannot be combined (Other info)
Q13. Influence – Car choice	Should not be combined (Other info)
Q16. Subjective norm – Owning a car	Cannot be combined (deteriorates CA)
Q18. Ability – Travel mode work	Should not be combined (nominal data)
Q19. Ability – Travel mode public utilities	Should not be combined (nominal data)
Q25. Parking Management - Payed parking	Should not be combined (Other info)
Q26. Parking Management – Payed parking sort	Should not be combined (Other info)
Q27. RI – Parking location	Cannot be combined (Other info)
Q31. Ability – Maximum walking distance to car	Cannot be combined (Other info)
Q44. Awareness – Space use car	Cannot be combined (deteriorates CA)

4.1.3 Correlation

All items with an ordinal scale have been tested to the dependent variable *perception concerning transformation* with Spearman's rho correlation, as this is described to be the best fitting correlation test when non-parametric data like the output from Likert scale data or other ordinal data is used (Curusa & Cliff, 1997; Hauke & Kossowski, 2011). All multi-item variables have been tested towards the dependent variable *perception concerning transformation* with Pearson's r, as this is the best fitting correlation test when continuous data is used (Benesty, Chen & Cohen, 2009). These correlation tests will be used to discover strengths of the direct relationships between the factors from the conceptual framework have on the perception of parking space and its relation to public space and the eventual transformation of parking spots, where a high correlation coefficients normally describe a stronger direct relationship on the matter than factors with a low correlation (Mukaka, 2012). It is important to note that while correlations can describe a relationship between different factors, it does not imply causality and does not control for all other variables in one system.

Value of r	Strength of relationship
-1.0 to -0.5 or 1.0 to 0.5	Strong
-0.5 to -0.3 or 0.3 to 0.5	Moderate
-0.3 to -0.1 or 0.1 to 0.3	Weak
-0.1 to 0.1	None or very weak

Figure 13 Correlation strength (Hinkle, Wiersma & Jurs, 2003)

Either Pearson's r as Spearman's rho cannot be calculated for the "sex" variable, as it is a nominal variable without order. To find out whether a significant relationship exists between the dependent variable and the gender of a respondent, the MannWhitney test has been executed. The table below shows a statistical significance of 0.876, which shows there is no significant relationship between gender and the dependent variable.

Test Statistics[a]

	DV - Perception concerning transformation (MIS)
Mann-Whitney U	104475,500
Wilcoxon W	207760,500
Z	-,156
Asymp. Sig. (2-tailed)	,876

a. Grouping Variable: Demographics - Sex

Correlations[a]

			Demographics - Age	DV - perception concerning transformation (MIS)
Spearman's rho	Demographics - Age	Correlation Coefficient	1,000	-,075*
		Sig. (2-tailed)	.	,023
	DV - perception concerning transformation (MIS)	Correlation Coefficient	-,075*	1,000
		Sig. (2-tailed)	,023	.

*. Correlation is significant at the 0.05 level (2-tailed).

b. Listwise N = 926

The variable *age* shows a statistical significant correlation with the dependent variable at the 0.05 level (p = 0.023), although the correlation is significant, the correlation has such a low score (r = -0.075) that the correlation can be neglected. It can be stated that there is no or a very weak (negative) correlation. So, age doesn't seem to be directly related to the attitude towards eventual transformation.

Correlations[a]

			Demographics - Education	DV - perception concerning transformation (MIS)
Spearman's rho	Demographics - Education	Correlation Coefficient	1,000	,124**
		Sig. (2-tailed)	.	,000
	DV - perception concerning transformation (MIS)	Correlation Coefficient	,124**	1,000
		Sig. (2-tailed)	,000	.

**. Correlation is significant at the 0.01 level (2-tailed).

b. Listwise N = 925

The variable *level of education* shows a statistical significant correlation with the dependent variable at the 0.01 level (p = 0.000), while the correlation is significant, the correlation has a relatively low score (r = 0.124). This score describes a weak relationship. So, as the level education becomes higher, the attitude perception of transformation becomes more positive. But, the relationship is not very strong.

Correlations[a]

			Ability - Distance from work/education	DV - perception concerning transformation (MIS)
Spearman's rho	Ability - Distance from work/education	Correlation Coefficient	1,000	-,055
		Sig. (2-tailed)	.	,103
	DV - perception concerning transformation (MIS)	Correlation Coefficient	-,055	1,000
		Sig. (2-tailed)	,103	.

a. Listwise N = 872

The variable *distance from work/education* does not show a statistical significant correlation with the dependent variable (p = 0.103). Besides not being significant, the correlation coefficient is negligible (r = -0.055). This shows that the distance that people live away from their work or education has no direct relationship with their perception towards transformation.

Correlations[a]

			RI - Amount of cars in household	DV - perception concerning transformation (MIS)
Spearman's rho	RI - Amount of cars in household	Correlation Coefficient	1,000	-,247**
		Sig. (2-tailed)	.	,000
	DV - perception concerning transformation (MIS)	Correlation Coefficient	-,247**	1,000
		Sig. (2-tailed)	,000	.

**. Correlation is significant at the 0.01 level (2-tailed).

b. Listwise N = 926

The variable *amounts of cars in household education* shows a statistical significant correlation with the dependent variable at the 0.01 level (p = 0.000). The correlation coefficient (r = -0.247) is pointing towards a weak relationship. So, as the amount of cars in a household is higher, the perception towards transformation tends to be more negative. Although this relationship exists, it is not strong.

Correlations[b]

			RI -Plans to buy a car	DV - perception concerning transformation (MIS)
Spearman's rho	RI -Plans to buy a car	Correlation Coefficient	1,000	-,187**
		Sig. (2-tailed)	.	,000
	DV - perception concerning transformation (MIS)	Correlation Coefficient	-,187**	1,000
		Sig. (2-tailed)	,000	.

**. Correlation is significant at the 0.01 level (2-tailed).

b. Listwise N = 454

The variable *plans to buy car* shows a statistical significant correlation with the dependent variable at the 0.01 level (p = 0.000). While the correlation is significant, the correlation has a relatively low score (r = -0.187), which describes a weak relationship. So, as people are more expecting to buy a car in the future, when they don't have one, their perception towards transformation tends to be more negative. Although this relationship exists, it is not strong.

Correlations[a]

			Subjective norm - Owning a car	DV - perception concerning transformation (MIS)
Spearman's rho	Subjective norm - Owning a car	Correlation Coefficient	1,000	-,096**
		Sig. (2-tailed)	.	,010
	DV - perception concerning transformation (MIS)	Correlation Coefficient	-,096**	1,000
		Sig. (2-tailed)	,010	.

**. Correlation is significant at the 0.01 level (2-tailed).

b. Listwise N = 726

The variable *subjective norm – owning a car* shows a statistical significant correlation with the dependent variable at the 0.01 level (p = 0.010). While the correlation is significant, the correlation has a very low score (r = -0.096), which describes a very weak or none relationship.so in fact, this relationship can be neglected. So the fact that most people that the respondents know own a car, seems not to be related to their perception concerning transformation.

Test Statistics[a]

	DV - perception concerning transformation (MIS)
Mann-Whitney U	58453,000
Wilcoxon W	101818,000
Z	-1,825
Asymp. Sig. (2-tailed)	,068

a. Grouping Variable: Parking management - Payed parking

Either Pearson's r as Spearman's rho cannot be calculated for the variable *parking management – payed parking*, as it is a nominal variable. To find out whether a significant relationship exists between the dependent variable and if the respondents are paying for parking or not, the MannWhitney test has been executed. This test tests if there is a statistical significant difference between the two groups, being 'yes' and 'no' on the question if they pay for parking. The table above shows a statistical significance of 0.068, which shows there is no significant relation between payed parking and the dependent variable, although the variable shows a moderate trend towards significance.

Correlations[a]

			RI - Parking location	DV - perception concerning transformation (MIS)
Spearman's rho	RI - Parking location	Correlation Coefficient	1,000	,002
		Sig. (2-tailed)	.	,957
	DV - perception concerning transformation (MIS)	Correlation Coefficient	,002	1,000
		Sig. (2-tailed)	,957	.

a. Listwise N = 727

The variable *RI – parking location* does not show a statistical significant correlation with the dependent variable (p = 0.957). Besides not being significant, the correlation coefficient is with close to zero negligible (r = 0.002). This shows that the location where people currently park their car has no direct relationship with their perception towards transformation.

Correlations[b]

			Ability - Maximum walking distance parked car	DV - perception concerning transformation (MIS)
Spearman's rho	Ability - Maximum walking distance parked car	Correlation Coefficient	1,000	,278**
		Sig. (2-tailed)	.	,000
	DV - perception concerning transformation (MIS)	Correlation Coefficient	,278**	1,000
		Sig. (2-tailed)	,000	.

**. Correlation is significant at the 0.01 level (2-tailed).

b. Listwise N = 721

The variable *Ability – Maximum walking distance parked car* shows a statistical significant correlation with the dependent variable at the 0.01 level (p = 0.000). While the correlation is significant, the correlation doesn't have a very high score (r = 0.287), which describes a weak relationship, but is tending towards a moderate strength. So, as people are willing to walk further to their parked car, their perception towards transformation tends to be more positive. Although this relationship exists, it is not very strong.

Correlations[b]

			Awareness - Space use parked car	DV - perception concerning transformation (MIS)
Spearman's rho	Awareness - Space use parked car	Correlation Coefficient	1,000	,216**
		Sig. (2-tailed)	.	,000
	DV - perception concerning transformation (MIS)	Correlation Coefficient	,216**	1,000
		Sig. (2-tailed)	,000	.

**. Correlation is significant at the 0.01 level (2-tailed).

b. Listwise N = 923

The variable *Awareness – space use parked car* shows a statistical significant correlation with the dependent variable at the 0.01 level (p = 0.000). While the correlation is significant, the correlation doesn't have a very high score (r = 0.216), which describes a weak relationship. So, as people are more aware about the space use of parked cars, their perception towards transformation tends to be more positive. Although this relationship exists, it is not very strong.

Correlations[b]

		Car driving behavior (MIS)	DV - perception concerning transformation (MIS)
Car driving behavior (MIS)	Pearson Correlation	1	-,241**
	Sig. (2-tailed)		,000
DV - perception concerning transformation (MIS)	Pearson Correlation	-,241**	1
	Sig. (2-tailed)	,000	

**. Correlation is significant at the 0.01 level (2-tailed).

The multi-item scale variable *car driving behavior* shows a statistical significant correlation with the dependent variable at the 0.01 level (p = 0.000). With the correlation being significant, the correlation doesn't have a high score (r = -0.241), which describes a weak negative relationship. So as people are more valuing and using their car, they tend to be more negative towards transformation, although this relationship is not very strong.

Correlations[b]

		Parking behavior (MIS)	DV - perception concerning transformation (MIS)
Parking behavior (MIS)	Pearson Correlation	1	-,162**
	Sig. (2-tailed)		,000
DV - perception concerning transformation (MIS)	Pearson Correlation	-,162**	1
	Sig. (2-tailed)	,000	

**. Correlation is significant at the 0.01 level (2-tailed).

a. Listwise N=737

The multi-item variable *parking behavior* shows a statistical significant correlation with the dependent variable at the 0.01 level (p = 0.000). With the correlation being significant, the correlation doesn't have a high score (r = -0.162), which describes a weak negative relationship. So as people are more used to parking their car in their street and are valuing this more, they tend to be more negative towards transformation, although this relationship is not very strong

Correlations[a]

		Current satisfaction parking (MIS)	DV - perception concerning transformation (MIS)
Current satisfaction parking (MIS)	Pearson Correlation	1	,060
	Sig. (2-tailed)		,106
DV - perception concerning transformation (MIS)	Pearson Correlation	,060	1
	Sig. (2-tailed)	,106	

a. Listwise N=738

The multi-item variable *current satisfaction parking* does not show a statistical significant correlation with the dependent variable (p = 0.106). Besides not being significant, the correlation coefficient is negligible with a score close to zero (r = 0.060). This shows that the amount in which people are currently satisfied with the parking utilities in their street or neighborhood has no significant direct relationship with their perception concerning transformation.

