# A Virtual Reality Study to the Effects of a Speed Limit Reduction and the Presence of Parallel Parking on the Situational Workload of Drivers

E.M.M. (Esther) Menken

Student ID: 4731395
Msc. Civil Engineering: Transport and Planning

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| Student number: | 4731395 | |
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| Thesis committee: | | |
| Chair: | Dr.ir. H. Farah | TU Delft - Transport and Planning |
| Daily Supervisor: | Dr.ir. A.M. Salomons | TU Delft - Transport and Planning |
| Supervisor: | Dr. J.A. Annema | TU Delft - Transport and Logistics |
| Supervisor: | H. de Jong MSc. | Arcadis - Duurzaamheid en Gedrag in Mobiliteit |
| Daily Supervisor: | S. Blankers MSc. | Arcadis - Duurzaamheid en Gedrag in Mobiliteit |

# Preface

This research was conducted as part of my master's thesis project for the Transport & Planning Master's Degree at Delft University of Technology, in collaboration with Arcadis.

Readers particularly interested in the background of Dutch road design should refer to Chapter 1. For those more focused on the theoretical aspects of mental workload and road design, Chapter 2 is recommended. If your interest lies in virtual reality as a research methodology, Chapter 3 will be insighful. The conclusions and recommendations regarding road design characteristics and virtual reality are detailed in Chapters 5 and 6.

While writing this thesis, I have gained substantial knowledge about road designs, virtual reality, and mental workload. Nevertheless, I may have learned even more about myself during this process. Midway through my thesis, I experienced an accident while cycling. This incident resulted in a concussion with an unpredictable recovery time. I had to deal with daily headaches and significantly scale back my activities. For recovery, I had to take frequent breaks to rest my head, relearn how to process stimuli, slowly build up the number of working hours per day and learn how to set new boundaries for myself.

Although this period has been very challenging, it provided a valuable opportunity to reflect on the incredible people I have gathered around me over the years. I am deeply grateful for everyone in my life, and I want to thank all my friends and family who supported me and believed in me throughout this journey. I appreciate those who cheered me up and motivated me whenever I needed it.

Furthermore, I want to say a special thanks to Sören Blankers from Arcadis. I am very grateful for the amount of time you have made free for me in your busy schedule, even though half of our weekly updates were just very short check-ins to see how things were progressing. You truly inspired me during my thesis and you always provided me with constructive feedback and guidance. I also want to thank the rest of my thesis committee: Maria Salomons, Jan Anne Annema, Haneen Farah and Hessel de Jong. Finally, I would like to thank Arcadis for its support and collaboration.

In closing, I hope that this research serves as a meaningful contribution towards enhancing road safety making the streets a safer and better place for everyone.

E.M.M. (Esther) Menken
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# Summary

In the Netherlands, roads are classified into three categories: access roads, distributor roads, and through roads, each with distinct functions and design criteria. Nonetheless, within built-up areas, some roads have characteristics of both access and distributor roads, leading to inadequate separation of various traffic flows while having a speed limit of 50 km/h resulting in a heightened risk of accidents. These are so-called 'grey roads'. To improve road safety on grey roads, recent adjustments have been made to the design requirements. Whereas the standard speed limit on distributor roads was previously 50 km/h, it is now 30 km/h unless 50 km/h can be safely implemented. The requirements for when a road is safe enough for a 50 km/h speed limit have been tightened. Nevertheless, a combination of parallel parking and a speed limit of 50 km/h are still permitted in these tightened design requirements. Literature indicates that roads with parallel parked vehicles have an increased risk of accidents and that higher speeds increase the impact of an accident.

Due to the recent implementation of these design requirement adjustments, there is insufficient data on road accidents to determine whether road safety would improve by lowering the speed limit to 30 km/h on roads with parallel parking. Therefore, a surrogate safety measure was necessary. In this research, situational workload was chosen as the surrogate safety measure. This thesis investigated the following research question: "What is the effect of parallel parking in combination with speed reduction from 50 km/h to 30 km/h on the driver's situational workload, the feeling of safety and credibility of the speed?".

Situational workload was derived from the concept of 'mental workload,' which refers to the dynamic relationship between a driver's capabilities and the task demand. A driver maintains control over the vehicle and adequate situational awareness if the task demand is within their capabilities. If the task demand exceeds the capability, the situational awareness is endangered and the risk of making errors increases. Changes in mental workload are often assessed using primary or secondary task performance measures: physiological measures, or subjective reflections. This research does not capture the full task demand or the complete capabilities of the drivers, since virtual reality (VR) was used as a research methodology. Consequently, it is unclear what each driver's baseline mental workload is, how it is affected by parallel parking and speed, and whether the increase in mental workload endangers driving performance.

To address this, the term situational workload was introduced in this study. Situational workload captures the influence of road conditions on self-estimated driving performance, self-reported situational awareness, and self-reported workload, based on a combination of subjective reflections and primary task performance measures. The self-estimated driving performance was assessed by evaluating the collision avoidance estimation and the situational awareness was measured by the level of overview on the road. The self-reported workload was complemented by the self-reported level of attention required for the driving task to measure the difficulty of the driving task.

VR was selected as the research methodology because it enables the presentation of various road scenarios and speeds to respondents in a controlled setting without being exposed to the risks and dangers of real-world driving conditions. VR was used by presenting 250-degree videos through VR glasses to the respondents. These videos were recorded on nine different distributor roads, both with and without parallel parking, from the driver's perspective. The vehicle in the videos travelled at either 30 km/h or 50 km/h, resulting in eighteen different videos. Each respondent viewed four videos and answered some questions after each video. These questions were regarding the collision avoidance estimation, the level of overview and the task difficulty. Safety perception was gauged through their self-reported feeling of safety in the different videos. The credibility of speed was evaluated based on their estimations of the speed, the speed limit, and whether the shown speed was suitable for the road.

The experiment was conducted with a diverse group of 63 respondents varying in age, gender, driving frequency, driving experience level of stress and level of tiredness. The analysis revealed that the combination of parallel parking and a speed of 50 km/h caused a reduction in the level of overview and an increment in the task difficulty. The overview was increased after lowering the speed of the vehicle from 50 km/h to 30 km/h and removing the parallel parking facilities from the street had an even bigger positive impact on the overview. The task difficulty was almost equally lowered by either removing the parking facilities or by lowering the speed. The respondents indicated that they had fewer possibilities to avoid a collision by unexpected hazards: the estimated room to swerve was significantly reduced by the parallel parked vehicles and 51% of the respondents felt they would not be able to stop in time to avoid a collision. Removing parallel parking reduced this percentage to 36%, while only reducing the speed had an even more substantial effect, with only 23% of the respondents doubting their ability to stop in time. The changes in overview, collision avoidance estimation and task difficulty indicated that the situational workload was affected by parallel parking and the speed of the vehicle.

The feeling of safety was notably higher in scenarios without parallel parking or with a reduced speed limit. The average safety rating on a scale from one to ten for roads with parallel parking while driving 50 km/h was 6.1. In contrast, removing parking or reducing the speed limit to 30 km/h both resulted in a higher average safety rating of 7.3. The feeling of safety was significantly ($p<.001$) influenced by the situational workload.

The credibility of the speed limit was strongly affected by the presence of parallel parking. All selected streets originally had a 50 km/h speed limit. Respondents were very accurate in identifying the speed limit on distributor roads without parallel parking. However, roads with parallel parking often led to confusion as respondents frequently assumed the speed limit was 30 km/h. The majority of the respondents indicated that a speed of 50 km/h was too fast for roads with parking and that they would drive at a slower speed themselves. Most of them thought that this speed was suitable for roads without parking. The respondents perceived a speed of 30 km/h as too slow for roads without parking but as suitable for roads with parking.

Although this research methodology has found that the situational workload, the feeling of safety and the credibility of the speed were affected by the presence of parallel parking and the speed of 50 km/h compared to 30 km/h, it also had some limitations. For example, not all the factors of the road design that influence the task demand were taken into account, even though these could have had a significant influence on the respondents' experiences. Moreover, the drivers could not steer or adjust the speed of the vehicle which lowered the sense of realism.

The used research method with VR did not measure the exact level of situational workload and it gave a simplification of the driving task and capability of drivers. Nevertheless, it is a useful methodology to gain valuable primary insights into the effects of a certain road design characteristic on drivers' situational workload and feeling of safety demonstrating that adjusting the road design can improve driver safety and performance. It is therefore recommended to apply this research methodology in future studies to analyze the effects of other road designs on situational workload and perceived safety.

Based on these findings, it is recommended to avoid the combination of parallel parking and a speed limit of 50 km/h on distributor roads in the Netherlands. For municipalities determining which distributor roads in urban areas should have a reduced speed limit of 30 km/h and which are safe to maintain at 50 km/h, this research offers insights to make well-informed decisions. Although each road requires attention for the design and the decision about the speed limit depends on more factors than the presence of parallel parking only, it could give handles to the decision making. Removing the parallel parking facilities or reducing the speed leads to a reduced situational workload giving the drivers more spare capacity to obtain a sufficient level of situational awareness and to be less likely to make errors while driving. It contributes to a higher feeling of safety and causes less confusion about the speed limit.

# Contents

# 1 Introduction

Every road in the Netherlands is unique. This comes due to factors such as the location, the length, the width or the design of the road. Nevertheless, you often know (subconsciously) how fast you can drive on a road and what behaviour is expected of you. For example, you will never (hopefully) drive at 100 km/h through a residential area and you will not drive at a speed of 30 km/h on a motorway without traffic jams. This is because each road has a different function and each function has its design characteristics which should be recognisable to road users to make clear what behaviour is expected of them.

Within the built-up area, you will find only two types of roads: residential access roads (In Dutch called "erftoegangsweg" and abbreviated by ETW) and distributor roads ("gebiedsontsluitingsweg", abbreviated by GOW). Within these, the distributor roads have a speed limit of either 50 km/h (GOW50) or sometimes 70 km/h (GOW70), while the speed limit choice for residential access roads is between 30 km/h (ETW30) and 15 km/h (ETW15 or 'woonerf'). The trade-off between GOW50 and ETW30 is based on whether the road and its surroundings have a traffic function (flow of traffic and exchanging traffic) or a residential function (schools, stores, playgrounds etc.). On a distributor road, the focus is on the traffic function and no residential functions may be present, while access roads may only have residential functions. However, part of the GOW50 roads do not meet these requirements and have a double function; both the traffic and the residential function are found on the same road. These are the so-called 'grey roads'. These roads cause a lot of problems such as an increased risk of accidents.

To increase road safety within built-up areas, a new road type has therefore been introduced: a distributor road with a speed limit of 30 km/h (GOW30). This is a road where the traffic function is still central, but influences from the residential function may also be present. The new principle within built-up areas is that the speed should be 30 km/h unless 50 km/h can be implemented safely. This new road type comes with new road design characteristics and the design characteristics of GOW50 roads have also been tightened. These tightened design characteristics for GOW50 state, among others, that bicycle lanes must be separated from the carriageway and that parallel parking is still allowed in a parking bay along the road. The latter in particular is an interesting design characteristic since parallel parked cars can also increase the risk of accidents on the road due to, for example, visibility obstruction, more people on and around the carriageway to access their parked vehicle and opening doors. Combined with a speed of 50 km/h, the impact of a collision is also more severe than when the speed is 30 km/h and the braking distance is longer. It is therefore remarkable that this design requirement is stated like this for GOW50. Therefore, this report examined this design requirement in more detail by looking at the effects of parallel parking and the driving speed on the workload of drivers to see whether these road design features could lead to an increased risk of making errors.