Correlations[b]

		Current satisfaction public space (MIS)	DV - perception concerning transformation (MIS)
Current satisfaction public space (MIS)	Pearson Correlation	1	-,134**
	Sig. (2-tailed)		,000
DV - perception concerning transformation (MIS)	Pearson Correlation	-,134**	1
	Sig. (2-tailed)	,000	

**. Correlation is significant at the 0.01 level (2-tailed).

b. Listwise N=915

Where the current satisfaction in parking utilities showed no significant relationship with the dependent variable, the multi-item variable *current satisfaction public space* does (p = 0.000). Although the correlation is significant on the 0.01 level, the correlation coefficient has a very low score (-0.134) and is pointing towards a weak negative direct relationship, which tends towards a very weak or none relationship.

Correlations[b]

		Awareness public space (MIS)	DV - perception concerning transformation (MIS)
Awareness public space (MIS)	Pearson Correlation	1	,259**
	Sig. (2-tailed)		,000
DV - perception concerning transformation (MIS)	Pearson Correlation	,259**	1
	Sig. (2-tailed)	,000	

**. Correlation is significant at the 0.01 level (2-tailed).

b. Listwise N=923

The multi-item variable *awareness public space* shows a statistical significant correlation with the dependent variable at the 0.01 level (p = 0.000). With the correlation being significant, the correlation doesn't have very a high score (r = 0.259), which describes a weak direct negative relationship, but is tending slightly towards a moderately strong relationship.

Correlations[b]

		Motivation (MIS)	DV - perception concerning transformation (MIS)
Motivation (MIS)	Pearson Correlation	1	,636**
	Sig. (2-tailed)		,000
DV - perception concerning transformation (MIS)	Pearson Correlation	,636**	1
	Sig. (2-tailed)	,000	

**. Correlation is significant at the 0.01 level (2-tailed).

b. Listwise N=928

Where till now no strong correlations were found, it is the case for the multi-item variable *motivation.* It shows a significant correlation on the 0.01 level (p = 0.000). The correlation coefficient has a high score (r = 0.636), which points towards a strong direct relationship with the perception concerning transformation.

Correlations[b]

		Perceived improvements (MIS)	DV - perception concerning transformation (MIS)
Perceived improvements (MIS)	Pearson Correlation	1	,654**
	Sig. (2-tailed)		,000
DV - perception concerning transformation (MIS)	Pearson Correlation	,654**	1
	Sig. (2-tailed)	,000	

**. Correlation is significant at the 0.01 level (2-tailed).

b. Listwise N=928

For the multi-item variable *perceived improvements* a comparable situation results as with motivation. The variable shows a significant correlation on the 0.01 level (p = 0.000) and a high correlation coefficient score (r = 0.654), which also points towards a strong direct relationship with the perception concerning transformation.

Variable	Correlation Coefficient
Age	- 0.075*
Level of Education	0.124**
Distance from work/education	-0.055
Amount of cars in household	-0.247**
Plans to buy a car	-0.187*
Subjective norm – Owning a car	-0.096*
Parking location	0.002
Maximum walking distance	0.278**
Awareness – Space use car	0.216**
Car driving behavior	-0.241**
Parking behavior	-0.162**
Current satisfaction parking	0.060
Current satisfaction public space	-0.134**
Awareness public space	0.259**
Motivation	0.636**
Perceived improvement	0.654**

In the table above, an overview is given of the correlation coefficients of all independent variables, when tested with the dependent variable. It shows that only two of the variables have a significant and strong relationship with the dependent variable, being motivation and perceived improvements. Although only two variables can be considered as strongly related to the perception concerning transformation, 11 out of the 14 remaining variables show a significant direct relationship, of which nine are weak relationships, and two are very weak. Only the variables distance from work or education, parking location and current satisfaction parking seem not to be significant and consistently related to the perception of eventual transformation.

4.1.4 Regression

To better understand the influences of the independent variables on the dependent variables and to discover causal relationships, multiple regression analysis has been performed. The type of regression that is used is linear regression and is performed on all the multi-item variables, as these variables, as well as the dependent variable, are transformed into continuous data by calculating the mean of the score of all items of which the multi-item variable consists. Also for binary variables, like *sex* and *payed parking*, linear regression will be used. For all items with categorical data, dummy variables will be used.

Multiple regression analysis

As the dependent variable is predicted by more than one independent variable, multiple regression analysis has been conducted. Multiple regression allows for the overall fit of the model to be determined and the relative contribution of each of the predictors to the total variance to be explained. As finding a significant correlation is not a pre-requisite for running regression, as variables that show no significant correlation with the dependent variable can show an association in regression when they are controlled for, all variables will be used in the regression model.

Dummy variables

As not all variables are ratio data, but are categorical, these variables have been transformed and have been analyzed in the regression analysis with the help of dummy variables. These variables are *age, education, distance from work or education, amount of cars in household, plans to buy a car, subjective norm owning a car, parking location* and *maximum walking distance.* All of these variables, which originally represented four to seven categories, have all been transformed into variables with three categories, for example young-middle-old or low-middle-high. These variables are subsequently transformed into three dummy variables per categorical independent variable, which are used in the multiple regression analysis. For each independent variable a constant term has been chosen, which is left out the analysis to be compared to the other dummy variables.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	,730[a]	,533	,517	,77107	1,930

a. Predictors: (Constant), Perceived improvements (MIS), Education_Low, Subjectivenormowningacar_Agree, Planstobuyacar_No, Parkinglocation_Middle, Distanceworkeducation_Long, Amountofcars_0, Age_Middle, Planstobuyacar_Maybe, Maximumwalkingdistance_Long, Satisfaction public space (MIS), Amountofcars_2ormore, Education_Middle, Distanceworkeducation_Middle, Maximumwalkingdistance_Middle, Parkinglocation_Faraway, Behaviour car driving (MIS), Awareness public space (MIS), Behaviour parking (MIS), Age_Young, Current satisfaction parking (MIS), Motivation transformation (MIS), Subjectivenormowningacar_Disagree

In the model summary, which is used to determine how well a regression model fits the data, a R score, which represents the multiple correlation coefficient, of 0.730 (R = 0.730) becomes evident, which indicates a good level of prediction. The R Square (R^2 = 0.533), which represents the proportion of variance in the dependent variable that can be explained by the independent variables, indicates that the independent variables explain 53.3% of the variability of the dependent variable. The adjusted R square score indicates a score of 0.517 (Adjusted R^2 = 0.517). The Durbin-Watson test, with a score of 1.930 (DW = 1.930), indicates that the errors are not correlated, as the score is between 1.000 and 3.000, so the assumption of independent errors has been confirmed.

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	447,155	23	19,442	32,699	,000[b]
	Residual	391,811	659	,595		
	Total	838,966	682			

a. Dependent Variable: Behaviour/perception concerning transformation (MIS)

b. Predictors: (Constant), Perceived improvements (MIS), Education_Low, Subjectivenormowningacar_Agree, Planstobuyacar_No, Parkinglocation_Middle, Distanceworkeducation_Long, Amountofcars_0, Age_Middle, Planstobuyacar_Maybe, Maximumwalkingdistance_Long, Satisfaction public space (MIS), Amountofcars_2ormore, Education_Middle, Distanceworkeducation_Middle, Maximumwalkingdistance_Middle, Parkinglocation_Faraway, Behaviour car driving (MIS), Awareness public space (MIS), Behaviour parking (MIS), Age_Young, Current satisfaction parking (MIS), Motivation transformation (MIS), Subjectivenormowningacar_Disagree

In the ANOVA-table, where the *F*-ratio tests whether the overall regression model is a good fit for the data. It is visible that the independent variables statistically significantly predict the dependent variable, as the score shows a significance on at least the 0,01 level (p = 0.000). The regression equation for the model is ($F(23,659)=32.699$, $p < 0.000$), with an R^2 of 0.533

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	1,287	,367		3,505	,000
	Age_Young	**,276**	**,083**	**,115**	**3,315**	**,001**
	Age_Middle	**,199**	**,074**	**,087**	**2,699**	**,007**
	Education_Low	**-,216**	**,108**	**-,057**	**-1,988**	**,047**
	Education_Middle	-,024	,065	-,010	-,368	,713
	Distanceworkeducation_Middle	,004	,079	,002	,055	,957
	Distanceworkeducation_Long	,054	,085	,019	,635	,526
	Amountofcars_1	,253	,235	,098	1,076	,282
	Amountofcars_2ormore	,272	,243	,103	1,122	,262
	Planstobuyacar_Maybe	-,083	,089	-,026	-,935	,350
	Planstobuyacar_No	-,077	,096	-,022	-,806	,420
	Subjectivenormowningacar_Disagree	**,297**	**,141**	**,090**	**2,115**	**,035**
	Subjectivenormowningacar_Agree	,084	,116	,030	,721	,471
	Parkinglocation_Middle	-,044	,100	-,014	-,439	,661
	Parkinglocation_Faraway	,174	,322	,016	,540	,589
	Maximumwalkingdistance_Middle	**,161**	**,065**	**,072**	**2,486**	**,013**
	Maximumwalkingdistance_Long	,180	,162	,033	1,114	,266
	Car driving behavior (MIS)	-,001	,020	-,001	-,026	,979
	Parking behavior (MIS)	**-,076**	**,032**	**-,078**	**-2,359**	**,019**
	Current satisfaction parking (MIS)	**,082**	**,019**	**,145**	**4,211**	**,000**
	Current Satisfaction public space (MIS)	-,017	,019	-,028	-,860	,390
	Awareness public space (MIS)	-,014	,035	-,012	-,388	,698
	Motivation (MIS)	**,370**	**,033**	**,385**	**11,150**	**,000**
	Perceived improvements (MIS)	**,298**	**,026**	**,384**	**11,271**	**,000**

a. Dependent Variable: Behaviour/perception concerning transformation (MIS)

In the graph for the parameter estimates it is visible that eight of the independent variables are statistically significant in the regression model, being: *Age, education, subjective norm owning a car, maximum walking distance, parking behavior, current satisfaction parking, motivation* and *perceived improvements.* This indicates that there is no causal relationship between perception towards transformation and the other independent variables. For the variables that are statistically significant, five have a positive effect on the dependent variable: Education (St. B = -0.047) which is positive as the constant term a high education, maximum walking distance to parked car (St. B = 0.072), current satisfaction parking (St. B = 0.145), motivation transformation (St. B = 0.385) and perceived improvements (St. B = 0.384) and two have a negative effect: Age (St. B = 0.115 and St. B = 0.087), which is negative as the age group old is used as constant term, and parking behavior (St. B = -0.078).

4.2 Focus group discussions

To elaborate on the quantitative data and enrich it, focus group discussion are executed. The focus group discussion mainly focusses on the underlying reasons behind the perception towards transformation and tries to discover the ideal situations for the residents of Nijmegen-Oost, in both parking and public space. Furthermore, it tries to identify how the people could or would act in relation to the eventual implementation of transformation. To discover the fluctuations between two sides of the spectrum, two focus groups have been created; one with a negative perception towards transformation of parking space and one group with a positive perception. In order to identify the representative data, the two groups are selected to be as diverse as possible. The characteristic criteria that are used for this diversity are age, gender, mean score of the items used for the multi-item dependent variable, attitude towards transformation, amounts of cars in household and the strength of motivation. In this way the fluctuations can be identified within the certain population groups. For how the underlying reasoning differs when people do own a car or not, or when they are motivated to put effort against/for transformation, or lack this motivation. The focus group discussion have been held on two separate evening, both discussions had five attendees and took around one and a half hour to complete. In the table below an overview is given of the specific characteristics of the attendees in both groups.

Negative group

Attendee	Gender	Age	Mean score DV	Attitude transformation	Cars in household	Motivation
1	Male	40-49	2,25	Very negative	2	High
2	Female	30-39	4,50	Very negative	1	Moderately low
3	Male	50-59	4,75	Negative	2	Neutral
4	Male	40-49	5,00	Moderately negative	2	Very high
5	Female	60-69	3,25	Negative	1	Moderately high

Positive group

Attendee	Gender	Age	Mean score DV	Attitude transformation	Cars in household	Motivation
1	Female	50-59	6,50	Very positive	0	Very high
2	Female	60-69	5,50	Positive	1	High
3	Male	50-59	6,00	Positive	1	HIgh
4	Female	40-49	6,00	Positive	1	Very high
5	Male	40-49	6,25	Very positive	1	Moderately high

The focus group discussion consists out of eight questions, of which one is more of a general nature and the other seven are actively contributing in answering the research questions. The questions were: *"What were the first thoughts that came to your mind while completing the survey?", "How do you imagine your ideal parking situation/design?", "Can you describe your ideal street image and public space?", "Can you explain your negative/positive attitude towards the potential transformation of parking space?", "What do you think are the most important factors*

that influence this attitude?", "What could make you think differently about the subject or in what way would you be more positive towards the transformation of a (number of) parking spots?" (only discussed in the negative group), "If you think about possible transformations, what do you think would be good ideas or options for this transformation?" (only discussed in the positive group) and *"How would you express your motivation for/against transformation if there were plans to transform some parking spaces?"*. Below a summary is provided of the discussions, illustrated with important quotes. It is important to note that these statements don't necessarily represent the whole population, but represent possible reasoning of parts of the population in Nijmegen-Oost.

What were the first thoughts that came to your mind while completing the survey?

Negative group

The general tendency within this group was that the attendees were finding it a very interesting topic, and that the idea of transformation was a triggering innovation for the mind. Furthermore, they believe that they topic appeals to everyone, which can also explain the high response rate. But, all the attendees in the group experience a parking pressure that is too high in their street, which makes them more negative towards some sort of transformation. *"with the current amount of cars in Nijmegen-Oost and the pressure this brings to the parking facilities, I can't begin to imagine a transformation away from parking space"* (Attendee 2, focus group discussion, 2020) also illustrates this idea. Although the attendees of the negative group couldn't imagine a situation with less parking spots, they were all agreeing that there are some potential chances when it comes to the 2nd car in a household. The sentence *"I think the 2nd car in households can be disposed in many situations, when the right measures or incentives are taken, I think that's an area where a lot of gains can be made."* (Attendee 1, focus group discussion, 2020), was supported by the rest of the group. Although the attendees see some potential in eliminating the second car, they can also describe, out of own experience, why it is currently not happening, what they mainly attribute to the lack of sufficient alternatives. *"Greenwheels (car sharing service) is currently too expensive, because of this I find it reasonable that people keep their second car"* (Attendee 1, focus group discussion, 2020) and *"At the moment car sharing services are financially not competitive enough with an old 2nd car, which is truly yours"* illustrates this phenomenon.

Positive group

The positive group seem to be mainly motivated by a general idea that there are simply too many cars in street image. They do acknowledge that there is a parking problem in the neighborhood, but they are personally not very bothered by this problem. The attendees of this group all live in relatively old parts of Nijmegen-Oost, where the streets are very narrow. *"I do not own a car and I live in a narrow street. The street exists of nothing but cars. Then I think, let's take some of the cars away and transform it into something else. People don't really consciously think about the matter. The car is just there."* (Attendee 4, focus group discussion, 2020) illustrates the problem with the amount of cars and the spatial character in many parts of Nijmegen-Oost. Also it makes clear the sense that many people just take the current situation for granted and don't think about possible alternatives with fewer cars or another use of space, which will be discussed later in this chapter. From the attendees of the positive group, two of the car owners currently did not park often in their own street, mainly because of the parking pressure, due to which there are often no parking spots available in their street. But, they both are not really bothered by this situation. Another attendee, who does park his car in front of his house seemed to understand this *"I would have no problem with walking 10 minutes to my parked car. Nobody asks me now to do so, so I park it in front of the house, and if I didn't do it myself someone else would park their car there.*

But if something else, like greenery, would be the replacement, I would be happy to walk" (Attendee 3, focus group discussion, 2020) and mentions that he would have no problem to walk further, as long as the space would be replaced with something else.

How do you imagine your ideal parking situation/design?

Negative group

The negative group was mainly motivated by personal comfort when it came to their ideal parking situation. Their ideal situation can be summarized as simply being able to park in their own street. When they were discussing possible measures to eliminate the need for parking space, they showed a central tendency that the problem couldn't be fixed by rethinking parking, but only by rethinking mobility. *"You can think in a hopeful academic way, maybe we can make parking-boxes in the ground, somewhere in a central place, or even in the ground, but I think that will only work in theory. I think we should focus on mobility, or car ownership, to make a real difference in this subject"* (Attendee 2, focus group discussion, 2020). Currently the attendees still favor the current situation of personally owning one or two cars, mainly because it gives them a sort of freedom and independence. Also the family- or household situation plays a big role *"The holy cow is, I hate to say it, really a holy cow because of the situation in my family"* (Attendee 4, focus group discussion, 2020), illustrates this situation, which mainly occurs with the attendees who have kids in the age group 0-15, for which the parents have to drive to things like sport clubs and other obligations. Three of the five attendees currently pay for parking, and they all experience it as a blessing. *"Payed parking is truly a solution. Since we pay for parking there is much more available parking space in our street."* (Attendee 1, focus group discussion, 2020). Although they have a positive personal experience with the system they also see the downsides of it on more general level. *"Payed parking only relocates the parking problem, if payed parking is introduced in an area the people will just park for free on the borders of the newly created border."* (Attendee 3, focus group discussion, 2020). They illustrate the problem that, while payed parking is fixing problems for the areas in which it is introduced, the problem is just shifting towards the new border area. Also the attendees who currently do not pay for parking, have an open attitude towards it. *"I'm okay with paying some more money if my chances on a parking spot are increasing"* (Attendee 4, focus group discussion, 2020). Again, the negative group is bringing the potential of eliminating the 2nd car up, *"Making the 2nd car way more expensive than the main car, could make a big impact, mainly for people who don't necessarily need it or are not dependent form it"* (Attendee 1, focus group discussion, 2020), although there was a bit more discussion about the topic than in the first question. When discussing if paying a relevant proportion more for the 2nd car than for the first car *"I think paying extra for parking or the second car is comparable with smoking, once you're used to it you are still going to do it, at least if it doesn't double in price or something like that"* (Attendee 3, focus group discussion, 2020) was mentioned, to which *"Yes, but I think, now that smoking is getting more expensive, people will less likely start with smoking. I think this works the same for people who do not yet own a second car and are thinking of getting one. I think high pricing, together with some sort of reward, could work in restraining people from getting a second car"* (Attendee 1, focus group discussion, 2020) and was agreed on by the whole group. So the attendees believe that making the 2nd car a lot more expensive wouldn't necessarily work in taking the 2nd car away, but it has potential in preventing people from getting one. Furthermore, it is again emphasized that the solution in the parking problem doesn't need to be sought in the physical environment. *"We are living in an old part if the city, which has it pro's and con's, on the one hand, we all want two cars, on the other hand, the living environment we all choose for lacks the physical*

space for that. How we can change that? We have to think about behavior, facilities. Discourage and reward, name it. We can't create more physical space." (Attendee 2, focus group discussion, 2020). This steering of behavior is has the most potential when rewards or incentives are being used, according to the group. "*The idea of an incentive in the form of a reward, which can be very small, is working very well as a trigger to steer behavior, that's what I see by myself and with other people."* (Attendee 3, focus group discussion, 2020). So, the ideal parking situation for the negative group is mainly focused around being able to simply park their car in their own street. In order to achieve this they think the answer should not be sought in the physical environment, but more in the changing of behavior and in eliminating the 2nd car in households. Lastly, the group showed a positive attitude towards payed parking.

Positive group

In the positive group, 3 out of five people are currently paying for parking, and they also show their satisfaction towards it. *"I live in a parking zone, where I pay for parking. It costs money, but it's worth every penny"* (Attendee 3, focus group discussion, 2020). Because not every attendee in this group does own a car, some other fluctuations can be found within the group. An attendee who does not own a car and uses a bicycle a main transport means of transports, perceives a lack of public bicycle parking *"It would be nice if there would also be some parking facilities for bicycles"* (Attendee 4, focus group discussion, 2020). As mentioned in the discussion about the first question, two of the attendees in this group didn't park their car regularly in their own street, which they didn't see as a big problem. One of them did however mention something he did found troublesome; *"The most important thing for me is that I know where the car is parked, location-wise, so that I know where I have to go if my girlfriend parked the car a few blocks away."* (Attendee 2, focus group discussion, 2020). He mentioned that this problem occurs when people don't park in their own street and when there is no fixed location for the car, that it can become hard to find the car if the person who needs the car didn't park the car him- or herself. Also in this group, people mention that the parking space itself is not the real cause for the problem with the parking pressure in Nijmegen-Oost, but that it is the car ownership. *"The problem is not parking, it is car ownership, our holy cow. Everybody in my street can use my car, but 99% of the people don't want that."* (Attendee 3, focus group discussion, 2020) was mentioned in the discussion, in which the attendee described that he would have no problem to make his car part of a collective ownership, but don't expects that this opinion applies to a large size of the population. This opinion was being confirmed by something within the group; *"I'm a bit reluctant to the practical matter of this. Sometimes you can impulsively think, okay I want to go somewhere. I don't thinks that possible when you share these cars. The independence and freedom of owning a car really is a thing. But I don't know how it would work out in practice"* (Attendee 2, focus group discussion, 2020) illustrate the problems that can occur with a concept like collective ownership, which in this case is taking away the freedom and independence of personally owning a car.

Can you describe your ideal street image and public space?

Negative group:

The negative group acknowledges that there is a big difference between the ideal street image and the one they want in a more pragmatic and realistic way. The attendees in the group sketch their ideal image as *"Idealistically? Many trees, a field of grass, a play yard on the corner of the street, no cars."* (Attendee 2, focus group discussion, 2020) and as *"My ideal image: Greenery, a car here and there, a tree, slow mobility."* (Attendee 4, focus group discussion, 2020). But in the same sentence the contrast between ideology and reality is illustrated; "*The reality: I want my car*

to be parked in front of my house." (Attendee 4, focus group discussion, 2020). One of the attendees, who works for a developer, gave a practical example on how this contradiction occurs in real life. *"Near the Goffert (location in Nijmegen) a new neighborhood has been build, where they park their cars under the ground in a big garage. They share a big front garden where people can interact and meet, a bit like a vacation park, fantastic! It's a good concept but the people there are really experiencing a practical limitation of not having the car directly in front of their house. It seems nice, the concept of a holiday feeling. But after a few months in Ibiza, you're also done with it."* (Attendee 4, focus group discussion, 2020)

Positive group:

The ideal street image and the ideal image of public space corresponds a lot with the one represented by the negative group. They mention utilities like greenery, playgrounds and mention fewer cars, but they tend to see more possibilities to actually implement this than the negative group did. One of the attendees lives in a street where they actually did transform a couple of parking spots temporarily into something else, *"Recently a restaurant in our street got two parking spots for their terrace. It works really well. It makes this part of the street a lot more lively, cozy and more fun. Really awesome!"* (Attendee 2. Focus group discussion, 2020). He mentions that he is very enthusiastic about it and that his neighbors share this opinion and even put effort in making the concept work; *"It is funny to see that the people in my street are really supporting the restaurant that got the parking sports for this idea. They park there on Monday and Tuesday, when the restaurant is closed, and when it opens they take their car and park it somewhere else. It is a good example of how it could be, two parking spots are eliminated, but its replaced by something nice."*. Another attendee supports this idea, in his street a big parking square has been transformed into a terrace for the summer months, which can be used by local cafes and restaurants. *"It's funny indeed. In my neighborhood there is also a big car park that in the summer is occupied by cafes and restaurants, and not a single car-owner is complaining about it. I think it would be a very different story if they would replace it with art or something similar."* (Attendee 3, focus group discussion, 2020). Although they sketch a positive image of this concept, they acknowledge that they are not sure if it would work when the parking spots were replaced by other utilities than utilities in the hospitality sector, as this is something that brings direct bustle and liveliness to the street. Another attendee brought up the idea that the streets in her part of Nijmegen-Oost could be improved when it comes to interaction- and meeting space. *"During times of the corona lockdown, when we were all working form our houses, I thought, well, we can also sit together in the street and drink some coffee. You can make such a spot easily, just remove 2 or 3 parking spots from the street that is currently filled with nothing but cars."* (Attendee 4, focus group discussion, 2020). This point of view could count on support from the rest of the group. They came to the conclusion that *"The street is owned by the car owner"* (Attendee 4, focus group discussion, 2020) and that it could be, or should be, owned more by the people. *"Wouldn't it be possible to decide together with people from your street to replace some parking spots for something else?".*

Can you explain your negative/positive attitude towards the potential transformation of parking space?