This chapter will first dive deeper into the background information of the Dutch road system, its principles and why this research must be performed. This leads to a problem definition and a research aim. Then, a research scope is presented to narrow down and specify the subjects. This results in different research objectives and research questions. Finally, a global approach to the research is presented which is further elaborated in Chapter 3.

## 1.1. Background Information

Every road in the Netherlands has been designed or redesigned with Sustainable Safety characteristics in mind since the nineties (SWOV, 2019). Sustainable Safety has five principles that have to be followed while designing a road. These principles are functionality, homogeneity, predictability, forgiveness and state awareness. Functionality means that the road network is structured hierarchically in which every road has one function; The three existing functions, given with the Dutch translation and abbrivation, are through roads ("stroomwegen"), distributor roads ("gebiedsontsluitingsweg" or "GOW") and access roads ("erftoegangsweg" or "ETW"). Each road can only have one function. On the through roads, traffic flows on road sections and across intersections. Traffic also flows on the road sections of distributor roads, however, the purpose of the intersections on these roads is to exchange traffic. At access roads, exchanging of traffic happens both on the road sections and intersections. A road is designed with homogeneity when the flows of different modes are separated in speed, direction and mass. This is especially necessary on roads with high speed limits (distributor and through roads) since it makes the impact of a crash more severe. On access roads, the focus lies on the residential function and all sorts of traffic (pedestrians, cyclists, cars etc.) are exchanging with each other. This makes it difficult to design roads with the homogeneity principle and therefore the speed limit on access roads has to be low to protect the vulnerable road users. Predictability means the roads meet the road users' expectations and that the design of the road supports the desired behaviour of the road user. This is achieved by a continuous and consistent road design. The design of the road should limit the possibility of an accident by its homogeneity and forgiveness, however, human errors contribute to the occurrence of most accidents. Those human errors are hard to prevent, therefore, a road's design should be forgiving. This means that if an accident happens, the consequences such as injuries should be limited. In the last principle, state awareness, the driver stands central instead of the design of the road. More attention is being paid nationally to the state of the driver while driving (such as fatigue or under the influence of alcohol or drugs) to make the driver more aware of his/her capabilities in a certain state to reduce the chance of making errors.

### 1.1.1. Sustainable Safety

The Dutch Sustainable Safety is part of a safe system approach (SWOV, 2019). The safe system approach consists of five key components, which are: establish robust institutional governance, shared responsibility, strengthen all pillars, prevent exposure to large forces and support safe road-user behaviour (International Transport Forum, 2022). The pillars that have to be strengthened are the following six road-safety pillars: road-safety management, safe roads, safe vehicles, safe speeds, safe road-user behaviour and post-crash care. The effects of the different pillars strengthen each other and if one of the pillars fails, the road users remain protected. Road safety is thus broader than the design of the road only. This safe system approach is developed to reduce the number of fatalities and serious injuries caused by road traffic accidents. The long-term goal is to halve the number of fatalities and serious injuries by 2030 in comparison to 2021 and to reduce it back to zero in the year 2050 (SWOV, 2022b). The latter is a result of the widely accepted Vision Zero. Vision Zero implies that it is unethical to accept any road casualty and that road users should not be held fully responsible for accidents; The road design also plays a role.

The CROW has developed a step-by-step plan to (re)design every road with the Sustainable Safety principle in mind. This step-by-step plan consists of the following steps (CROW Kennisplatform, 2012); First, the road network has to be categorized. This means that a function is assigned to each road (either access, distributor or through). Secondly, the basic requirements have to fit into the road design to ensure safety. These basic requirements are:

1. The function of the road is recognizable
2. Conflicts between traffic flows in opposite directions have to be avoided
3. Conflicts between intersecting and crossing directions have to be avoided
4. Different traffic types are separated
5. There are no obstacles along the road
6. There is a relation between the road and its surroundings

Note that all these six basic requirements apply for distributor roads and through roads however the basic requirements two, three and four can be ignored for access roads since traffic on these roads mixes on the lane. In the third step, the layout of the road is elaborated on the base of basic features per road function. The basic features are developed by CROW to foster the recognizability of the function and to stimulate a certain behaviour of road users to increase road safety. Every road function has its ideal features for designing the 'perfect' road and a set of minimal features that the road design must at least meet. Both the ideal and the minimal features are established with Sustainable Safety principles in mind. The ideal guidelines cannot always be met due to a lack of space or budget. In that case, road designers should make trade-offs between where the ideal guidelines should be followed and where to add minimal features. Efforts must be made to choose these trade-offs in such a way that the final layout is close to the ideal layout. Whenever the minimal features are also impossible to fit in the street, it is recommended to revise the function of the road.

### 1.1.2. Grey Roads

Although the Dutch design principles give very clear guidelines about how a road should be designed, there are still some roads that do not meet these guidelines. The biggest category of these poorly designed roads is the grey roads in the built-up area. The grey roads can be seen as a combination of GOW50 and ETW30, however, they are categorised officially as GOW50. Influences from both the residential and the traffic functions can be found here. The grey roads have a speed limit of 50 km/h and the slow traffic is not physically separated from the fast traffic. This makes these roads dangerous. Redesigning a grey road to a safe GOW50 road or to an ETW30 road is not always possible due to regulations, the road environment or available budget and space (Dijkstra and van Petegem, 2019).

In the statistics of the number of road traffic accidents in the Netherlands, it is also visible that many accidents happened on GOW50 roads. Of all the fatalities in 2021, 49% happened outside the built-up area, 35% inside the built-up area and from the other 16%, it is unknown where it happened. If one looks at the speed limit compared to the number of fatalities, 26% of the fatalities happened on 50 km/h roads, followed by 80 km/h roads with 23% of the fatalities and 60 km/h roads with 16% of the fatalities SWOV, 2022b. An overview of this is given in Figure 1.1. In 2020, the total length of roads in the Netherlands is approximately 141,000 km. The lengths of the 50 km/h, 60 km/h and 80 km/h are approximately 31,500 km, 43,000 km and 11,800 km respectively (Centraal Bureau voor de Statistiek, 2021). 70% of the roads in the built-up areas have a speed limit of 30 km/h while only 9% of the fatalities happen on roads with a speed limit of 30 km/h (Drolenga, 2021). To conclude, the GOW50 roads have one of the greatest risks for fatalities of all types of roads and it has the greatest risk for fatalities within the built-up area.

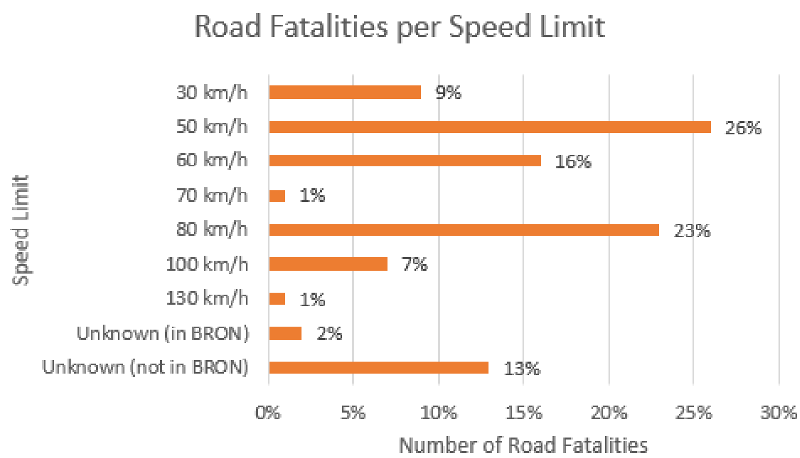


Figure 1.1: The number of road traffic fatalities in 2021 in the Netherlands by speed limit on the road where the fatality happened[km/h], Translated from (SWOV, 2022a)

If one looks closer at the causes and types of accidents on GOW50 roads, one can distinguish between fatalities and injuries at intersections and those at the road section. Remarkably, 17% of all the bicycle-motor vehicle accidents with injuries recorded in BRON (the Dutch database of registered road traffic accidents) on road sections happened near parked vehicles. Meanwhile, only 30% of all GOW50 roads have parallel parking facilities and cycle lanes and 10% of the GOW50 roads have parallel parking facilities with separated cycle paths (Drolenga, 2021). These accidents are primarily caused by collisions between cyclists and vehicles performing the parking manoeuvre or between cyclists and opening doors. Secondary accidents happen when cyclists start swerving to avoid a collision with parking vehicles or opening doors and fall or collide with other road users (van Petegem and Uijtdewilligen, 2021). This is in line with other findings that the presence of parallel parking increases the likelihood of bicycle crashes by a factor of 2 (Van Petegem et al., 2021). There is a lack of information about the accident risks between two motor vehicles on roads with parked vehicles. However, crashes between driving vehicles and parking vehicles or between driving vehicles and opening doors are still likely to happen. It is also known that the stop-sight distance (the distance a car travels from the moment the driver has seen a potential hazard until the car comes to a complete stop) is influenced by parked vehicles. The parked vehicles block the view of the drivers which can result in them seeing the other road users too late (Cao et al., 2017). Furthermore, parked vehicles can cause more pedestrians on the street to step in and out of their vehicles (Vandenbulcke et al., 2014). The number of pedestrians on the road also depends on the turnover rate (Van Petegem et al., 2021, Ewing and Dumbaugh, 2009).

### 1.1.3. GOW30

To solve the problem of grey roads and the GOW50 roads having a high risk of accidents, the SWOV has analysed the consequences of lowering the common speed limit in the built-up area from 50 km/h to 30 km/h (Dijkstra and van Petegem, 2019). This study estimates that the number of severe road traffic accidents (both fatalities and injuries) lowers significantly. It is estimated in this study that the decrement varies between 22% and 31%. Note that it was assumed in this study that all the 30 km/h roads are designed in such a way that the road users really drive at a speed of 30 km/h. A negative side effect of the speed reduction is the increasing number of cut-through traffic and the decreasing flow. Moreover, to realise the speed limit reduction, the regulations in the Netherlands have to be adjusted. Finally, this study gives three recommendations about how to solve the troubles around grey distributor roads to increase safety:

- Add infrastructural measures such as speed bumps or road narrowing to reduce the speed. However, this solution is difficult to realise because public transport and emergency services desire an unobstructed passage.
- Include urban planning aspects in the road categorisation together with the aspects flow, accessibility and road safety to adapt local conditions in the road categorisation and give custom advice for each street. This can help municipalities to make adjustments on a bigger scale, such as assigning car-free zones.
- Reduce the speed limit on the grey distributor roads. This is beneficial for the residential function. Vulnerable road users are better protected from accidents and severe injuries when the speed is lower at road sections without proper facilities to separate different types of road users. However, the traffic function is disadvantaged by this.

With this study from Dijkstra and Petegem as starting point, a motion was proposed by ministers Kröger and Stoffer in the Chamber of Representatives of the Netherlands in 2020. This motion requests the government in consultation with municipalities and SWOV to develop a new consideration framework in which a speed limit of 30 km/h is the new guiding principle in the built-up area unless a speed limit of 50 km/h can be realised safely on distributor roads (Kröger and Stoffer, 2020). The premise of this motion is thus that a road in a built-up area should have a speed limit of 30 km/h unless 50 km/h can be realised safely. The premise used to be 50 km/h unless other indicated. The goal of this new consideration framework is to increase road safety, especially around zones with many residential facilities such as schools and shopping centres.

To elaborate on the new consideration framework, two changes in the main principles are accepted which are (CROW Kennisplatform, 2021b):

1. More attention should be paid to the road environment and the facilities along a road while indicating its function. Roads with double functions (both the traffic function and the residential function) are now recognised and accepted.

2. A new type of road is proposed for roads with a strong traffic function but without the possibility of realizing a safe GOW50. This new road type is GOW30: a distributor road with a speed limit of 30 km/h. GOW30 is the solution for the grey roads on which both residential and traffic functions are present. The accent on this road type is still to flow higher traffic flows, however, the lower speed secures the safety of vulnerable road users better to be in line with the residential function.

On the base of these new principles, the consideration framework, shown in Figure 1.2 (translated from CROW Kennisplatform, 2021b), is elaborated. The framework stimulates road designers to revise the current function of all the roads with the road environment and facilities along the road in mind. In the case of a double function, it should be considered, whether the double function can be solved by changing the road network as a whole. If that is not possible, the main reasons why that road has a traffic function should be indicated, for example, due to being a part of a public transport or emergency services route. If there is no steady flow of such traffic function indicators, the road can be classified as ETW. However, if there are important traffic function indicators present on the considered road, there should be considered whether the appropriate speed limit on the road is 30 km/h or 50 km/h based on the facilities, environment and available space. Note that this consideration framework is developed for existing roads. All the new roads are designed as either a GOW50 or an ETW30 road, GOW30 is not an option for new roads (Roedoe and Schenk, 2023).

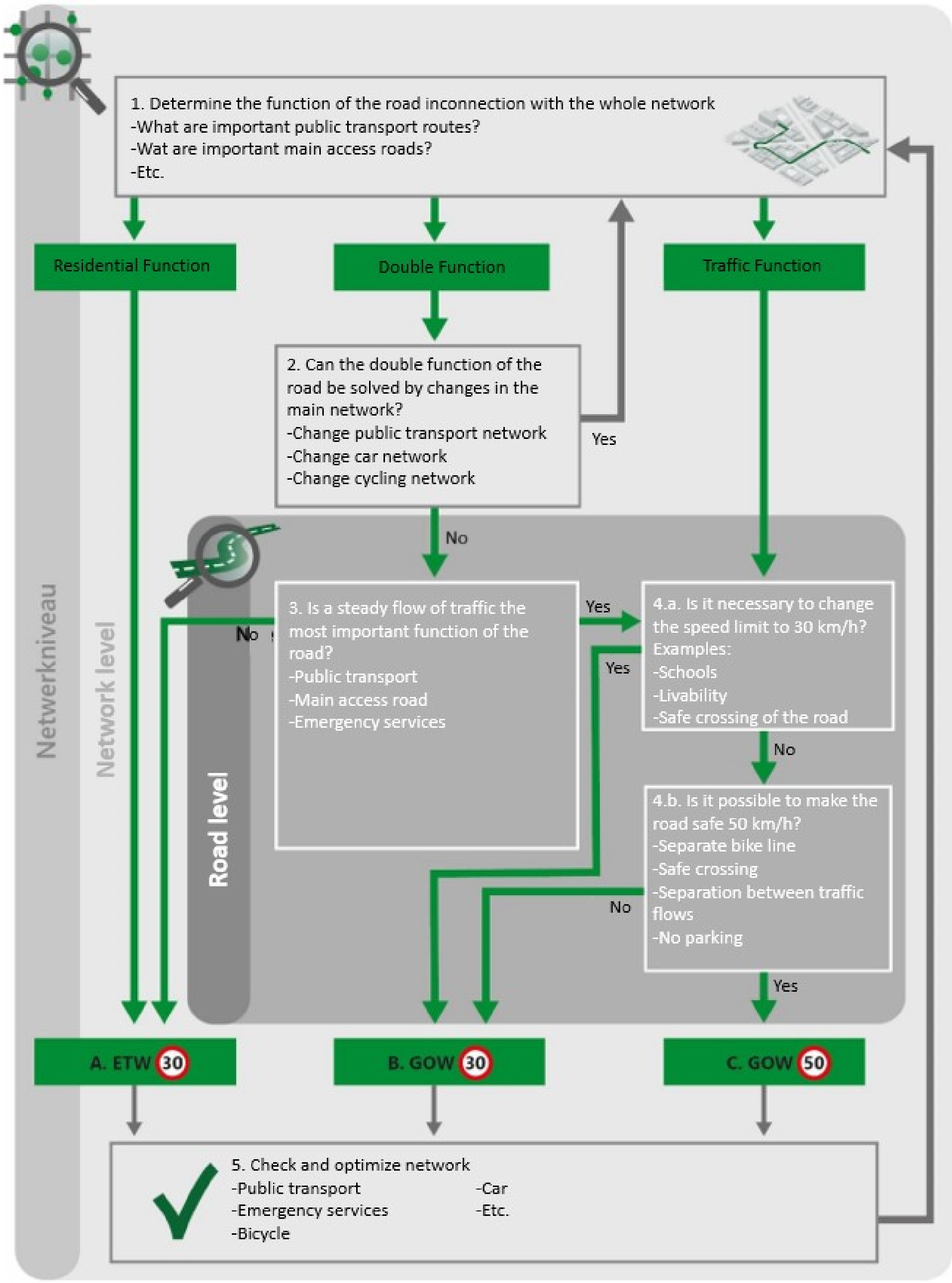


Figure 1.2: Consideration framework for road categorisation and determining the speed limit in the built-up area, translated from (CROW Kennisplatform, 2021b)

In May 2023, the (preliminary) design requirements for GOW30 along with tightened design requirements of GOW50 and ETW30 roads were published (Roedoe and Schenk, 2023). A table with an overview of all these design requirements is given in Appendix A. All of these new and tightened design requirements are based on existing research, knowledge and practical experience. In the design requirements, the terms 'ideal' and 'minimum' were frequently used before the design requirements were tightened and have now been abandoned and replaced by 'starting principle' and 'deviation option' to give road designers more options and insights into choices.

## 1.2. Problem Definition

The tightened design guidelines for GOW50 roads state, among other things, that cycle lanes are no longer allowed: all cycle lanes must be separated from the carriageway. It also states that longitudinal parking is still allowed on GOW50 in parking bays. Parked vehicles attract pedestrians on and around the carriageway to get in and out of their vehicles. Accident figures also show that roads with a speed limit of 50 km/h and parked vehicles along them have an increased risk of accidents. Although many of the described accidents on these roads between cyclists and cars have been eliminated by separating cycle lanes from the carriageway, the risk of accidents between driving cars and cars parking in or out, or driving cars and pedestrians walking around parked cars has not been eliminated. Especially in combination with a speed of 50 km/h, where the impact of an accident and the stop-sight distance is much greater than when the speed limit is 30 km/h, it can negatively affect the safety on the road. Therefore, the question can be asked whether it is wise to allow parallel parking on GOW50. Do the parallel parked cars along the road contribute to an additional residential function on the road, which means that GOW50 roads with longitudinal parking still partly remain a grey road and therefore would it not be better to lower the speed limit on these roads to 30 km/h?

## 1.3. Research Aim

As stated above in the problem definition, the combination of parallel parked vehicles and a high-speed limit can negatively affect road safety. However, it is uncertain to what extent these problems are solved once the speed limit is lowered to 30 km/h. To measure the effects of a speed limit reduction on roads with parallel parking, one can either look at the objective safety (numbers of road casualties, injuries, fatalities etc.) or at the subjective safety (how drivers experience it). Since the GOW30 is a new road type and barely realised in the Netherlands, it is not possible to compare their accident numbers to those of GOW50 roads and make correct assumptions from that. Therefore, a subjective approach is chosen in this research.

The chosen subjective approach is the 'situational workload'. This is an umbrella term which is based on the theory behind mental workload (which is further elaborated in Chapter 2). The mental workload is defined in this research as the dynamic between one's capability and the task demand. In the Literature Review, it is explained that the driving performance is influenced by this dynamic: The driver is less able to maintain its situational awareness once the task demand exceeds the capability causing the driver to become less attentive to their surroundings leading to an increased likeliness of making errors or performing an undesired behaviour. A change in mental workload is frequently measured by primary task performance measures, secondary task performance, physiological measures or subjective reflections (see Subsection 2.3.5). This research does not capture the whole task demand and the whole capability of the drivers (which is further explained in Section 1.4. Therefore, it is uncertain what the starting point of the mental workload is of each driver, to what extent it is changed by parallel parking and speed and whether the mental workload is so increased that driving performance is endangered. To solve this, the term situational workload is introduced in this research. The situational workload captures the influence of the road situation (both the road design and velocity of the vehicle) on the self-estimated driving performance, self-reported situational awareness and self-reported workload based on a combination of subjective reflections and primary task performance measures. The aim of this research is not to provide a model of how these three variables exactly affect the situational workload or mental workload. The aim is to analyse whether these three variables are changed by the presence of parallel parking and the speed on the road. Next to this, the feeling of safety and the credibility of a speed of 30 km/h and 50 km/h are analysed in combination with the presence of parallel parking.

The results of this study can help argue the design requirements for GOW50 and GOW30 roads: It can give insight into whether parallel parking on distributor roads affects the feeling of safety of drivers and their situational awareness. Moreover, the results of this study can advise what speed limit suits those roads best or whether parallel parking should be advised against its realisation on distributor roads.

## 1.4. Research Scope

How a driver experiences the safety of a road, the speed of the vehicle to the road design and how his/her situational workload is affected depends on more factors than only the speed limit and the presence of parallel parking. The total design of the road influences this. Therefore, it is important to analyse more than one distributor road to filter out the influences from other road design characteristics and to draw the correct conclusions. To narrow the scope of the research, it is chosen to analyse nine different roads which are selected based on their type of direction separation (a centre line, a strip of grass or crossable stones) and how the parking places are realised (continuous, interrupted or no parking). All the selected roads have separate cycling paths. All the other design features of the roads are neglected. All the analysed roads are designed as GOW50 roads, none of the chosen roads is a GOW30 road since these roads did not officially occur in the Netherlands while performing this research.

As briefly described in Section 1.3, the analysed variables to measure the effects of parallel parking and the speed limit are based on the mental workload. If the task demand exceeds the driver's capability, the driver is more likely to make an error. For both ethical and practical reasons, it is undesirable to let drivers navigate over different roads at different speeds and measure whether they make mistakes. Therefore, virtual reality is chosen as the research method in this study. The respondents got to see different scenarios on different roads through VR glasses. This methodology ensured that the real task demand could not be fully captured since the respondents could only watch the videos through these glasses and s/he could not control the trajectory or speed of the vehicle. This study does also not measure the whole capability of the drivers: only certain aspects of the driver's capability are taken into account. As described in the Research aim, the situational workload comprises the following three variables: self-estimated driving performance, self-reported situational awareness and self-reported workload. To make the scope of this research not too broad, these variables are narrowed down to the overview of the road, the collision avoidance estimation and the difficulty of the driving task. Furthermore, the feeling of safety and the respondents' thoughts about the speed in combination with the road design are analysed.

Finally, only the driver's point of view from a driving vehicle on the road is analysed in this research. The feeling of safety or situational workload of other road users, such as pedestrians or people who are parking their vehicles along these roads, are not considered and have been left out for further studies.

## 1.5. Research Objectives

The research objective following the research aim and scope is to find the effects of parallel parking and a speed limit reduction on the feeling of safety of drivers. Moreover, a change in the situational workload is measured by measuring a change in the overview of the road, the self-reported difficulty of the driving task and the collision avoidance estimation are analysed after a speed limit reduction on distributor roads with and without parallel parked vehicles in order to estimate whether the driver's situational awareness is affected. The last research objective is to analyse the suitability of a speed of 30 km/h and a speed of 50 km/h on distributor roads with and without parallel parked vehicles.