Negative group

As mentioned before, the negative group can't really imagine a situation with less parking space than there currently is, as they think this will result in an even bigger parking shortage. This aspect seems to be the most important reason that they have a negative attitude towards eventual

transformation. Although they have this attitude, they are generally positive about the idea itself, only not in the situation they currently live in. This is visible in the statements *"It would be very nice to sacrifice a parking space for something beautiful or fun, but then the parking problem will only increase. But if I consider all the pros and cons, it's not worth it for me."* (Attendee 1, focus group discussion) and *"I'm not negative necessarily, I'm more critical. For myself I see it as something positive. But in general, if I look to streets in Nijmegen-Oost, I think you will create more problems than you would solve, if you would perform these kind of transformations. More unsatisfied people. And because of that a less enjoyable living environment"* (Attendee 2, focus group discussion, 2020). All the attendees in the group thought that there should be other priorities in the neighborhood than transforming parking space and that number one priority should be fixing the parking problem itself. Again, collective ownership is suggested as a possible solution to fix this. *"I think the priority should be pointed towards other things, like fixing the parking problem. I think that collective ownership really has a lot of potential for a more streamlined society. But we grew up with the idea of individualism. Everybody has a lawn mower for example, but I have never seen two people at the same time mown their lawn."* (Attendee 4, focus group discussion, 2020). Again this topic resulted in a lot of discussion. *"It triggers me. The collective ownership. What if you have 10 cars in the street for 40 people. I think it could work, not every car is used at the same time. But how are you going to manage that in God's sake?"* (Attendee 3, focus group discussion, 2020). Coincidental, one of the attendees in the group, who works as a spatial planner, works on a project were they have implemented a sort of collective ownership *"I'm doing a project in Ede (small city in the Netherlands), where you automatically rent a shared car as part of your rent for the apartment. You are most certainly guaranteed that you can use the car if you book it 3 hours up front. For me it would be the perfect example to let go of my 2nd car."* (Attendee 2, focus group discussion, 2020). The group is again emphasizing that letting go of their 2nd car, or not taking one, should be accompanied by getting some sort of reward or creating sufficient alternatives. *"You'll get rewarded with not paying for your 2nd car and also there are fewer cars in the street image. We want to do something, but we have to get something in return."* (Attendee 3, focus group discussion, 2020). *"If you have good alternatives, which are cheaper than owning a car, I think that would work in preventing young people from buying a car"* (Attendee 1, focus group discussion, 2020).

What do you think are the most important factors that influence this attitude?

<u>Negative group</u>

The negative group described the personal circumstances concerning parking as the most important factor that influences their perception towards transformation, being in this group mainly the lack of availability of parking. *"Nobody is against a more beautiful neighborhood. But it's comfort. You don't want to compromise on comfort. Parking is quite bad in this area, you don't want to make it worse."* (Attendee 2, focus group discussion, 2020). They also agree as a group that just extra public space is not enough of an incentive to change people's parking behavior, they think that there has to more rewarding. *"You have to put something positive in return. That can change it."* (Attendee 1, focus group discussion, 2020). The group also came up with another concept. *"I think that it's also something that fits Nijmegen, everybody parks their car in front of their house, or at least tries to do so. In Utrecht in Amsterdam it is already accepted to not own a car of park your car nearby, there is it is in many cases just impossible. As long as this is not the case for Nijmegen, this will keep happening."* (Attendee 2, focus group discussion, 2020) that sketches the idea that as long as the problems with parking are not big enough, and people are still owning one or two cars because of this, there will be not a big support for such transformations.

This idea is discussed thoroughly and also illustrated by the quote *"I think the problems are not big enough here. If I would have to search for a parking spot for 10 minutes every day and they could guarantee a parking spot in a garage on a five minute walking distance and also my street would become more green, than I think I would be very positive towards the idea of transformation!"* (Attendee 3, focus group discussion, 2020) and illustrates the idea that, if the parking problem would be worse, a transformation could be perceived differently. Besides parking, also the quality of public space is mentioned as a reason that influences people perception about parking transformation. *"I think it can also be explained by the quality of our neighborhood. It is not the case that we have no greenery or green public space in our surroundings, we do. Also, we have a very cozy and social street. If this was not the case, I would have thought okay.. I would want to sacrifice some parking space in order to create some green or some seating facilities, but now it is, in my case, already there. Maybe there is no urgency for us."* (Attendee 1, focus group discussion, 2020), which describes the other side of the spectrum and illustrates the idea that there is currently, for these attendees, a satisfaction with public space, but not with parking. Because of this reason they don't want to see the ratio of parking and public space be changed in the direction of extra public space. This has no urgency according to the negative group, also because there are yet no sufficient alternatives for owning (multiple) cars.

<u>Positive group:</u>

The positive group is again mentioning that they are bothered by the number of cars in their street image; *"Firstly I'm bothered by the parked cars in my street, it's ugly and makes the street from the car. On the other side, green in the street is very good. Also with the hot weather from last summer, the trees are cooling the street down."* (Attendee 3, focus group discussion, 2020) and one of the attendees is also referring to heat-stress, to which eventual transformation could help, as it replaces hardened surfaces with possibly more green, which cools the street down. Although the group agrees that there are too many cars in the street image of Nijmegen-Oost, they also realize the ambiguity of this problem. *"Everybody has a preference for green instead of parked cars. Only, not when it comes to their own car."* (Attendee 2, focus group discussion, 2020), which illustrate the idea that everybody would idealistically have fewer cars in their street, but in the end want their own car to be nearby. But, the attendees of the positive group also see another side to the story. They think that most people don't imagine what it could be like if parking would be rethought, as they don't know or don't realize the alternatives. *"We just take it as the truth, like there is no other way, how streets currently look. Normally you don't think about alternatives."* (Attendee 4, focus group discussion, 2020). When exposed, to this alternatives, opinions can quickly change, illustrates one of the attendees; *"During the survey my irritation of not being able to park was bend towards seeing the alternatives. The idea of transformation, a big change. The car, a source of annoyance, somewhere else, or just somewhat less."* (Attendee 5, focus group discussion, 2020). *"We have to part from the idea that the car is a holy entity"* (Attendee 3, focus group discussion, 2020) illustrates the idea that it is time for a new paradigm when it comes to urban mobility, where car ownership is no longer the distinct standard. One of the attendees also describes the concept of transformation as a way in which people can participate in making the street truly theirs. *"These type of transformations can be a very good measure to make the street more of the people, of the residents. I imagine that the street's residence can have a big participation, and from that comes responsibility and care. It would find it very nice to create and maintain such a space with my neighbors."* (Attendee 2, focus group discussion, 2020).

What could make you think differently about the subject or in what way would you be more positive towards the transformation of (a number of) parking spots? (only discussed in the negative group)

Again the negative group is mentioning that they won't see the transformation happen because of the current amount of cars. They also mention that it is hard to change because they know that people around them won't make the same changes. *"On the one hand we all want to change things and you want to work towards real solutions, but on the other hand we are all very pragmatic, we don't see that our neighbors are changing and then we take it for granted and don't take the first step."* (Attendee 2, focus group discussion, 2020). Although they can't see it happening currently, they think it is a good idea in the future, assuming that there will be less car ownership. Another thing that the group thinks would work, are rigorous measures, like making the public transport free of charge. Again they mention that there currently is a lack of sufficient alternatives to personal car ownership. Although the group seems to be quite negative about the concept of transformation, they describe that even they can be motivated to for example park their car somewhere else than their own street, as long as they get the right rewards or incentives in return. *"If I would have to walk to my parked car every day, but I would walk through an improved neighborhood and can think about the reward I get in the end of the month, go to a restaurant for example, I wouldn't mentally complain about the situation that I have to walk with two heavy shopping-bags."* (Attendee 1, focus group discussion, 2020). In this example the attendee mentions that an improved street image, together with another form of rewarding – in this case a coupon for a restaurant – could be enough to make the change. Another attendee mentions that he coupons should be for local businesses, *"You can reward people with for example coupons for local businesses, in that way you are keeping the money in the neighborhood"* (Attendee 1, focus group discussion, 2020).

If you think about possible transformations, what do you think would be good ideas or options for this transformation? (only discussed in the positive group)

The main focus point in transformation for the attendees of the positive group would be to make the streets more attractive. In the old parts of Nijmegen-Oost, where the streets are quite narrow, there is not enough space for other things than car parking, which causes an perceived problem in safety for children. *"It is a trend that people with young children leave the neighborhood, the kids can only play on the sidewalk. The street is too busy and too wide. If you create a buffer between the street and the sidewalk, it becomes a lot more attractive"* (Attendee 2, focus group discussion, 2020). This buffer can be simple greenery, which has to be maintenance-friendly, but also space to play, for example a ping-pong table. Also the concept that has been brought up in a previous discussion question, is mentioned again *"I think it would be good to create spots where you can meet each other."* (Attendee 4, focus group discussion, 2020). Apparently, some inhabitants of Nijmegen-Oost perceive a lack of utilities to meet and interact in their own street. Another interesting concept is mentioned in the discussion; *"You could do it temporary. Design it for the summer months and make it easily removable."* (Attendee 4, focus group discussion, 2020), where it is suggested to make the transformation seasonal. Where for example parking space is replaced by something else in the beginning of the spring and is being removed in the beginning of the autumn or end of the summer. In this way it's possible to use the space temporarily way and make it adapt easily to the circumstances.

How would you express your motivation for/against transformation if there were plans to transform some parking spaces?

Negative group:

Most of the attendees from the negative group are saying that they just won't let it happen. They will make steps, towards the municipality, to block the implementation of the project. But, in fact, they all think that the municipality will never implement the concept in their parts of the neighborhood, not as long as they are as many cars as there are now. One attendee in the group mentioned *"I will let it happen but I will stay very critical, because I think it is too singular"* (Attendee 2, focus group discussion, 2020). During the discussion, the group came up with an idea; numbering parking spots for personal use, so people can choose themselves if they either want to use it for parking, or for something else. *"Then you should just start numbering parking spaces. 1 is for me, 2 is for you. And if you don't have a car, you can put your bench there."* (Attendee 3, focus group discussion, 2020). Also the idea of buying a parking spot was discussed. Although the group thought it could work, the parking spaces can't be bought, as the land they are on is owned by the municipality, so they space should be leased, or rented as part of the housing rent. *"I can see that happening. You can lease your parking spot from the municipality. Than it is your spot and no-one else can make use of it."* (Attendee 2, focus group discussion). Although the group saw potential at first in the idea, they think it has more downsides in the end than advantages, after considering it for a while. *"The problem is, what to do when people are away for a long period of time?"* (Attendee 3, focus group discussion, 2020).

Positive group:

The positive group mentions that they want to express their motivation towards the concept of transformation mainly by participating in experiments, pilots or projects that are offered, for example from the municipality. They want to *"Participate in the offer"* (Attendee 3, focus group discussion, 2020). Although the group seems to be very motivated, they say that the first step should not be taken by the residents of Nijmegen-Oost, but by the municipality or another organisation. *"There has to be a start-shot, some kind of launch, then I would definitely participate. A sign form the municipality that shows us that there are possibilities if we would like to do things. I'm sure people will pick that up, at least I would do it myself."* (Attendee 2, focus group discussion, 2020).

Other important info

In both groups it was emphasized that taking part in the survey changed the attendees' perception of the topic. *"What surprised me in the survey was that I filled it in with the idea that I wanted to keep all the parking spots that there currently are. But when there came some images of the alternative, I thought, okay, that really looks a lot better."* (Attendee 1, negative focus group discussion, 2020) and *"I started the survey with the idea that there should really be something done about parking, in a sense of creating more parking spots. But during the survey I changed my opinion. Fewer cars and more space for other things. It really changed my mind."* (Attendee 5, positive focus group discussion, 2020). Another topic that came the light in both focus groups was the situation that employees, who work in the city centre of Nijmegen, park their car in the free parking zone, take a folding bike out of the trunk and cycle to their work; *"People just park their car in the neighborhood, take their folding bike out of the trunk, and cycle to their work"* (Attendee 3, negative focus group discussion, 2020).

5. Conclusions & Discussion

In this chapter the conclusions will be presented and the research questions will be answered. The conclusions are derived from the literature review and the analysis of the survey data, with results from both correlation- and regression analysis. Also the results from the focus group discussions are contributing to the conclusions and help in answering the research questions. The conclusions will be formulated per single research question, starting with the three sub-questions, which are followed by the main research question.

"What factors influence the choices of people regarding parking and car use?"