## 1.6. Research Questions

Considering the problem definition and the research scope, aim and objectives, the following main research question is formulated:

"What is the effect of parallel parking in combination with speed reduction from 50 km/h to 30 km/h on the driver's situational workload, the feeling of safety and credibility of the speed?"

Although it is not specifically mentioned in the research question, it is important to keep in mind that all the analysed roads are distributor roads in the Netherlands with separated cycling paths and currently have a speed limit of 50 km/h. To answer the main research question, several sub-research questions are formulated. The situational workload is divided into three variables in this research which are the overview on the road, the collision avoidance estimation and the difficulty of the driving task. To determine the effects of parallel parking and speed reduction on the situational workload, the effects on the three different variables that measure the situational workload in this research are analysed. Moreover, this report analyses the relationship between situational workload and the feeling of safety. This is captured in the following sub-questions:

1. "How do parallel parking and speed reduction from 50 km/h to 30 km/h influence the driver's:"
   I. overview on the road?
   II. collision avoidance estimation?
   III. difficulty of the driving task?
2. "What is the effect of the situational workload on the feeling of safety of drivers?"

Finally, virtual reality is used as research methodology in this research which is a relatively new research method to measure mental workload. This research does not measure mental workload but situational workload which makes it even more important to analyse whether virtual reality is a useful tool for this purpose and whether it could be used more frequently. This results in the last sub-question:

3. "To what extent is virtual reality a useful research methodology to determine the situational workload of drivers?"

The methods used to answer these research questions are described in the following section.

## 1.7. Research Approach

To answer the research questions, this report is divided into four parts. The first part is a literature review that focuses on various themes. These themes include the definition of mental workload, factors influencing mental workload, methods to measure it and the relation between mental workload and safety. Additionally, the report discusses what is known about the relationship between mental workload and speed limits, as well as the relationship between mental workload and parallel parking facilities. The final section of the literature review provides an overview of how virtual reality and 360-degree videos are utilized in other scientific research.

In this research, it is chosen to use virtual reality as a research method. The main goal of the experiment is to show participants 250-degree videos from a driver's perspective (this is further elaborated in Chapter 3). The videos are captured on different distributor roads with and without parking combined with different speed levels (50 km/h or 30 km/h). After each video, the participant is asked several questions to identify how s/he has experienced factors such as the workload, safety and speed on the road. With virtual reality, a realistic road environment can be pictured to the respondents in which small changes can be made in each video. In this way, the respondents are shown different combinations of road designs and speeds without bringing the respondents into dangerous situations. The answers of the respondents are analysed with several statistical tests to find significant relationships between the variables.

## 1.8. Report Structure

Based on the research approach given above, the report is structured in the following way. In Chapter 2, the literature review is given. The experiment set-up is further elaborated in Chapter 3 Methodology. All the results and analyses are presented in Chapter 4. A discussion is presented in Chapter 5 and the final conclusion is given in Chapter 6.

# 2
# Literature Review

In this chapter, a literature review is presented. This chapter is subdivided into multiple sections. The first section, Section 2.1, elaborates on speed and how it relates to road design, the driver and traffic safety. The second section, Section 2.2, focuses on the presence of parallel parking and its influence on the risks created around parallel parked vehicles, the chosen speed of drivers on the road and traffic safety. Section 2.3 presents an overview of what mental workload is, how it is related to road safety and how the mental workload can be measured. Note that in this literature review, mostly the mental workload is discussed, which is abbreviated to workload. If a different type of workload is meant, for example, the self-reported workload or the situational workload, it is specified. The usage of virtual reality as research method is discussed in Section 2.4. Finally, a conclusion from the literature review and a conceptual framework are given in Section 2.5 and 2.6 respectively.

## 2.1. Speed

The velocity of a vehicle influences the difficulty of the driving task. The rate of flow of information is higher when the velocity is high: the driver has less time to detect all the information on the road if s/he drivers faster. A lower speed choice gives the driver more time to process all the things that s/he sees on the road and to perform a suitable reaction to that. This gives the driver a higher feeling of control over the demands of the driving task. According to Fuller, the driver controls his/her task demand by adjusting the speed (Fuller, 2000). An increase in the task demand thus results in the driver choosing a lower speed to keep all the demands within his/her capabilities. This effect is further explained in Subsection 2.3.1.

The speed limit and the average driving speed on the road do not always correspond with each other. The speed that the driver chooses depends on both the road characteristics and the personality of the driver. This is further elaborated in Subsection 2.1.1 and 2.1.2 respectively. The influence of the driven speed on traffic safety is described in Subsection 2.1.3.

### 2.1.1. Speed and Road Characteristics

The speed limit on a road is not always the same as the actual average speed driven on the road. It often happens that drivers are driving faster than the indicated speed limit. If the chosen speed is less or equal to the actual speed limit, the driver is compliant with the speed limit (Yao et al., 2019). A contributing factor to this is the credibility of the speed limit. Credibility means that the speed limit is logical in combination with the road environment and the way that the road is designed. The chosen speed of the drivers should naturally correspond with the actual speed limit and if that is the case, the road is defined as a self-explanatory road (Theeuwes, 1998). The speed that the drivers choose is thus partly based on the road characteristics and not only on the speed limit sign (Kosztolanyi-Ivan et al., 2016). The credibility is based on the road and surrounding characteristics which can either be an accelerator or a decelerator (Jansen et al., 2018).

Many factors of the road characteristics contribute to the credibility of the speed limit. Examples of such accelerator factors are wide medians, a great openness to the environment and wide roads and examples of decelerator factors are the number of intersections, the presence of horizontal curves and the presence of sidewalks. Moreover, the number of lanes, the longitudinal marking and the road surface contribute to the credibility of the speed limit ((SWOV, 2021), (Tarko, 2009)). According to Tarko, the credibility of the speed limit relates to the perceived risk. Drivers seek their preferred level of risk and they adjust their speed according to that. A higher speed is related to a higher level of risk. This is in line with the findings of Charlton and Starkey, 2016.

In addition, drivers may not always accurately assess their speed due to the road and surrounding characteristics. For instance, the presence of trees or dashed lines on the road can create the illusion of driving at a higher speed than actual. The level of visual information around the road influences the ability to estimate the speed of the vehicle correctly among drivers (European Road Safety Observatory, 2015). Moreover, a lower speed makes the dimensions of the visual field wider (Näätänen and Summala, 1974). Other situations in which it is more difficult to assess the speed correctly are when the driver is driving at a high speed on a road for a long period or when the driver has to deal with transition situations, especially when s/he has driven on a high speed for a long time, s/he might underestimate the speed on slower roads (European Road Safety Observatory, 2015).

### 2.1.2. Speed and Driver-Related Factors

As described in Section 1.1, one of the five aspects of the Dutch Sustainable Safety principles is state awareness of the driver. More attention is being paid to warning drivers of the increased risk of making errors when they drive while being very tired or drunk for example. The risk of making an error is increased because the driver is less able to react quickly to (unexpected) events and s/he can become more recklessly which can result in, for example, choosing a too-high speed. These states are temporary and can be fixed by taking a break or waiting till you are sobered up.

However, also non-temporary aspects of the driver can influence the driver's behaviour while driving. Human factors such as skills, training and experience influence the driver's perceived risk and capability, which relate to the driver's speed choice (Ju et al., 2022). Also, personality traits are of influence to the speed choice. Studies have found that drivers with traits such as impulsivity, sensation-seeking (a personality trait that determines how much a person seeks intense, novel experiences and is willing to take risks for them) and psychopathy are related to choosing higher speeds. On the other hand, personality traits related to slower speeds are, for example, high anxiety and personal distress (Ju et al., 2022). Other studies have found that personal characteristics, e.g. age and gender, influence speed choice as well. Male drivers choose higher speeds in common than female drivers and younger drivers are more likely to drive faster than allowed (Ellison and Greaves, 2010).

Several studies have examined the relationship between self-reporting speeding and the actual speeding behaviour of drivers and found a correlation between these two ((Conner et al., 2007), (Haglund and Åberg, 2000) and (Stephens et al., 2017)). Drivers are generally aware of their common behaviour and likeliness of speeding. The research of Haglund and Åberg was conducted on 50 km/h roads in Sweden. Connor et al. used two types of research methods: a driving simulator and real driving. Both these methods studied different roads varying from roads in urban areas to highways in the UK. Stephens et al. have analysed multiple roads with different speed limits in Australia. The latter found a correlation between the speed limit, speeding and self-reported speeding. 47% of the respondents reported themselves as being likely to speed on roads with a speed limit of 100 km/h in comparison to 0.5% on roads with a speed limit of 11 km/h. In addition, Stephens et al. found the same relation between gender and age as already described above: younger drivers and male drivers are less compliant with the speed limit in comparison to older and female drivers respectively. The study by Connor et al. found that drivers who indicate that they have a high likeliness to speeding also drive faster, on average, than drivers who indicate that they are low or medium likely to be speeding. A different study has analysed self-reported speeding behaviour in comparison to actual speeding on 30 km/h roads in Japan (Dinh and Kubota, 2013). Most of the respondents were aware of the impact of high speeds on road safety, however, they would consider speeding to save travel time. Moreover, the respondents stated that the road design should be credible for the speed limit in order to make them adjust their speed. French has developed a questionnaire for drivers to report their own driving style (French et al., 1993). This questionnaire consists of fifteen questions which could be subdivided into six categories: speed, calmness, social resistance, focus, planning and deviance. The questions about speed were: 'do you break the motorway speed limit?', 'do you drive fast?' and 'do you exceed the speed limit in built-up areas?'.

### 2.1.3. Speed and Traffic Safety

The stop-sight distance is the distance a car travels from the moment the driver has seen a potential hazard until the car comes to a complete stop. The stop-sight distance can be divided into three parts: First, the driver must see the possible hazard on the road, then the driver has to form a reaction to it and finally s/he has to execute the reaction.

To detect a potential hazard on the road, the driver must be alert. This alertness depends partly on the driver's workload and capability. A too-high workload can cause the driver to be in tunnel vision, so s/he does not perceive everything around him/her properly (Fuller, 2000). A too-high task demand requires a lot of attention to keep performing all the tasks correctly which results in a high workload. This effect is further elaborated in Subsection 2.3.1. The driver has less reserve capability left to pay attention to the situation and the situation awareness decreases. Also, detecting hazards depends on the driver's sight distance. Especially around parked cars, this is an important issue. In Figure 2.1, it can be noted that the parked cars block the view of pedestrians who step from behind parked cars (Cao et al., 2017). The car on the right in lane 2 is only close enough to see the pedestrian. Within such a short distance, it is almost impossible to react to stand still on time. In Figure 2.1, the left car in lane 2 indicates the actual distance required for the motorist to stop in time for the pedestrian. This distance to standing still is indicated in the image by $S_T$.

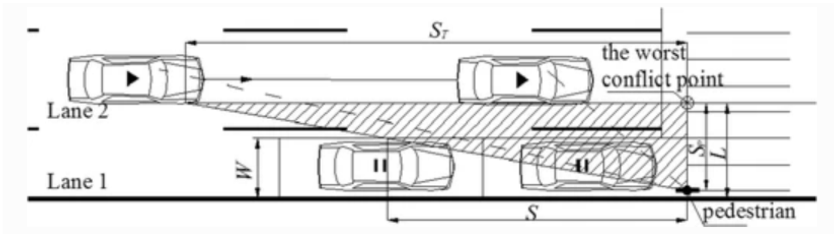


Figure 2.1: The sight distance influenced by parked vehicles from drivers to pedestrians (Cao et al., 2017)

From the moment that, in the case of Figure 2.1, the pedestrian is visible to the driver, the reaction time starts. This is the time required for the driver to detect the pedestrian, take it in, devise an appropriate response and execute this reaction. The reaction time also depends on the workload. When the workload is too high, the driver takes longer to execute his reaction. On average, the reaction time is 1 second (Advocaat Verkeersstrafrecht, 2021). In this second, the vehicle is still approaching the hazard without any notable change in speed. That means, the car has already travelled almost 14 m until the driver starts reacting when the car is moving at 50 km/h. For a speed of 30 km/h, this distance is around 8 m.

The braking distance also plays a role in the stop-sight distance. The faster a car drives, the longer it takes to come to a complete stop. If an average stopping decelaration of - 8 $m/s^2$ is assumed, it takes 4 meters to stand still from 30 km/h and 12 m from 50 km/h (Advocaat Verkeersstrafrecht, 2021). These distances, combined with the distance of the reaction time, are often greater than the actual distance a driver has when a pedestrian steps from behind a parked car.

Finally, the speed of the car affects not only the distance to standing still but also the impact of the accident. In other words, speed affects the risk of an accident and the severity of an accident. Several studies have found that a higher speed leads to more serious consequences in an accident (SWOV, 2012) (Aarts and Van Schagen, 2006). This is because more energy enters the collision at higher speeds. As the speed of the car increases, the chances of a vulnerable road user surviving the accident decrease. When there is an accident between a car and a pedestrian, the pedestrian has almost a 100% chance of survival at a speed of 20 km/h. This percentage already drops to 90% at a speed of 40 km/h, and at a speed of 100 km/h, the chance of survival is only 10% (SWOV, 2012).

## 2.2. Parallel Parking

A study by Edquist et al. has analysed the effect of curbside parking on a driver's workload in a driving simulation (Edquist et al., 2012). Situations without parallel parking, with empty parallel parking places and occupied parallel parking places, are compared in this study by Edquist et al.. In the simulations without parked vehicles, speeds closer to the speed limit and less speed variability were measured. It was noticed that drivers decreased their speed when there were cars parked along the road. Moreover, the drivers shifted their lateral position on the road more towards the centre line to keep more distance from the parked vehicles. The drivers made these adjustments to increase their reaction time. However, the adjustments were insufficient to maintain a safe hazard response time with parked vehicles present. A speed limit of 60 km/h was used in this study. Edquist et al. state that on-street parking facilities increase the visual complexity of the road environment. These findings align with the study of Hasan and Hossain, which also found that parallel parking increased the mental workload, reaction time and collision frequency (Hasan and Hossain, 2021). Drivers who are searching for a free parking spot experience an increased workload and are driving slower and closer to the curb (Ponnambalam and Donmez, 2020).

Several studies have researched to what extent parallel parking contributes to the credibility of the speed limit and whether it is an accelerator or a decelerator. These studies give different outcomes. For example, the study by Ivan et al. has found that parallel parking facilities decrease the average speed (Ivan et al., 2009). However, Gargoum et al. have found that the average speed on the road is increased with the presence of parallel parking (Gargoum et al., 2016). These differences can be caused by the studies being performed in different countries, a different occupation rate on the parking facilities or by neglecting other contributing factors such as weather conditions.

In another study from Sweden, the before and after effects of a change in speed limit (from 50 km/h to 40 km/h or from 50 km/h to 60 km/h) on the free flow speed and the speed variability were analysed (Silvano and Bång, 2016). The period between the before- and after-situation is 12 months. The data were collected by field measurements with radar guns and pneumatic tubes on different sites. Only changing the sign on the road with an increased speed limit resulted in a 2.6 km/h increase in the mean free-flow speed. The free flow speed decreased by 1.6 km/h for the speed limit reduction. The speed reduction results in a reduced speed variance and a reduced 85th percentile speed by 2.44 km/h. These changes are very small in comparison to the actual speed change. The reason for this is that the road characteristics do not change and thus the new speed on the road is not credible. This study has found that the road environment, the road function, the presence of sidewalks and on-street parking influence the free flow speed, can contribute to the credibility of the speed limit and that on-street parking is a decelerator of the free flow speed.

Different studies are in line with the finding by Silvano and Bång that on-street parking reduces the free flow speed. For example, an old American study has found that speeds on a road increase from between 30-45 km/h to 40-60 km/h when parking is prohibited (Crossette and Allen, 1969). Moreover, Wang et al. have found that on-street parking facilities are, after the number of lanes, the most important factor that influences drivers' free flow speed (Wang et al., 2006).

Another problem caused by parallel parked vehicles is the chance of crashes between driving vehicles on the road and pedestrians around the parked vehicles or opening doors (Vandenbulcke et al., 2014). More space could be created between the parked vehicles and the driving lane by placing a scare strip of at least 0.9 meters in between. Moreover, wider lanes or a crossable direction separation could create more space between the moving vehicles and the parked vehicles. However, it is not always possible to add a scare strip, widen the road or change the crossability of the direction separation on existing roads. Attention should also be paid to the influence of the width of the road on the actual speed on the road. Different studies have found that the width of the road influences the speed choice of the drivers. A more narrow road is associated with lower speeds (De Waard et al., 1995) (Mecheri et al., 2017). According to the Dutch road design guidelines, the width of a distributor road with separated bicycle paths and parallel parking should be between 2.90 m and 3.50 m (CROW Kennisplatform, 2021a). However, the CROW also notes that a width wider than 3.00 m leads to a decrease in credibility resulting in higher speeds than the speed limit.

## 2.3. Workload

The Dutch Sustainable Safety state that every road in the Netherlands should be designed with homogeneity, predictability and forgiveness to reduce the risk of accidents. Human error contributes to 95.4% of all accidents and is the sole contributor to 57% of all accidents. (Treat et al., 1977). Therefore, the principles of Sustainable Safety can contribute to reducing the likelihood of those errors. The road users recognize the layout of the road and know what kind of behaviour is expected from them and what they can expect from the other road users. The likelihood of making an error and the driver's performance also depend on the driver's workload ((Hart and Wickens, 1990), (Hart and Wickens, 2010), (Fuller, 2000) and (Tsang and Vidulich, 2006)). Note that workload could be both the physical workload and the mental workload. Only mental workload is meant in the report and thus when 'workload' is written, it refers to the mental workload. In the literature, different definitions of workload can be found (Matthews et al., 2019). Two of the most widely cited definitions are "workload is the cost incurred by a human operator to achieve a particular level of performance" by (Hart and Wickens, 2010) and "workload is in terms of a relationship between supply and demand of resources, where the operator is said to be overloaded when the required resources exceed the maximum resources that the human operator can supply" by (Wickens et al., 2015).

Different models are developed to describe the correlation between performance and workload. These models are given in the following subsections.

### 2.3.1. Task Capability Interface Model

The first model that describes the relation between performance and workload is developed by Fuller, 2000 and is called the Task Capability Interface Model. A schematic view of the Task Capability Interface Model is shown in Figure 2.2. This model looks at both the task demand and the driver's capability. The ratio between the task demand and the driver's capability is the workload and that is what influences the driver's performance. If the driver's capability is lower than the task demand, the performance decreases. As a result, the driver is more likely to make mistakes or could lose control of the vehicle. The driver is in full control of the vehicle when the capability is higher than the task demand.

According to Fuller, the driver's capability is defined as "the momentary ability of the driver to deliver his or her level of competence. It refers to what the driver actually is able to do at any given moment". This means that the capability is not constant over time for each driver. Human factors such as fatigue, alcohol, drugs, emotions etc. influence the capability over time for an individual. However, the capability of each individual differs as well and depends on factors such as training, experience and mental and physical characteristics.

Fuller defines task demand as "a control task in a dynamic environment in which the driver has the primary dual tasks of satisfying mobility (i.e. travel) needs and avoiding collision". The task demand depends on multiple variables which can increase the complexity of the task demand. Those variables are road position and trajectory, communication, speed, control of the vehicle, other road users and the environment. The task demand is not constant over time.

Based on Fuller's Task Capability Interface Model, one can say that the driver's workload depends both on the task demand and on the capability of the driver which both fluctuate over time. Whenever the task demand exceeds the driver's capability, the performance decreases.

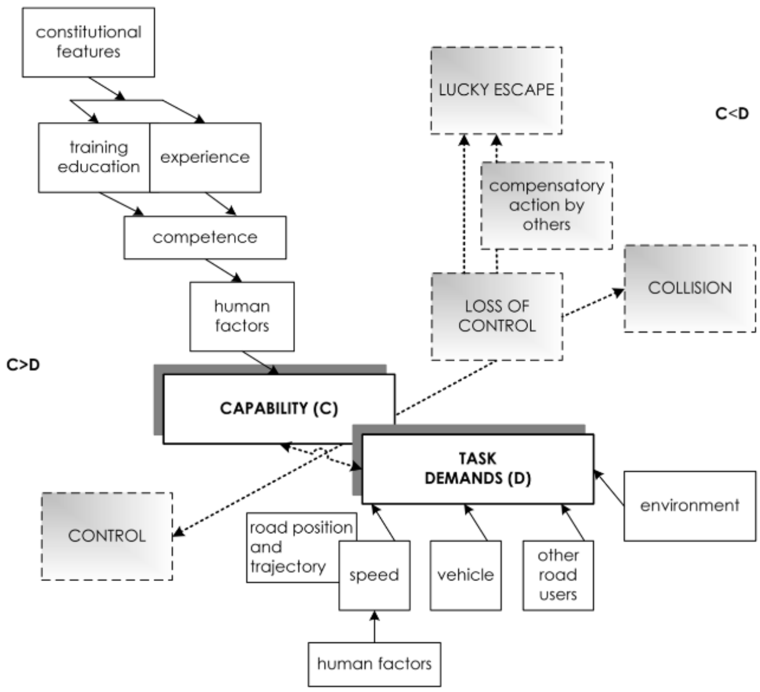


Figure 2.2: Task capability interface model (Fuller, 2000)

### 2.3.2. Workload and Situation Awareness

A different framework to understand the role of workload on performance is described by Tsang and Vidulich (Tsang and Vidulich, 2006). This framework is focused on both workload and situation awareness. Although in some contexts, situation awareness and workload are alternately used, explains this model how these two terms, while distinct, are intricately related to each other. In the framework presented in Figure 2.3, two main loops can be identified: the attention and mental workload loop and the memory and situation awareness loop.

Tsang and Vidulich define workload as a supply and demand function. The demand side is defined as the task demand influenced by factors such as task difficulty, task priority and situation contingencies. These factors are schematically illustrated by the globe in Figure 2.3. On the other hand, the supply side is defined as the attention or processing resources to support information processing. Examples of the supply side are perceiving, updating memory, planning, decision making and response processing. The supply side is also influenced by the skills and training of an individual (long-term memory and expertise in Figure 2.3). It could be said that the demand side is an exogenous process while the supply side is an endogenous process. The performance is described as the inference for the amount of resources used and remaining. The performance is illustrated by the feedback loop from mental workload to the globe in Figure 2.3. In other words, as long as the driver has enough supply left to capture all the demand, he has control over the vehicle. The remaining resources are called spare capacity. The driver should always have some spare capacity left for hazards, unexpected demands and emergencies. Other attention resources can be used by the driver for voluntary and strategic allocation (strategic management).