From the literature, different factors are derived that empirically influence people's choices regarding parking and car use. These different factors have been tested in the survey and later qualitatively enriched in the focus group discussions. The first important thing to conclude is that The high Cronbach's Alpha for the variable current satisfaction parking, which consists out of the current satisfaction in parking in both street and neighborhood but also out of the ease in which the respondents can find a parking spot in their street normally, indicates that the ease in which people can find a parking spot - which can also be seen as the parking availability or amount of perceived parking pressure – is representative for the current satisfaction. Also the correlation coefficient ($r = 0.803$) confirms this statement. So to be satisfied with the current parking facilities, the starting point should be not to have a high pressure on the parking availability.

From the survey can be concluded that three factors have the most influence on the choice for the car as transport mode, being *distance/time*, *ease/comfort* and *weather conditions*. This shows that the car is considered to be merely a practical object, which makes life easier and less time consuming for people. Mostly financial and prestigious reasons seem not to play a big role within the population of Nijmegen-Oost. So, if alternatives for personal car ownership would offer the same comfort and agility, they could have the potential to work. The focus group discussion confirms the idea that comfort is the most influential factor, in both parking and car-use. In parking, comfort mainly represents the possibility to park in close proximity to the house. Also freedom and independency are mentioned a lot as important factors for car use- and ownership. The concept 'holy cow' in relation to the car describes how many people still value the personal ownership and use of the car. Another very important factor, derived from the focus group discussions, are the personal circumstances of people. For example the type of household, where families with children tend to be more dependent on their car(s), but also the working situation plays a big role. This also becomes clear in the survey, where personal circumstances and the working situation are mentioned by 35% of the people to be their number one reason to own and use a car.

"How can parking demand and car ownership in Nijmegen-Oost be decreased?"

The reduction of parking demand and car ownership is widely discussed in the literature, the most important measures, together with the one who are the most relevant for neighborhood types like Nijmegen-Oost, have been tested in the survey and discussed in the focus group discussions. Where in the literature (Shoup, 2004; Gou & Ren, 2013) the elimination of (minimum) parking requirements a widely discussed measure to tackle parking problems, this is not highly relevant for Nijmegen-Oost, as it is mainly a measure for new building projects. Although, one way to still get rid of these requirements is to bundle a parking spot together with the house, where residents can choose if they favor a parking spot or not, as discussed by Gabbe & Pierce (2017). The attendees of both focus group discussion all saw a lot of downsides to this concept and thought it would create more problems than it would solve. People who do not own a car however, were more positive towards the idea, as they then wouldn't pay for something they don't use. The second most discussed topic in literature is paid parking, and the right pricing of it. Within the respondents in the survey, 59.8% currently pays for parking. In the focus group discussions, this ratio was comparable, as five out of the eight people who do own a car were paying for parking. The people who did yet not pay for parking were quite hesitant about it. But, the people who were already paying for parking al experienced it in a very positive way. They personally experienced the transformation from free to paid parking really helped in improving the parking availability, which is in line with the findings of Moore et al. (2007), who state that non- or under-pricing of parking leads to over-exploitation of the facilities. Important to note is that, while people are experiencing it in a positive way, they are aware that it only relocates the problem to the new border areas that offer free parking. So, improve the parking situation, it can be a possible solution to implement paid parking in the whole neighborhood, or search for the border where people are not willing to park for free anymore if they want to visit the city center.

Car disposal cannot count on a lot of positivity according to the survey data. However, some possible triggers or measures to decrease car ownership are more popular than others. Car sharing services have the most potential, followed by extra public space and a financial subsidy. From these factors only car sharing services is discussed on literature, where Litman (2017) stated that for every shared vehicle 4-8 parking spots can be eliminated. In the open answering, better public transport and a changing working situation are the most popular answers, which correspondents with the data that 35.9% of the people only use their car for forensic transport to their work location. If the working situation would be different, this group within the population seems to be open towards disposal of their car if this situation would change. Changing parking behavior however has far more potential. People are a lot more positive about parking somewhere else, which could lead to a better distribution of parked cars throughout the neighborhood, than they are towards completely eliminating their car ownership. Extra public space is actually the most popular trigger, so a transformation from parking space to other forms of public space could potentially lead to a better distribution in parking. Car sharing services are here not amongst the most popular triggers or measures. So car-sharing can work for eliminating car ownership, but is not a feasible solution for better distribution of parked cars throughout the neighborhood. Arguably because car sharing services have no practical advantage over parking somewhere else than the own street. The people in Nijmegen-Oost again do not show a lot of eagerness in disposing their car in order to reach their preferred street image form the survey. More than half of the respondents either disagrees or totally disagrees with the statement. But, again they show they are willing to park somewhere else than their own street. More than half of the population who own cars agrees with this statement. With the earlier discussed locational fluctuations, this could make a better distribution of cars through the neighborhood possible. So it is possible to conclude

that eventual transformation does not have a lot potential to work as a trigger for decreasing personal car ownership, but people are generally quite positive to the idea that they would have to park their car possibly somewhere else than their own street, if they get newly created public space in return. Where in literature, Tasi & Chou (2012) mention demographics as an important factor for the need of parking space, the results are mixed in this research. Some demographics, like gender, are not influential on the dependent variable, while level of education (in a more minor way) and age do show a statistical significant influence.

In the focus group discussion there was a lot of consensuses that the elimination of the second car in household would be a measure with a lot of potentials in both decreasing the parking demand as car ownership. But, currently there is a perceived lack of sufficient alternatives. The alternatives which are currently there, mainly car-sharing services, mainly have a lack in the factors that are the most influential according to first sub-question, being comfort and independency. But, also financial downsides were agreed on. It is also mentioned that preventing people from taking their 2nd car is far more manageable than disposing it in existing situations, so if the focus would be on preventing, fewer cars would be owned in Nijmegen-Oost in the (nearby) future. Another crucial point is that the attendees al feel that they should be rewarded for changing their behavior. Although some attendees think extra public space is a sufficient reward, mainly the attendees from the positive group, others think there should be an extra incentive on top. Another measure that was extensively discussed in both groups was the collective ownership of cars. Although the attendees agreed on it being not manageable for now, it is an interesting topic with potential for the future, if researched and elaborated upon.

"What barriers are in the way for repurposing parking space into public space?"

This sub question is mainly answered by input from the focus group discussions and on a minor level by data from the survey. The biggest barrier that's in the way of the transformation of parking space is quite self-evident; currently there is a (perceived) parking problem in many parts of Nijmegen-Oost. There are yet simply too many cars, mainly in the older parts of the neighborhood, and not enough parking space. This is obviously the biggest barrier as number one prerequisite for such a transformation should be that there should be enough space to execute it, and not make problems worse than they already are. The second biggest barrier is the urban paradigm, which is, as was illustrated a lot in the focus group discussion, still centered around the personal ownership of cars. Derived from literature (Glazebrook & Newman, 2018), and also illustrated in a minor form by a weak but significant relationship between age and the dependent variable, this will change in the future, as young people are generally less dependent on the personal ownership of cars. But for now, people who are used to this paradigm don't see very much potential in actively changing it. One reason why this paradigm is currently not significantly changed is the lack of sufficient alternatives for personal car ownership. These two important barriers go hand in hand, if the paradigm will change, for example with the help of good and accessible alternatives, automatically fewer cars will be part of the street images in Nijmegen-Oost, which will in return offer space for eventual transformation from parking space to other forms of public space.

"What are the most important factors that influence the perception of people in Nijmegen-Oost on parking space and its eventual transformation to other forms of public space and how can this perception be explained?"

As this topic has yet not been discussed in the empirical literature, only the framework for the methodology has been derived from literature. For this framework, two theories on behavior change are used, as well as one theory about innovation. From these theories, the different factors with potential influence on the perception concerning transformation were derived. These factors, which are also included in the conceptual framework, were subsequently tested in the survey and later qualitatively enriched with data from the focus group discussions.

When the quantitative data were analyzed, two factors clearly showed to have the biggest influence and strongest relationship with the perception concerning transformation, being *motivation* and *perceived improvement.* Perceived improvement seems to be an easy explainable influence, as it quite literally represents the idea that the situation after the transformation will be an improvement over the current situation. Motivation however needs more nuance, which will be discussed later in this chapter. Four factors factually represent a weak direct relationship with the dependent variable, but have a tendency towards a moderate direct relationship with the perception towards transformation. Of these variables, two represent a negative relationship, being *amount of cars in household* and *car driving behavior,* and two represent a positive relationship, being *maximum walking distance* and *awareness public space.* There are five factors which have a minor direct relationship with the dependent variable. Two of these relationships are positive, being *level of education* and *awareness space use car* and three represent a negative relationship, being *plans to buy a car*, *parking behavior* and *current satisfaction public space.* Lastly, there are also five factors that show a relationship that is negligible or not statistically significant, being *age,* distance from work or education, *subjective norm owning a car*, *current parking location* and *current satisfaction parking.*

Looking at the regression model, and therefore causality. It is visible that eight variables have a statistically significant influence on the perception of parking space and its eventual transformation to other forms of public space. Two of these variables clearly represent the strongest influence, which is positive, being *motivation* and *perceived improvement*. The variable which represent the most influence after these two variables, on quite some distance, is *current satisfaction parking* (positive), followed by *age* (negative). The other variables with a significant influence on the dependent variable are, in order of strength, *subjective norm owning a car* (negative), *parking behavior* (negative), *maximum walking distance* (positive) and *education* (positive).

When the data is compared with the conceptual framework, it becomes clear that the *intention* that people have is more influential on the perception concerning transformation than their *current behavior. Motivation* is clearly the factor within *intention* that represents the biggest influence, but also represents a positive relationship with the dependent variable. When looking at the factors that represent people's current (relevant) behavior, it is evident that *car driving behavior* has a stronger direct relationship with the perception concerning transformation than *parking behavior.* Although car driving behavior shows a significant correlation with the dependent variable, which is stronger than parking behavior, it is different in the regression model. When all the other independent variables are considered and controlled for, parking behavior does have a significant influence on the perception on eventual transformation, where car driving behavior does not. This indicates that car ownership and the way in which people use this/these car(s) is not significantly influential, while the way in which they park this car and how they value it to park their car in their own street, for example, is. So, to make eventual transformation a success, land-use and spatial considerations on a neighborhood- or street level. should to be taken into account even more than

other mobility factors that directly relate to car driving behavior. The fact that *car driving behavior* has a significant correlation with the perception but has no significant influence on the dependent variable derived from the multiple regression model, indicates that car driving behavior is very dependent on other variables that are tested in the survey, which in fact eliminate the influence of this behavior when controlled for.

When looking to the subjective norm about owning a car in the regression model, it is visible that there is no significant influence when the group where most people they know own a car is compared to the neutral group, however the group where most people they know does not own a car, shows a significant difference in influence. The standardized beta coefficient has a positive value, which indicates that when people are surrounded by people who do not own car, they tend to have a more positive perception towards the eventual transformation of parking space. Although the regression analysis points towards a significant influence of the subjective norm, the influence is not very big. So the people in Nijmegen-Oost don't seem to be very consciously affected by the social pressure, behavior or beliefs form their neighbors. This rejects one if the main pillars of the Theory of Planned Behavior (1991), where the subjective norm is treated equally with attitudes and perceived behavioral control concerning the intention towards behavior. Although the respondents are, derived from the survey data, not very strongly affected by their nearby residents, the input from the Focus Group Discussion created another point of view. Where people are not strongly affected in their current behavior or perception, they think they are affected by subjective norms in their ability to change this current behavior or perception, as it was mentioned that they are not very eager to make a big change because they see, or assume, that their neighbors won't participate in the same change.