In the framework of Tsang and Vidulich, a distinction is made between working memory and long-term memory. Working memory is all the relevant processes that are working in the driver's brain, examples are pattern recognition and object categorization. These processes are stored in one's long-term memory but can only be used through the working memory. Perception and working memory are closely related to situation awareness. Situation awareness is the perception of the now and present which is obtained by the working memory in the past. If a driver is more skilled, the long-term memory is structured in a more organized way which makes it faster to access the right information. A skilled driver has thus not a larger supply, but a quicker supply side.

To elaborate on the distinction between workload and situation awareness, when a task becomes more challenging, it demands more effort and attention to manage effectively. This increase in workload results in less available resources for maintaining situational awareness, causing the driver to become less attentive to their surroundings. This can increase the likelihood of making errors.

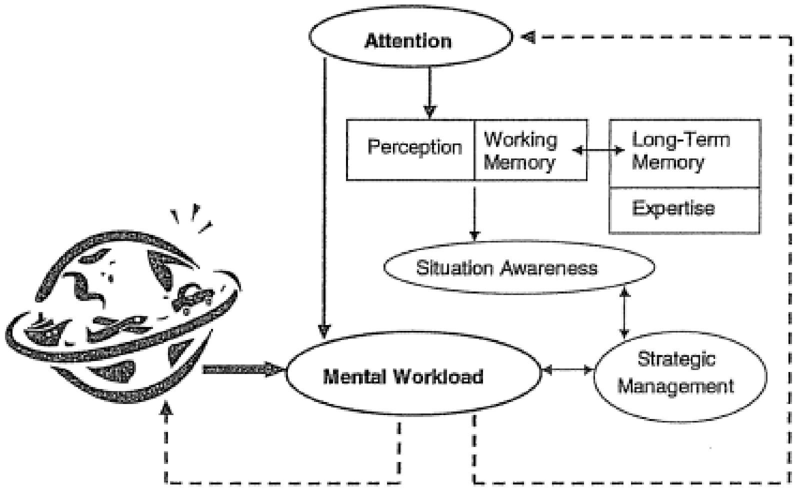


Figure 2.3: Theoretical framework illustrating the relationship between mental workload and situation awareness (Tsang and Vidulich, 2006)

### 2.3.3. Demand and Supply Model

A third framework to describe the relation between performance and workload is developed by Hart and Wickens, given in Figure 2.4 and 2.5 (Hart and Wickens, 2010). This framework is a simplification of a demand and supply model. Figure 2.4 shows the relation between task demand and task performance. Both an excessively low and excessively high task demand can have a negative impact on task performance. The driver can become bored or less alert when the demand is low which can cause distraction from the driving task. Only a few resources are used by the driver. If the task demand increases, more operator resources are used and the performance becomes stable at an optimum level. A further increase in the task demand becomes critical for the operator because it starts to overload: the demand is too high for the supply. As a result, the driver's responses are likely to come too late or to be not the right responses. The point where this starts to happen is indicated with the right red line. Right from this red line is where the operator is overloaded. The driver still has a reserve capacity of resources at the left from the red line and can perform all the tasks well.

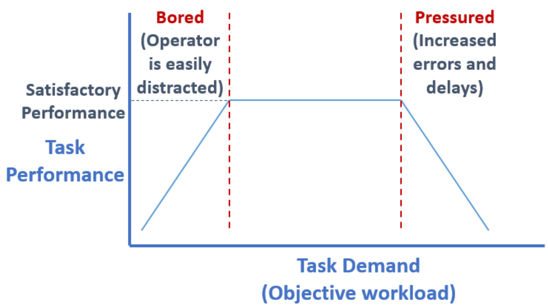


Figure 2.4: Task Demand and Task Performance
(Hart and Wickens, 2010)

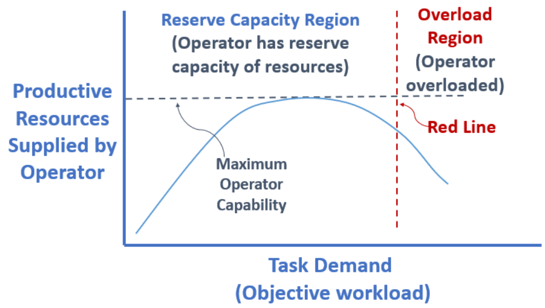


Figure 2.5: Task Demand and Productive Resources Supplied by Operator
(Hart and Wickens, 2010)

### 2.3.4. Workload and Driving Performance

The three models described above give a different insight into how the term 'workload' could be defined and interpreted. Despite their differences, they all converge on one point: when the driving task becomes overly challenging, errors are more likely to occur. This is either because the driver's capability is exceeded or because his/her situation awareness is decreased. However, it is important to remember that an increment in workload does not automatically mean that the driver starts making errors and that road safety is seriously affected. Instead, research has found that a heightened workload results in subtle changes in the driver's behaviour which could potentially lead to hazardous situations or errors.

For example, studies have found that the reaction time of drivers is decreased by an increased workload (Pouliou et al., 2023) and (Makishita and Matsunaga, 2008). When taking Figure 2.1 in mind, the stop-sight distance is already hazardously affected by the blocked view due to parked vehicles. In combination with an increased reaction time, the risk of an accident is higher. A different study has found that the steering frequency depends on the workload: a driver steers less frequently when the workload goes up (Verwey and Veltman, 1996). The eye movement is also known to be influenced by the mental workload.

A study has found that the visual field of drivers is reduced to 92.2% when they experience a medium workload. The visual field is even only 86.41% under heavy workload. A high workload can also cause tunnel vision (Rantanen and Goldberg, 1999). The reduced visual field and tunnel vision can prevent a driver from having a full overview of the road. The situational awareness is lowered. The speed choice is also partly dependent on the workload. A driver tries unconsciously to keep his/her workload at a steady state by making small adjustments in his/her behaviour. This is, for example, by reducing his/her eye movements which reduces the visual fields, but also by adapting the speed of the vehicle. A lower speed reduces the workload while a high speed increases the workload. Finally, workload influences the judgemental skills of the driver. Under a great workload, the driver is more likely to misjudge a situation or to perform an unsuited manoeuvre than the desired behaviour (Lee et al., 2023). All these effects can endanger road safety.

### 2.3.5. Measuring Workload

Since there exist many different frameworks and definitions in literature to explain what workload exactly is, it is also difficult to measure it. Something that all the definitions and frameworks have in common is that the workload correlates with the task demand. However, a high task demand does not necessarily mean that the driver's workload has increased to a level on which s/he is not able anymore to perform his/her driving task correctly. In literature, a distinction between four main categories is made to measure workload which is systematically illustrated in Figure 2.6. The four categories are primary task performance measures, secondary task performance, physiological measures and subjective reflections. The following subsections elaborate on these methodologies of measuring workload.

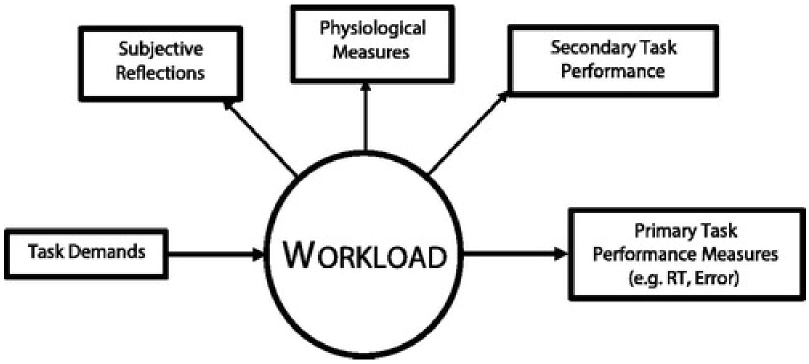


Figure 2.6: Different outcomes from workload (Matthews et al., 2019)

### 2.3.6. Primary and Secondary Task Performance Measures

Although the three presented frameworks above have different understandings about what workload exactly is and how it is influenced, they all agree that the task demand plays a sufficient role in the level of workload which results in a certain level of performance. It is therefore not very remarkable that different literature state that the workload can be measured by measuring the task performance ((Matthews et al., 2019) (Tsang and Vidulich, 2006) and (Hart and Wickens, 2010).

A distinction is made between primary task performance and secondary task performance measures. In the primary task performance measure, an individual has to perform a certain task. How well s/he performs on that task, indicates the level of workload. Mostly, factors such as the speed in which the task is performed, the accuracy or the number of errors or the control activity are used to determine the workload (Hart and Wickens, 2010). Although the primary task performance measure is a relatively simple method to use, it gives poor insight into the actual workload of the driver. Performance and workload do correlate with each other, however, their correlation is not a one-on-one relation. According to Gopher and Donchin, 1986, the changes in resources used by the individual are not captured in the primary task performance measure and changes in resources used are a great indicator of workload. Moreover, the driver's state (fatigue, stress) is not taken into account while only looking at the primary task performance (Louis et al., 2023).

The secondary task performance measure is introduced to give a more adequate image of the workload based on performance than the primary task performance measure. In the secondary task performance measure, the individual got extra tasks that s/he has to complete which are meant to challenge the individual's capabilities (Hart and Wickens, 2010). Secondary tasks can be extra visual or auditorial input given to the individual on which s/he has to respond verbally or manually, examples are letting the individual press a button in regular intervals or testing his/her memory by making him/her remember certain words or numbers. Secondary task performance is mostly used in combination with primary task performance. this addition gives a better insight into the workload. However, one still has to keep in mind that the workload and performance are correlated, but not in a linear relation. Poor performance can also be caused by a low workload and not only a high workload (Teigen, 1994).

### 2.3.7. Physiological Measures

Physiological measures, sometimes called objective measures, are a method for measuring the workload by looking at one's behavioural or physiological changes, such as heart rate, hormones, pupil dilation or skin conduction ((Theeuwes, 2012) and (Rusnock et al., 2015)). These changes can indicate how much stress a driver experiences and the mental effort required while driving. When the observer looks at the behavioural changes of the driver, s/he can look at the driver's posture, head movements, blink rate or eye movements. These changes also indicate the level of workload under different tasks. There is less known about the relationship between physiological changes and workload, however, just like the relation between performance and workload, it is not a linear relation (Rusnock et al., 2015). For example, if one uses the change in heart rate as a workload indicator and the task also involves some physical effort, the heart rate also changes as a result of the physical workload (Hart and Wickens, 2010).

### 2.3.8. Subjective Reflections

When subjective measures are used to measure one's workload, it is asked to them how s/he perceived his/her workload. This can be done by asking questions about, for example, how they feel, how much mental effort they exert and whether they experience stress. A scale could be used on which drivers indicate how they feel in certain situations. This method makes use of the self-reflective abilities of the respondent. According to de Waard, no one else can judge the perceived workload as good as him/herself (De Waard et al., 1995). The advantage of the subjective method is that it is relatively easy to measure. However, the experience of stress can feel different between individuals, making it more difficult to draw conclusions. Moreover, small changes in workload are harder to measure in the subjective methods (Da Silva, 2014).

There exist several questionnaires which are developed to capture the subjective mental workload. Each of these questionnaires focuses on different aspects of the mental workload. These questionnaires and their aspects are listed below:

- Subjective Workload Assessment Technique (SWAT) (Reid and Nygren, 1988)
  - Time Load
  - Mental Effort Load
  - Psychological Stress Load
- Workload Profile (WP) (Tsang and Velazquez, 1996)
  - Perceptual/Central Processing
  - Response Selection and Execution
  - Spatial Processing
  - Verbal Processing
  - Visual Processing
  - Auditory Processing
  - Manual Output
  - Speech Output
- NASA Task Load Index (NASA-TLX) (Hart and Staveland, 1988)
  - Mental Demands
  - Physical Demands
  - Temporal Demands
  - Own Performance
  - Effort
  - Frustration
- Rating Scale Mental Effort (RSME) (Zijlstra, 1993)
  - Mental Effort
- Driving Activity Load Index (DALI) (Pauzié, 2008)
  - Effort of Attention
  - Visual Demand
  - Auditory Demand
  - Temporal Demand
  - Interference
  - Situation Stress

Both the DALI and the RSME questionnaires are developed for car drivers specifically. The NASA-TLX is originally used in aviation and the other two questionnaires are for general use.

## 2.4. Virtual Reality

Virtual reality (VR) has become a more frequently used research method over the last decade. The growing knowledge about virtual reality, advancements in technology and becoming more affordable are the main reasons for this trend (Mathysen and Glorieux, 2021). 'Virtual reality' could be seen as an umbrella term since many different research methods could be described as virtual reality. Each method differs in realism and level of interaction. For example, in some VR methods, the participant enters an interactive virtual world in which s/he has full control over him/herself (e.g. driving simulator or VR glasses with controllers), while in other VR methods, the participant can only view the virtual world (e.g. with VR-glasses or on a tv screen) (Vankov and Jankovszky, 2021). Virtual reality is a great opportunity to simulate road traffic situations in a feasible manner without bringing someone in real danger. It helps respondents to focus on what they are seeing without having to focus on understanding a new device or performing certain actions. Also, many different aspects of road safety can be analysed by using virtual reality such as gap acceptance, hazard perception or speed choice.

Besides the many benefits of virtual reality, the methodology has also some downsides. One of these downsides is the chance of getting motion sick from using virtual reality (Baysan et al., 2023). Motion sickness is caused by the 360 degrees videos that are mostly shown through VR glasses. According to Jasper et al., whether a participant suffers from motion sickness partly depends on the respondent's personal characteristics (such as his/her history of motion sickness) and the respondent's workload while being exposed to virtual reality (Jasper et al., 2023). Furthermore, the level of realism can decrease through the usage of virtual reality. Parts of the real world are still missing in a virtual world and thus not all human senses are triggered in a virtual world (e.g. sound, smell, touch or even taste are lacking) (Chalmers and Ferko, 2010). Some VR researches make use of a programmed/animated world which also makes it less realistic.

One of existing the VR methods is called 'VR-assisted interview' (Mathysen and Glorieux, 2021). This method can be compared to a regular interview, however, the respondent is wearing VR glasses and is confronted with a virtual environment to support the respondent's answers. This is the methodology that is used in this research.

## 2.5. Conclusion of the Literature Review

From the findings in the literature review, it can be concluded that road safety and workload are not the same thing, however, workload influences the drivers' performance which can negatively influence road safety. Workload could be seen as the dynamic between one's capability and task demand. As long as the driver's capability is greater than the number of tasks, the driver can handle the workload. If the task demand exceeds the capability, the workload becomes too high which negatively affects the driver's reaction time, visual field, situation awareness, judgemental skills and driving performance. Measuring one's precise workload is difficult, however, there are many different methods to measure whether the workload is increased or not. Research has found that drivers can self-report whether the workload is increased or not and different questionnaires have been developed for this. Other possible methods are to measure the physiological changes (head movement, eye movement, sweat, heartbeat etc.) or to analyse the performance of the primary tasks (making no errors while driving) or the secondary tasks (letting the drivers execute other tasks such as small calculations).

Moreover, from the literature, both the speed and the presence of parked vehicles have a negative influence separately on the workload and road safety. Parallel parked vehicles block the view of drivers on the road, attract more pedestrians on and around the carriageway, increase the risk of accidents between an opening door from the parked vehicle and the driving vehicle and cause a speed difference between driving vehicles and parking vehicles. The speed coherence with the braking distance and the impact of a crash. The speed that drivers choose depends on more factors than only the sign that indicates the speed limit. Both the road characteristics and the driver characteristics contribute to the speed choice. The road should be designed in such a way that the speed limit is credible. Studies have found that parked vehicles lower on average the free flow speed of a road and influence the credibility of the speed limit. With all these reasons in mind, it can be concluded that a road with a speed limit of 50 km/h is more dangerous than a road with a speed limit of 30 km/h and a road with parked vehicles is more dangerous than a road without parallel parked vehicles. However, it is uncertain whether these two road design variables influence the workload for drivers in such dimensions that driving performance is affected and that road safety is endangered. As a result, this study explores the effects of the presence of parallel parking and speed limit reduction at distributor roads on the estimated driver performance in more detail. These effects are measured by investigating the changes in the drivers' overview of the situation on the road, how difficult the drivers found the driving task on the road and how the drivers themselves estimated their ability to avoid a collision from happening

## 2.6. Conceptual Framework

To capture all the findings from the literature review, a conceptual framework was developed, which is shown in Figure 2.6. The conceptual framework is based on the task capability interface model by Fuller and the mental workload model by Tsang and Vidulich. Fuller's task capability interface model described that the mental workload is a dynamic relation between one's capability and the task demand and when the task demand exceeds the capability, the driving performance is negatively affected. Tsang and Vidulich also included situational awareness in their mental workload model: if the driver does not have enough spare mental capacity left to process all the task demands, the driver becomes less attentive to his/her surroundings.

In this research, the whole capability and task demand were not captured. Only certain aspects that influence the capability and the task demand, according to the mental workload models, were taken into account. The objective of this research was not to establish a model for the exact relationships between those individual aspects and either the capability or the task demand (graphically shown by the blue and orange boxes respectively in Figure 2.7). This is left for further research. The same yields for the situational workload: this report does not provide a model for the exact relationship between the parameters overview, collision avoidance estimation and difficulty of the driving task and the situational workload. This is shown in the middle green box in Figure 2.7. This report only analysed the individual relationships between the variables in the 'capability' and the 'task demand' boxes on the feeling of safety and the variables in the 'situational workload' box. This is done by linear mixed models, which is further elaborated in Section 3.7. The credibility of the speed is only tested on its relation to the presence of parking and the driven speed. Based on the literature, it is assumed that there is a relationship between the credibility of the speed and the parked vehicles along the road and the speed of the vehicle, however, this is left for further research. Therefore, that line is a dashed arrow instead of a solid arrow in Figure 2.7. The same yields for the relationship between the feeling of safety and the credibility of the speed and between situational workload and the credibility of the speed. These relationships are not further analysed in this report, however, it is assumed based on the literature review that the relationships exist.

The presence of parallel parking and the speed of the vehicle are the main independent variables that are changed and analysed in this research. Therefore, these two are coloured in a darker shade of orange in the 'task demand' box.

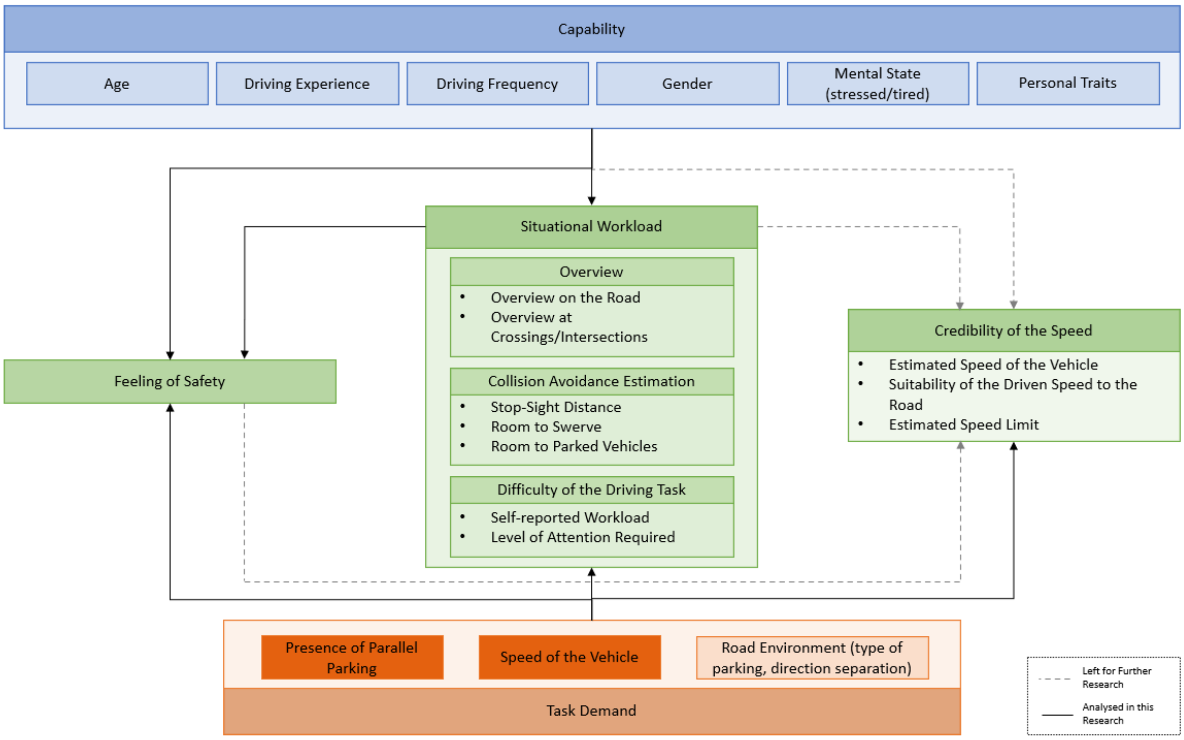


Figure 2.7: Conceptual Framework

# 3
# Methodology

In this section, all the different aspects of the methodology used in this research are elaborated. Virtual reality was used to find the influences of the presence of parallel parking and a speed limit reduction on distributor roads on the feeling of safety, difficulty of the driving task, perceived speed, collision avoidance estimation and the overview on the road. First, the experiment set-up is described in Section 3.1. Then, the chosen roads are described in Section 3.2. How the videos were captured and edited is described in Section 3.3. The experiment procedure and the questionnaires used are elaborated in Sections 3.4 and 3.5 respectively. Furthermore, how the respondents were gathered and their demographics are shown in Section 3.6. Finally, Section 3.7 presents the data analysis plan.

## 3.1. Experiment Set-up

This experiment aimed to let drivers experience varied realistic scenarios of distributor roads, including those with and without parallel parked vehicles, and at speeds of 30 km/h and 50 km/h, while using virtual reality to estimate the effects of those different combinations on the estimated driving behaviour, feeling of safety and the credibility of the speed limit. To make the virtual driving environment feel realistic to the respondents, it was chosen to record videos on existing roads with a multi-degree camera instead of creating virtual roads. Each video is captured from the driver's perspective. These videos were shown to the participants using VR glasses. With this technique, the respondent could not influence the vehicle's movement or speed. The respondent could only watch and assess what s/he had seen. Each respondent was shown four videos.

The used methodology is called a VR-assisted survey. In this methodology, surveys are conducted by different respondents and these surveys are supported by virtual reality. The multi-degrees videos were shown to the respondents through VR glasses and questions were asked to them after each video. The VR glasses are shown in Figure 3.1. A mobile phone was placed into the VR glasses to project a video. The mobile phone was connected to a laptop so that the researcher was able to see what the respondent saw through the glasses. The researcher knew by this when a video was finished and when the researcher could start asking questions about what the respondent had seen. The researcher read the questions aloud and filled in the respondent's answers via Microsoft Forms. The lenses of the glasses could be adjusted so that respondents with a prescription were also able to see clearly through the VR glasses. Before the videos were shown, each respondent had to answer a few questions about his/her driving experience and behaviour. This is further elaborated in Section 3.5.