Within *intention*, *motivation* clearly has the most influence on the dependent variable. This can be interpreted as a logical result, as people who are motivated towards transformation, logically also have a positive perception towards this transformation. But, the variable also represents the motivation of the people who are more negative towards transformation and want to keep the current situation as it is, or want to create even more parking space. It can be concluded, as the relationship is positive, that people who want to see a form of transformation are far more motivated in reaching this goal than people who don't want to see a transformation from parking-to public space. Also people who are more motivated towards thinking about and improving their neighborhood and who are willing to take part in the design process, are more open and positive towards an eventual transformation. This creates a potential for the concept, as the people who think it is a good concept, are generally also motivated to actually help in implementing it, for example as part of a participation process. Lastly, within the intention, also maximum walking distance, which can be assigned to ability, has a weak influence on the dependent variable. This seems to indicate that people are expecting that, as a result of the transformation, they would have to walk an extra distance to their parked car because people who have no big problems with walking an extra bit, are more positive towards the idea of a transformation

Lastly, the other factors that show a statistically significant correlation with the perception concerning transformation all fall under the roof of situational influences. These factors are the *level of education, amount of cars in household, plans to buy a car* and *current satisfaction public space*. From these variables, only *age, level of education* and *current satisfaction parking* represent a significant influence on the perception towards eventual transformation. From these three variables, *current satisfaction parking* represents the biggest amount of influence. This seems a logical result, as people who are satisfied with the current parking facilities and availability, see more potential in transforming some of this parking space into other forms of public space

than people who are currently experiencing a lack of parking availability, which will quite probably not improve directly when parking space is transformed, from their point of view. This idea has been confirmed in the focus group discussions, where the negative attitudes and perceptions towards eventual transformation where mainly explained by the personal experience in car parking in the attendees' direct environment. Where current satisfaction in parking does have significant influence on the dependent variable, current satisfaction about public space does not. Apparently, the satisfaction about the public space in both peoples' street and neighborhood does not lead to a necessity of changing this public space. This is peculiar, as the transformation has the potential to solve this dissatisfaction. The people in Nijmegen-Oost however don't seem to consider it as a measure to solve this, which makes the potential of the concept quite questionable. However, this plight can also be explained in a more positive way; if people who are already satisfied are positive towards transformation, this will lead to the same results in the regression model. Derived from the focus group discussion, this seems very plausible, as the attendees from the positive group showed a lot of affection and satisfaction towards their street and neighborhood. *Age* also represents a significant influence on the dependent variable. Both people with a middle age (40-59) and a young age (18-39) have a more positive perception concerning transformation as people with an old age (60+), as they both are significant in the multiple regression model. As the standardized coefficient for the age group *young* has a higher value than the *middle* age group in comparison the age group *old*, it can be stated that the influence of age is linear and that the perception towards transformation tends to become more positive when people are younger. Lastly, also the *level of education* has a significant influence on the dependent variable. However, the influence is only significant for people with a low education level (MBO or less), as the education level *middle* is not significant in the multiple regression model when compared to the education level *high.* As this influence exists, combined with the high levels of education, Nijmegen-Oost seems to have more potential for eventual transformation than neighborhoods with a low(er) level of education.

In the focus group discussion, the perceived parking pressure has been agreed on in being the most important factor that influences the perception concerning transformation, mainly in the negative group. Besides the perceived parking pressure, the positive group mainly agreed on too many cars in the street image being the most influential on their perception of transformation. Mostly attendees who live in older parts of the neighborhood, where the streets are very narrow and the housing density high, agreed on this statement. Also, attendees from the negative group shared this opinion. Also the correlation shows that this seems to be true ($r = 0.526$, bothered by parked cars). Another important point, derived from the focus group discussions, was that some people currently park their car in front of their house, as if they wouldn't do this, other people would simply park there. If there would be something other than a parking spot, they would have no problem with parking somewhere else. The most important conclusion that can be derived from the focus group discussions is that people's personal experience, in different subjects within the topic is very highly influential in how they think and act towards the topic. This is mainly the experience in parking and the perceived parking pressure, which is very location-dependent, but also the quality of public space in their surroundings and their experience with, or knowledge about, alternatives on car parking. It also became clear that people who had yet experienced some forms of transformations form parking space to other forms of public space (mainly to space use of the hospitality sector), were far more positive towards the subject. This is in line with the Diffusion of innovation theory (1962), as the people already experienced the *relative advantage* of the concept and experienced its *trialability.*

Another important thing to conclude is that there is a big contradiction between what people see as their ideal, in this case their ideal street image, and what they truly want and care about in practice. All the attendees sketched a comparable ideal street image; green, varied, lively and aesthetically improved. But, mainly the negative group, stated that while they saw this as their

ideal, the comfort and ease that comes with being able to park in their own street weighs heavier in practice than this ideal street image. Again, a more negative perception is accompanied by a feeling that eventual transformation will lead to a situation where people will not be able to park their car in their own street anymore. Another underlying reason for a negative perception concerning transformation can be that people simply don't envision or imagine the alternatives to the current situation; two of the attendees of the focus group discussion saw their opinion about the transformation of parking space actively change while participating in the survey. So, if people are exposed to alternatives, their perception can quickly change. Another concept, that was introduced in the conclusions about the main research question, is that people are positive towards transformation if they are very satisfied with the parking availability, or if the problem with parking has already become so big that they are more open towards alternatives. This could also explains why there is no direct linear relationship between the *current satisfaction of parking* and the perception concerning transformation, as this idea would result in a more curved relationship. This partly also illustrates why *satisfaction in public space* has a negative influence on the dependent variable; when people are more satisfied with public space than they are with parking, they don't want to see the ratio changing towards public space. To conclude, the perception that people have about transformation is highly affected by the personal circumstances in both a spatial or locational sense, but also personal circumstances like the type of household and working situations.

When the conclusions from this research are reflected upon the used literature and theories, some results are in line with those concepts and some are divergent. Where in the Behavior Model of Fogg, *motivation* and *ability* are treated as equal factors for a certain behavior change to occur, this research shows that in this case *motivation* actually is far more influential, where *ability* did not show a significant influence on the perception concerning transformation. For example, the distance that people live from their work or education, which creates ability to change their car driving- and parking behavior as it eliminates a direct need for car use when people are living nearby, does not influence the perception of the respondents. Concerning the Theory of Planned behavior however, the results are more in line with the original theory, only the subjective norm, while having some minor influence on the dependent variable, showed not to be as important as it is stated in the original concept of the theory. Although, where the data from the survey did show no big influence from the subjective norm on behavior, the focus group discussion illustrated that the subjective norm actually does restrain peoples will to change this behavior. So, it can be stated that, concerning the relevant behavior within this research, the Theory of Planned behavior does not work as a model for explaining current behavior, but works better as a model which contributes to the understanding of behavior change. While these two theories about behavior change separately do not function as a sufficient model for explaining the type of behavior change researched in this thesis, together they offer the possibility to a model which is more applicable to complex behavior in a neighborhood like Nijmegen-Oost and is able to predict perception. Furthermore, the situational influences as illustrated in the conceptual framework, which concerned rather abstract concepts, as concrete literature on the topic was lacking, are in this research formulated into specific factors that support understanding the relationship between these factors and the perception of the concept of transforming parking space into other forms of public space. Where all the separate factors of the theories on behavior have been tested in this research, this is not the case for the Diffusion of Innovation theory as some factors can only be tested during the actual phase of implementation, which makes it difficult to extrapolate the results. Although, the two factors that have been tested, *relative advantage* and *trialability*, are confirmed to both be positive elements of the parking transformation concept.

6. Reflections and recommendations

6.1 Practical- and societal reflection and recommendations

The first important thing to note is that the concept discussed in this thesis was a topic that drew quite some attention in Nijmegen-Oost, mainly illustrated by the high response rate of 23% and the interest to attend the focus group discussions, for which a draw had to be executed to decide whom could attend the discussions. In the last years, there were several projects concerning parking in Nijmegen-Oost, mainly in introducing or expanding paid parking in the neighborhood. This can be the reason why it is such a hot topic, as the residents have already participated in the decision making process concerning parking. While car parking seems to be a problem in many parts of Nijmegen-Oost, it is interesting to see that the majority of the people (53.8%) have a positive attitude towards eventual transformation of parking space into other forms of public space. If we take a look at some other statistics of Nijmegen-Oost it is apparent that the neighborhood possibly holds quite some potential in relation to the concept. The first example of this, is the proximity of the residents to their work or education, which shows potential to limit car use. 54.9% of the people live within a radius of five kilometers from their work or education. Even in the 30+ group, as most students live within a 5 kilometers from the Radboud university, this is still 53.2%. The distance of zero to five kilometers is particularly suitable for transport by bicycle. As work-related transport was the most important reason to take the car within the respondents, there seem to be chances to change the potentially change the behavior of the people in this group. Another advantage of Nijmegen-Oost in the light of potential transformation is the level of education. The analysis showed that the level of education has a positive relationship with the perception concerning transformation. While it is arguable that the level of education form the respondents is representable for the average of Nijmegen-Oost, it seems plausible that Nijmegen-Oost has an above average level of education, which translate into people who are more positive towards the concept than people in other neighborhoods. In the focus group discussion, a lot of attention was paid to the 2nd car in households and the potential elimination of it. Not very many households however, do own more than one car, 18.1%, which represents 30.5% in the household with cars. An elimination of 15.3% (30.5 / 2) of the total of 10.106 cars (allecijfers.nl, 2020) in the research area , would result in well over 1500 cars less in the street image. Which would result in a significant impact on the parking pressure. While 77.4% of the households from the respondents own one or multiple cars, it is quite surprising that more than one third (36.0%) of the people are not attached to the idea of owning a car, especially when this is reflected with the input from the focus group discussions, where the car was frequently described as 'the holy cow'. Also 47.1% of the respondents are stating that car driving is not in their habit, so the results are very mixed, which ask for different approaches, as car driving behavior can hardly be generalized within the population of Nijmegen-Oost. However, parking in people's own street is experienced as being a habit (73.6%) and is also very valued (74.8%). This, together with the critical view on the concept from the negative focus group discussion, illustrates the point that transformation can likely count on a lot of frictions when it interferes with the parking availability, or even worsens it. This seems essentially to be a no-go. A last important note within this subject as that all previous points in the discussion are applicable for areas in the neighborhood which currently are experiencing a problem in parking availability. In parts of the neighborhood where there is a vast and sufficient availability in car parking space, eventual implementation of the concept can be a lot easier and will result in less controversy.

Another point that causes a lot of frustration in Nijmegen-Oost is the use of parking space in the neighborhood by commuters. Many people, both in the focus group discussions as people on the street while distributing the surveys, sketched the situation where people park their car in the free parking zones of the neighborhood, take a folding bike out of the trunk and drive to their work in the city center. This causes extra pressure on the parking demand and results in frustrated residents who can't park their car in their own street. In this case, responsibility should be taken by big employers in the city center, together with the municipality. However, the underlying thought of this phenomenon can be seen as something positive, if regulated. Where people park their car somewhere outside of the city center, and cycle the last part of the journey to their work.

So, what are possible ways to implement the concept? Important to note is that, while on average 78% of the respondents choose a street image with fewer cars, there are not many people who don't want to put any effort in reaching their wished street image, only 25.0%. This again indicates that the subject appeals to a lot of people in Nijmegen-Oost. Although not a big proportion of the respondents are highly motivated, they are willing to do at least something within the subject. As discussed in the focus group discussion, the municipality of Nijmegen would be the most important actor in the process. If they are interested in the concept (which they actually are, as they want to discuss it in the near future), they should be the party that introduces the topic to residents and gives some sort of starting shot. As people in Nijmegen-Oost showed they are motivated to participate in the process of the concept and are generally positive towards it, the transformation of parking space can be a project with a lot of civil participation, which has the potential to bring the residents of Nijmegen-Oost and the municipality of Nijmegen closer together. A good starting point can be to simply experiment with the concept. A few attendees in the focus group discussion showed that the opinion about the subject can actively change when they come in contact with possible alternatives to the existing situation. One of the reasons that streets are nowadays still filled with parked cars, is possibly that people take the current situation for granted and simply don't imagine alternatives to the existing situation. The concept lends itself particularly well experimenting with for example temporary installations, parklets for instance. In this way it is possible to create a temporary situation with more greenery in a street, or seating facilities, playgrounds and so on. These experiments can be for a very short term like a week, just to let people experience the concept and alternatives to the existing situation for a bit, but they can later on also be seasonal, where for instance an installation is installed for the spring and summer months. If these experiments are experienced positively, the different forms of new public space can be implemented permanently.

Again, it remains essential to choose the locations for these experiments or temporary installations very carefully and in a tactical way. As discovered in both the survey and the focus group discussions, there is a lot of locational fluctuation in Nijmegen-Oost in parking pressure. In some parts of the neighborhood people are already not used to parking their car in their own street as there is not enough parking availability, in some parts spaces are hard to find and people see the availability decreasing and in other parts there is a sufficient and vast availability of parking space. It is important that the implementation of the concept of transformation will not deteriorate the parking availability. So it is best to start in parts of the neighborhood where there is no perceived parking problem. As the concept has the potential to be very adaptive, shifts in car ownership and parking availability can be quickly overcome. However, as the survey data showed that extra public space can potentially work as a trigger for people to park somewhere else, it could also be helpful for the areas which do have a parking problem; people can park somewhere else in the neighborhood, for example on underused parking spaces or garages from for example supermarkets or companies, in return for an improved street image and public space.

6.2 Scientific reflection

Where in the contemporary scientific literature about parking, mainly parking economics and parking situations for new developments are discussed, this thesis contributes to other and new parts of the discussion about car parking and its space use. Firstly it combines a more traditional point of view, being parking behavior and perception, with a relatively new concept, being the transformation of existing parking space into other forms of public space. Where knowledge in the academic field about parking in general in existing neighborhoods is scarce, this thesis provides answers, mainly in the Dutch context. It provides answers about the values that citizens in comparable neighborhoods in the Netherlands, both demographical and spatial, attach to car use and parking. Where for this part the most important contribution comes from the conclusion that the car, while greatly valued, is mainly seen as a practical object which offers ease, comfort and freedom. This finding contributes positively to the discussion about alternatives to personal car use, where it is evident that personal car ownership can potentially be replaced by alternatives that offer these same core qualities. Furthermore it provides valuable knowledge, for both academics and planners, about the future of car parking. While the urban (mobility) paradigm is slowly changing, knowledge from this thesis can be used to smoothen this transition. The perception of people concerning the transformation of parking space is highly dependent on personal circumstances. However, this thesis shows that the exposure towards- and experience of- alternatives can be good measures to shift this urban paradigm. Furthermore it provides handles for further academic research within the topic, which will be discussed in the subchapter *recommendations for further research.*

6.3 Limitations of research

There may be some possible limitations in this study. Firstly, it is not sure if the results of this research can be generalized. Although there are many neighborhoods in the Netherlands, mainly in middle-sized cities to big cities like Nijmegen with an historic city center, which have comparable characteristics, it is unknown that the demographics in these neighborhoods will be comparable. As Nijmegen is known as a student city and a lot of students live in Nijmegen-Oost, this can have a big influence on the results in comparison to cities without a big student population. Also the level of education within the respondents, which was very high, raises questions if it is comparable to other neighborhoods, and for that reason generalizable to other Dutch neighborhoods, or neighborhoods in other countries, with comparable characteristics.

Secondly, it is important to note that the survey was distributed and completed by the respondents during times of the first Covid-19 lockdown in the Netherlands. This might have influenced the results as people could have had different attitudes during these strange times and moreover it had a big impact on the parking situation in the neighborhood, as people worked from home, which resulted in a lot more parked cars, mainly during the day. This might have influenced the results in multiple ways which are hard to determine. Another limitation comes from the lack of previous research studies about the topic. Although the topic gained quite some popularity in the United States over the last years, the topic has not been researched yet in the Netherlands, which has a completely different urban system and design than the United States has. Due to this lack of existing research, the literature review in this research is quite limited. Also, the different factors that are tested towards the dependent variable are all taken from theories that don't have a direct relationship with the concept of transforming parking space into other forms of public space.

Where the survey had a lot of respondents and due to that a high reliability and confidence level, the focus group discussion were performed on a much smaller scale. This choice has mainly been made because of the situation with Covid-19, but also pragmatic reasons played a role. The scale

in which the focus group discussion is executed, both the group sizes as the number of groups, can be seen as a limitation in the research. While the two focus group discussion provided for a lot of input and new insights, it could have been better if the groups were larger and if there were more focus groups, with more specified characteristics.

Another limitation can be found in the data collection. The survey, as well as the survey invitation, was only available in Dutch. However most of the people in Nijmegen-Oost can read and interpreted Dutch, this excludes the population group that does not have sufficient knowledge in the Dutch language. It is however questionable if this group represents a significant proportion within the population of Nijmegen-Oost.

6.4 Recommendations for future research

This research has been focused on the residents of Nijmegen-Oost. To gain more knowledge about the subject and to create more potential for it, it would be very valuable to include other actors than the civil society. This concerns mainly the municipality, but also local businesses, for example in the hospitality sector. If these actors would be included in the research, more comprehensive knowledge would be gained. Also, the qualitative part of the research can be expanded in future research. Due to circumstances the qualitative part in this research was limited. It would be very valuable to extend this process and execute more focus group discussions or even in-depth interviews with residents, but also with other relevant actors. Also, discussions between different actors can help in understanding more of the complexities of the concept. Another recommendation for future research is the use of GIS (Geographical Information System). In the research it became apparent that there are a lot of locational fluctuations throughout Nijmegen-Oost. While the existence of the phenomenon became clear in the research, it is yet not spatially and graphically represented. With the use of GIS, a lot of valuable information could be gained. For example in which parts of Nijmegen-Oost there is a perceived parking problem, by graphing the current satisfaction in parking on a map. This kind of data will be very valuable if there would be worked towards eventual implementation of the transformation, as it shows which areas have the potential for the concept and which areas do not.

References

Agha, S., Tollefson, D., Paul, S., Green, D., & B., J. (2019). Use of the Fogg Behavior Model to Assess the Impact of a Social Marketing Campaign on Condom Use in Pakistan. *Journal of Health Communication*, 284-292.

Azjen, I. (2006). *Constructing a Theory of Planned Behavior Questionnaire.* Massachussetts: University of Massachussetts

Ajzen, I. (2011). The theory of planned behaviour: Reactions and refelctions . *Psychology & Health*, 1113-1127.

Aliyah, I., & Aulia, S. A. (2019). The Flexibility of Parking Space of Traditional Market in the City Center (Case Study: Pasar Gede Of Surakarta, Indonesia). *The 4rd International Conference in Planning in the 2019 Era of Uncertainty* (pp. 1-9). Brawijaya: IOP Publishing.

Amin, A. (2008). Collective culture and urban public space. *City* , 5-24.

Anable, J. (2005). 'Complacent Car Addicts' or 'Aspiring Environmentalists'? Identifying travel behaviour segments using attitude theory. *Transport Policy*, 65-78.

Anderson, J., Ruggeri, K., Steemers, K., & Huppert, F. (2017). Lively Social Space, Well-Being Activity, and Urban Design: Findings From a Low-Cost Community-Led Public Space Intervention . *Environment and Behavior*, 685-716.

Azjen, I. (1991). The Theory of Planned Behavior. *Organizational Behavior and Human Decision Processes*, 179-211.

Bee, P. (2020, March 18). *De geparkeerde auto uit het straatbeeld.* Retrieved from Parkbee: https://parkbee.com/nl/de-geparkeerde-auto-uit-het-straatbeeld/

Ben-Amos, A., Castle, C., Ferrentino, C., Simpson, A., & Wolf, D. (2018). *Park(let) Here: Organizational and Demographic Preconditions for the Development of Parklets in Philadelphia.* Philadelphia: StreetBoxPHL.

Bijlsma, L., Bergenhenegouwen, G., Schluchter, S., & Zaaijer, L. (2008). *Transformatie van Woonwijken met Behoud van Stedenbouwkundige Identiteit.* Rotterdam & Den Haag: NAi Uitgevers & Ruimtelijk Planbureau .

Breen, R. L. (2006). A Practical Guide to Focus-Group Research. *Journal of Geography in Higher Education*, 463-475.

Bryman, A. (2012). *Social Research Methods.* Oxford: Oxford University.

Buhre, S., Bache, M., Bedmutha, S., Pawar, N., Shrivat, P., & Motegaonkar, S. S. (2018). Feasibility study of on-street parking for suitable solution on existing parking issues. *International Journal of Advance Research, Ideas and Innovations in Technology*, 195-203.

Candy, S. (2010). The Futures of Everyday Life: Politics and the Design of Experiential Scenarios. *Political Science*, 1-372.

Candy, S. (2014). Experiential Futures: Stepping into OCADU's Time Machine. *The Futurist*, 34-37.

Candya, S., & Dunagan, J. (2017). Designing an experiential scenario: The People Who Vanished. *Futures*, 136-153.

Carmona, M. (2019). Principles for public space design, planning to do better. *URBAN DESIGN International* , 47-59.

Caruso, J., & Cliff, N. (2000). *Emperical size, coverage, and power of confidence intervals for Spearman's Rho.* Los Angeles: University of Southern California .

Cats, O., Zhang, C., & Nissan, A. (2016). *Survey Methodology for Measuring Parking Occupancy: Impacts of an On-Street Parking Pricing Scheme in an Urban Center.* Delft & Stockholm: Delft University of Technology & KTH Royal Institute of Technology.

Chester, M., Horvath, A., & Madanat, S. (2010). Parking infrastructure: energy, emissions, and automobile life-cycle environmental accounting. *Environmental Research Letters*, 1-8.

Childs, M. C. (2004). *Squares: A public place design guide for urbanists.* Albuquerque: University of New Mexico Press.

Christiansen, P., Fearnley, N., Hanssen, J. U., & Skollerud, K. (2017). Household parking facilities: relationship to travel behaviour and car ownership. *World Conference on Transport Research* (pp. 4185–4195). Shanghai: Transportation Research Procedia.

Coevering, P. v., Zaaijer, L., Nabielek, K., & Snellen, D. (2008). *Parkeerproblemen in Woongebieden Oplossingen voor de Toekomst.* Rotterdam & Den Haag: NAi Ultgevers & Planbureau voor de Leefomgeving .

Cooper, M., & Francis, C. (1998). *People places: Design guidelines for urban open spaces.* New York: Van Nostrand Reinhold publishers.

Cresswel, J. (2005). *Educational research: Planning, conducting, and evaluating quantitative and qualitative approaches to research.* Upper Saddle River: Merrill/Pearson Education.

CROW. (2017). *Parkeren en Gedrag* . Ede: CROW-KpVV.

Cummins, A., Catling, C., Hogan, R., Sheehan, A., & Smith, R. (2013). Diffusion of Innovation theory made easy—An introductory workshop. *Women and Birth* (pp. 42-43). Sydney: Elsevier.

Davidson, M. M. (2013). *Tactical Urbanism, Public Policy Reform, and 'Innovation Spotting' by Government: From Park(ing) Day to San Francisco's Parklet Program.* San Francisco : Massachusetts Institute of Technology.

Dearing, J. W. (2009). Applying Diffusion of Innovation Theory to Intervention Development. *Research on Social Work Practice*, 503-518.

d'Orey, P., & Ferreira, M. (2014). ITS for Sustainable Mobility: A Survey on Applications and Impact Assessment Tools. *IEEE Transactions on Intelligent Transportation Systems*, 477-493.

Dogru, A., Malaitham, S., Okamura, M., Fukuda, A., & Fukuda, T. (2017). Parking Management Policies Based on Behavior Analysis at Fatih District Istanbal, Turkey . *World Conference on Transport Research* (pp. 5205–5219). Shanghai: Transport Research Procedia .

Duarte, F., & Ratti, C. (2018). The Impact of Autonomous Vehicles on Cities: A Review. *Journal of Urban Technology*, 3-18.

Eide, A., Dyrstad, K., Munthali, A., Rooy, G. v., Braathen, S., Halverson, T., . . . Rod, J. K. (2018). Combining survey data, GIS and qualitative interviews in the analysis of health service access for persons with disabilities. *BMC International Health and Human Rights*, 18-26.

Eisinga, R., Grotenhuis, M., & Pelzer, B. (2013). The reliability of a two-item scale: Pearson, Cronbach, or Spearman-Brown? *International Journal of Publc Health* , 637-642.

Elizabeth, K., Nisbet, L., & Gick, M. L. (2008). Can Health Psychology Help the Planet? Applying Theory and Models of Health Behaviour to Environmental Actions. *Canadian Psychology* , 296-303.

Field, A. (2013). *Discovering statistics using IBM SPSS statistics.* London: Sage .

Fogg, B. (2007). A Behavior Model for Persuasive Design. *Persuasive Technology*, 1-8.

Fogg, B. (2019, September). Designing for Behavior Change—New Models and Moral Issues . (J. Euchner, Interviewer)

Forbes, P. J., Wells, S., & Masthoff, J. (2016). SUPERHUB: Integrating behaviour change theories into a sustainable urban mobility platform. *British Computer Society Conference on Human-Computer Interaction* (pp. 1-4). Aberdeen: University of Aberdeen.

Francis, J., Giles-Corti, B., Wood, L., & Knuiman, M. (2012). Creating sense of community: The role of public space. *Journal of Environmental Psychology*, 401-409.

Gabbe, C., Pierce, G., & Clowers, G. (2020). Parking policy: The effects of residential minimum parking requirements in Seattle . *Land Use Policy*, 450-458.

Gehl, J. (2004). *Public spaces, public life.* The Danish Architectural Press: Copenhagen.

Gemeente Nijmegen. (2012). *Parkeernota Nijmegen 2013-2017.* Nijmegen: Gemeente Nijmegen.

Gemeente Nijmegen. (2020). *Nijmegen stad in beweging Omgevingsvisie 2020-2040.* Nijmegen: Gemeente Nijmegen.

Ghandi, M. (2019). Parklet: A New Urban Platform for Emergent Forms of Communication and Social Interaction in the Cities. *Modular and Offsite Construction* , 21-24.

Glazebrook, G., & Newman, P. (2018). The City of the Future. *Urban Planning*, 1-20.

Goodwin, P., & Dender, K. V. (2013). 'Peak Car' — Themes and Issues. *Transport Reviews*, 243-254.

Gray, N., & Hamilton, E. (2018). The Case for Ending Parking Requirements in Downtown Los Angeles. *Market Urbanism* , 1-5.

Greenbaum, T. (2000). *Moderating Focus Groups: A Practical Guide for Group Facilitation.* London: Sage.

Hajer, M., & Versteeg, W. (2019). Imagining the post-fossil city: why is it so difficult to think of new possible worlds? *Territory, Politics, Governance*, 122-135.

Harbers, A. (2009). De stedenbouwkundige kwaliteiten van de Nederlandse probleemwijken . *BEELD & PRAKTIJK* , 68-74.

Hauke, J., & Kossowski, T. (2011). Comparison of values of Pearson's and Spearman's correlation coefficients on teh same sets of data . *Quaestiones Geographicae* , 87-93.

Hinkle, D., Wiersma, W., & Jurs, S. (2003). *Applied Statistics for Behavioral Sciences .* Boston: Houghton Mifflin .

Huppert, F. A., & So, T. T. (2013). Flourishing Across Europe: Application of a New Conceptual Framework for Defining Well-Being. *Social Indicators Research*, 837-861.

Hut, P., Labots, D., Martens, P., Nijhuis, J., Paardeknooper, J., Ruster, S., . . . Wakeren, G. v. (2017). *Parkeren en gedrag* `. Utrecht : CROW-KpVV.

Ibeas, A., dell'Olio, L., & Moura, J. L. (2018). Parking Behavior and Policy. *Journal of Advanced Transportation*, 1-3.

Inci, E. (2015). A review of the economics of parking. *Economics of Transportation*, 50-63.

Ivankova, N., Creswell, J., & Stick, S. (2006). Using Mixed-Methods Sequential Explanatory Design: From Theory to Practice. *Field Methods*, 3-20.

Jacobs, A. (1993). *Great streets.* Cambridge: MIT Press.

Jacobs, J. (1961). *The death and life of great American cities.* New York: Vintage Books.

Jones, J., & Hidiroglou, M. (2013). Capturing, Coding, and Cleaning Survey Data. In G. Snijkers, G. Haraldsen, J. Jones, & D. K. Willimack, *Designing and Conducting Business Surveys* (pp. 459-504). Toronto: John Wiley & Sons.

Kelliher, A., & Byrne, D. (2015). Design futures in action: Documenting experiential futures for participatory audiences. *Futures*, 36-47.

Kitzinger, J. (1995). Introducing focus groups. *British Medical Journal*, 299-302.

Kothe, E. J., Ling, M., North, M., Klas, A., Mullan, B. A., & Novoradovskaya, L. (2019). Protection motivation theory and pro-environmental behaviour: A systematic mapping review. *Journal of applied social psychology*, 411-432.

Krosnick, J., & Presser, S. (2010). Question and Questionnaire Design. *Handbook of Survey Research*, 263-313.

Krueger, R. (2002). *Designing and Conducting Focus Group Interviews.* Minnesota: University of Minnesota .

Lavine, E. (2012). Spectacle in the New Green City. *Berkeley Planning Journal*, 140-149.

Lancaster, B. (1999). Defining and Interpreting Suppressor Effects: Advantages and limitations. *Annual Meeting of the Southwest Educational Research Associtation* (pp. 1-21). San Antonio: Plus Postage

Linan, F. (2013). Testing alternative measures of subjective norms in entrepreneurial intention models. *International Journal of Entrepreneurship and Small Business*, 35-47.

Litman, T. (2006). *Parking Management: Strategies, Evaluation and Planning.* Victoria: Victoria Transport Policy Institute.

Litman, T. (2017). *Reforming Municipal Parking Policies to Align With Strategic Community Goals.* Victoria: Victoria Transport Policy Institute.

Littke, H. (2016). Revisiting the San Francisco parklets problematizing publicness, parks and transferability. *Urban Forestry & Urban Greening*, 165-173.

Liu, Q., Wang, J., Chen, P., & Xiao, Z. (2017). How does parking interplay with the built environment and affect automobile commuting in high-density cities? A case study in China. *Urban Studies*, 3299–3317.

Lopez, M., Nes, A. v., Verhagen, D., & Bonth, L. d. (2016). Strategieën voor de revitalisatie van stadswijken. *Ruimtelijke veiligheid en risicobeleid* , 31-35.

Lorzing, H., Harbers, A., & Schluchter, S. (2008). *Krachtwijken met Karakter* . Rotterdam & Den Haag: NAi Uitgevers & Planbureau voor de Leefomgeving.

Lynch, K. (1960). *The Image of the City.* Cambridge: MIT Press.

Malik, F. A. (2017). Sustainable Parking. *International Journal of Engineering Development and Research*, 10-14.

Martin, E., Shaheen, S. A., & Lidicker, J. (2010). Impact of Carsharing on Household Vehicle Holdings. *Journal of the Transportation Research*, 150-158.

Mehta, V. (2007). Lively Streets: Determining Environmental Characteristics to Support Social Behavior. *Journal of Planning Education and Research*, 165-187.

Mehta, V. (2013). *The street: A quintessential social public space.* New York: Routeledge.

Mehta, V., & Bosson, J. K. (2018). Revisiting Lively Streets: Social Interactions in Public Space. *Journal of Planning Education and Research*, 1-13.

Michie, S., Johnston, M., Francis, J., Hardeman, W., & Eccles, M. (2008). From Theory to Intervention: Mapping Theoretically Derived Behavioural Determinants to Behaviour Change Techniques. *APPLIED PSYCHOLOGY: AN INTERNATIONAL REVIEW*, 660-680.

Mingardo, G. (2016). *Articles on Parking Policy.* Delft: TRAIL Resarch School.

Mitchell, D. (1995). The End of Public Space?People's Park, Definitions of the Public, and Democracy. *Annals of the Association of American Geographers*, 108-133.

Morency, C., & Trepanier, M. (2008). Characterizing Parking Spaces Using Travel Survey Data. *CIRRELT*, 17-34.

Moseley, S. F. (2004). Everett Rogers' Diffusion of Innovations Theory: Its Utility and Value in Public Health. *Journal of Health Communication*, 149-151.

Mukaka, M. (2012). Statistics Corner: A guide to appropriate use of Correlation coefficient in medical research. *Malawi Medical Journal*, 67-71.

Müller-Eie, D., & Bjorno, L. (2017). The implementation of urban sustainability strategies: theoretical and methodological implications for researching behaviour change. *Sustainable Development Planning* , 894-907.

Murray, C. E. (2009). Diffusion of Innovation Theory: A Bridge for the Research–Practice Gap in Counseling. *Journal of Counseling & Development*, 108-116.

Mutiawati, C., Lulusi, L., Suryani, F. M., & Sugiarto, S. (2018). Feasibility of on-Street Parking Based on Degree of Saturation. *Aceh International Journal of Science and Technology*, 11-23.

Nyumba, T. O., Wilson, K., Derrick, C. J., & Mukherjee, N. (2017). The use of focus group discussion methodology: Insights from two decades of application in conservation. *Methods in Ecology and Evolution*, 20-32.

Onwuegbuzie, A. (2000). Expanding the Framework of Internal and External Validity in Quantitative Research. *Annual Meeting of the Association for the Advancement of Educational Research* (pp. 2-61). Ponte Vendra: ERIC.

Owens, L. B. (2018). *A Tale of Two Cities: The Parklet Implementation Processes in Los Angeles and San Francisco.* Los Angeles: Department of Urban and Environmental Policy.

Pratt, L. (2011). *Parklet Impact Study.* San Francisco: San Francisco Great Streets Project.

Provincie Zuid-Holland . (2014). *Parkeren en verstedelijking .* Den Haag: Provincie Zuid-Holland .

Rabiee, F. (2004). Focus-group interview and data analysis. *Proceedings of the Nutrition Society*, 655-660.

Rahmat, H. (2018). *The Social Dynamics of Proliferated Micro Urban Interventions: A Case Study of Parklets' Diffusion on Twitter .* New South Wales: University of New South Wales .

Rehman, A. A., & Alharthi, K. (2016). An Introduction to Research Paradigms. *Internationa Journal of Educational Investigations*, 51-59.

Reith, M. (2020, July 7). *Bewoners Nijmegen-Oost verdeeld over betaald parkeren, vooral 's avonds weinig plek.* Opgehaald van de Gelderlander : https://www.gelderlander.nl/nijmegen/bewoners-nijmegen-oost-verdeeld-over-betaald-parkeren-vooral-s-avonds-weinig-plek

Rosenblum, J., Hudson, A. W., & Ben-Joseph, E. (2020). Parking futures: An international review of trends and speculation. *Land Use Policy*, 1-10.

Schönfeld, K. C., & Bertolini, L. (2016). Urban streets between public space and mobility. *International Scientific Conference on Mobility and Transport Transforming Urban Mobility* (pp. 300-302). 2016: Elsevier.

Schonlau, M., Fricker, R. D., & Elliott, M. N. (2002). *Conducting Research Surveys via E-mail and the Web.* Santa Monica : RAND Cooperation.

Segal, M., & Kockelman, K. M. (2018). DESIGN AND IMPLEMENTATION OF A SHARED AUTONOMOUS VEHICLE SYSTEM IN AUSTIN, TEXAS. *Journal of Urban Planning and Development*, 1-18.

Shoup, D. (2014). The High Cost of Minimum Parking Requirements. *Transport and Sustainability*, 87-113.

Smith, E. (2016). *An Exploratory Assessment of Parklet Usage in Seattle: Methods and Findings.* Seattle: University of Washington.

Staats, H., Harland, P., & Wilke, H. (1999). Explaining pro-environmental intention and behavior by the theory of planned behavior. *Social and Organizational Psychology*, 2505-2527.

Takebayashi, H., & Moriyama, M. (2009). Study on the urban heat island mitigation effect achieved by converting to grass-covered parking. *Solar Energy*, 1211-1223.

Tashakkori, A., & Teddlie, C. (2003). *Handbook on mixed methods in the behavioral and social sciences.* Thousand Oaks: Sage.

Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha . *International Journal of Medical Education*, 53-55.

Thiel, S. v. (2007). *Research Methods in Public Administration and Public Management: An Introduction.* Oxon: Routeledge.

Thompson, F., & Levine, D. (2007). Examples of Easily Explainable Suppressor Variables in Multiple Regression Research . *Multiple Linear Regression Viewpoints* , 11-13.

Tsai, M.-T., & Chu, C.-P. (2012). Evaluating parking reservation policy in urban areas: An environmental perspective. *Transportation Research*, 145-148.

Valente, T. (1996). Social network thresholds in the diffusion of innovations . *Social Networks* , 69-89.

Wendorf, G., & Schröder, C. (2018). *The Challenging Path to a Redistribution of Space – Renegotiating Urban Mobility.* Berlin: TU Berlin.

Whyte, W. (1980). *The social life of small urban spaces.* Washington, DC: Conservation Foundation.

Williams, M. (2000). Interpretivism and Generalistaion . *Sociology*, 209-224.

Zhang, W ., & Guhathakurta S. (2017). Parking spaces in the age of shared autonomous vehicles: How much parking will we need and where? *96th Transportation Research Boarding Meeting.* Washington D.C