It was also tested on three test respondents whether a gaming steering wheel, as shown in Figure 3.2 would increase the sense of realism in the videos. The gaming steering wheel was attached to the table and the test respondents had to sit in front of it on a chair so that they could hold the steering wheel as if they were sitting in a car. This steering wheel was not connected to the video thus the respondents could not influence the manoeuvre of the vehicle. However, these test respondents indicated that the gaming steering wheel had no contributed value to the realism. They said that it only made it more confusing since the vehicle in the videos was not connected to the steering wheel.


Figure 3.1: VR-glasses (Shinecon, n.d.)

Figure 3.2: Gaming steering wheel (Logitech, n.d.)

## 3.2. Location Selection

The task demand (and thus the workload) depends on many different factors besides the speed and presence/absence of parallel parking, for example, the number of intersections/crossings, the road geometry, the traffic flows, the weather conditions, distance to buildings and the presence of trees along the road also have an influence. It is therefore difficult to compare the workload of one distributor road with parallel parking to a random other distributor road without parallel parking. These roads vary in more ways than only the presence of parking which all have their own (unknown) contribution to the workload. To filter out those differences, multiple roads were selected in this research. In order to systematically select the roads for this experiment, two variables were chosen to which the roads have to comply. These variables are the type of direction separation (centre line, grass/vegetation and crossable stones) and the layout of the parking spaces (continuously, interrupted or no parking). By grass/vegetation, a non-crossable curb is meant. The crossable stones are as the description suggests crossable, however, crossing the stones gives discomfort to the driver. Figures 3.3, 3.4 and 3.5 show the different types of direction separation. By varying the type of direction separation and the layout of the parking spaces, nine different roads were selected. How the outcomes of the questions about each road are analysed is further elaborated in Section 3.7. Finally, all the selected roads must have separated cycle paths since this is in line with the new design principles for GOW50.

Figure 3.3: Centre Line
(Google, 2022f)

Figure 3.4: Grass/Vegetation
(Google, 2021)

Figure 3.5: Crossable Stones
(Google, 2022c)

With these requirements, nine different roads were chosen. An overview of the chosen roads is presented in Table 3.1. A picture of each road can be seen in Figures 3.6 up to 3.14. These same figures are also shown larger in Appendix B.

Table 3.1: Chosen Streets

| Street Name | City Name | Direction separation | Layout of Parking | Figure |
|---|---|---|---|---|
| Rode Kruislaan | Eindhoven | center line | continuously | 3.6 |
| Laan van Avant-Garde | Rotterdam | grass/vegetation | continuously | 3.7 |
| Jaffalaan | Delft | crossable stones | continuously | 3.8 |
| Oostmeerlaan (with parking) | Berkel en Rodenrijs | center line | interrupted | 3.9 |
| Laan van Oudpoelgeest | Oegstgeest | grass/vegetation | interrupted | 3.10 |
| Ruys de Beerenbrouckstraat | Delft | crossable stones | interrupted | 3.11 |
| Oostmeerlaan (without parking) | Berkel en Rodenrijs | center line | no parking | 3.12 |
| Zwaluwlaan | Schiedam | grass/vegetation | no parking | 3.13 |
| Rotterdamseweg | Delft | crossable stones | no parking | 3.14 |

Figure 3.6: Rode Kruislaan (Google, 2022a)

Figure 3.7: Laan van Avant-Garde (Google, 2022d)

Figure 3.8: Jaffalaan (Google, 2022c)

Figure 3.9: Oostmeerlaan with parking (Google, 2022f)

Figure 3.10: Laan van Oud Poelgeest (Google, 2021)

Figure 3.11: Ruys de Beerenbrouck-straat (Google, 2022e)

Figure 3.12: Oostmeerlaan without parking (Google, 2022g)

Figure 3.13: Zwaluwlaan (Google, 2022h)

Figure 3.14: Rotterdamseweg (Google, 2022b)

## 3.3. Videos

The videos were captured with the Nikon KeyMission 360 camera. This camera records videos automatically in 360 degrees and has a resolution of 3840 x 2160p / 24 fps. For this research, the camera was mounted to a helmet to capture the best point of view of the driver. As a result, the face of the researcher wass also filmed which is not relevant to the research. Therefore, the video was edited in Adobe Premiere Pro and the number of degrees is reduced from 360 degrees to 250. The angle of 250 degrees captures the whole range from the left side window of the vehicle to the right side window. Both the side mirrors and the rear-view mirror of the vehicle can be seen and used in the videos. The vehicle that was used in the videos is an Opel Zafira from 2016 and this vehicle has an automatic transmission. The speedometer was also edited away in each video. This was done by placing a black square over the speedometer in Adobe Premiere Pro. The answers related to speed might be influenced if the speed of the vehicle is visible on the dashboard of the vehicle.

Each video has a duration of 15 to 25 seconds and every road at every speed (both 50 km/h and 30 km/h) was filmed multiple times to make sure that there was at least one usable video per road per speed. A video was marked as useless, for example, when there was another vehicle too close in front, when the researcher was overtaken by another vehicle, when someone crossed the road in front of the researcher or when the sun caused a too-bright contrast. To prevent the last example from happening, the videos were recorded in the evening when the sun was less bright. However, it should be noted that a low sun can still cause some contrast problems. In addition, it should not be (totally) dark outside because this can also influence the visibility of the roads in the videos. Furthermore, for the streets with parallel parking, at least three-quarters of the parking bays had to be occupied since empty parking bays might also influence the workload. When all the recordings were finished, each video was controlled by the researcher on the presence of speed limit signs, readable license plates and recognizable faces. The latter two must be edited away due to privacy restrictions. Speed limit signs could influence the answers of the respondents. Therefore, those were removed from the videos in Adobe Premiere Pro.

Since there were nine different roads chosen and on each road, one video with a speed of 30 km/h and one with 50 km/h was filmed, and there is a total of eighteen videos. Four different videos were shown to each respondent. It was chosen to not show more than four videos to make the experiment not too boring for the respondents. It is not desired to make them lose concentration or rush through the answers to be finished sooner. The average duration of each experiment was 20 minutes including the explanation of the experiment and the questionnaires about their demographics and driving behaviour. Nine different versions of four videos were made to shuffle the eighteen videos. Each version consisted of two videos with a speed of 30 km/h and two with a speed of 50 km/h and at least one of the videos was of a street without parking. In Table 3.3, the order of each version can be seen. What each street indication means can be found in Table 3.2. In each version, there was strived to hustle the sequence of 30 km/h and 50 km/h videos.

Between each video, a black screen with a duration of four minutes was edited. In these four minutes, the researcher asked the questions to the respondent. When all the questions about a certain video were answered, the researcher was able to skip the remaining part of the black screen time to the next video via the laptop that was connected to the mobile phone in the VR glasses. Before each video, a red dot appeared on the screen to check whether the VR glasses and the video were aligned (and thus that the respondent was looking straight at the road when the video started). After the red dot, there was a countdown shown from 5 to 1 and then the next video started. In this way, the respondent was not surprised by a new video starting. Before the first video of the experiment started, a short introduction video was shown to the respondent. This was done to prepare the respondent for what s/he was about to see and to become familiar with the virtual environment. The test video was a video of the Papsouwselaan in Delft. If a version started with a video with a speed of 30 km/h, the test video also contained a speed of 30 km/h and if the version started with 50 km/h, the test video also showed a video of 50 km/h. The test video had a duration of 20 seconds and there were no further questions asked about it.

Table 3.2: Overview of how each street and speed combination is marked

| Street Name | 30km/h | 50km/h |
|---|---|---|
| Rode Kruislaan | 1A | 1B |
| Laan van Avant-Garde | 2A | 2B |
| Jaffalaan | 3A | 3B |
| Oostmeerlaan (parking) | 4A | 4B |
| Laan van Oudpoelgeest | 5A | 5B |
| Ruys de Beerenbrouckstraat | 6A | 6B |
| Oostmeerlaan (no parking) | 7A | 7B |
| Zwaluwlaan | 8A | 8B |
| Rotterdamseweg | 9A | 9B |

Table 3.3: Video sequence by version

| Version | Video 1 | Video 2 | Video 3 | Video 4 |
|---|---|---|---|---|
| 1 | 1A | 7A | 4B | 6B |
| 2 | 2A | 8A | 5B | 9B |
| 3 | 6B | 1B | 9A | 2A |
| 4 | 5B | 2B | 7A | 6A |
| 5 | 3B | 8A | 4B | 6A |
| 6 | 9B | 4A | 7B | 3A |
| 7 | 5A | 7B | 1A | 2B |
| 8 | 4A | 8B | 3A | 1B |
| 9 | 8B | 5A | 3B | 9A |

## 3.4. Experiment Procedure

Before the respondent started to answer all the questions of the experiment, a short briefing had to be done in which several things had to be explained to the respondent. Firstly, the respondent had to give consent about using his/her answers for this research. It was explained that the data is anonymous and that his/her answers could not be linked back to his/her identity. It was made clear to the respondent that only the researcher had access to the data and the data was not used for any other purpose than this Master's thesis. Moreover, it was told to the respondent that if s/he was uncomfortable answering one or multiple questions, s/he was not obligated to do so and any question could be skipped. The respondent was free to stop the experiment at any time or to let all the answers be removed after s/he finished the experiment. Once the consent for this was given, the experiment could go on.

The next step was to explain to the respondent what s/he was about to do. It was explained that the research consisted of three parts, in the first part a few questions about his/her demographics were asked (see Section 3.5.1) and in the second part, the respondent could expect questions about his/her driving behaviour (see Section 3.5.2). Then, the respondent was told that s/he was about to see four different videos captured from the driver's point of view. Before each video, a red dot and a countdown would be shown and after each video, the questions about what s/he had seen were asked. Moreover, the respondent was told that there was a test video to get familiar with the virtual environment. Furthermore, the respondent was warned that virtual reality might cause nausea and that if s/he started to feel sick, s/he could take a break or stop the entire experiment.

It was intentionally not told to the respondent what the research objective was to let the respondent start the experiment with an open mind instead of already being focused on the speed or the presence of parallel parked vehicles. If the respondent was interested, the research objective was explained afterwards. Finally, the meaning of the term 'workload' was explained to each respondent as the difficulty of the driving task and that a high workload means that it is very difficult to drive there. This explanation was given before they got the VR glasses.

Before the first questionnaire started, the VR glasses were given to the respondent to adjust the lenses until s/he saw clearly through the glasses. This was done by showing a 360-degree picture of a park through the glasses. Once the lenses were adjusted properly, the respondent could fill in the questionnaires of parts 1 and 2 while the researcher would start up the test video.

## 3.5. Questionnaires

The questions used during the experiment are discussed in more detail in this section. The experiment can be divided into three parts and each part has its own questionnaire: a demographic questionnaire, a personal traits and driving style questionnaire and a questionnaire for the VR videos. These parts are respectively discussed in Subsections 3.5.1, 3.5.2 and 3.5.3.

### 3.5.1. Part 1: Demographic Questionnaire

The first questionnaire is focused on some demographic details of the respondents. It was chosen to include questions about the respondent's age, driving frequency and period of having a driver's license to gain insight into the respondent's driving experience since the driving experience influences his/her driving skills and how one can handle certain (unexpected) situations. For the question about the driver's license, the respondent could choose from an interval between 0-2 years, 2-5 years, 5-10 years or more than 10 years. It was chosen to include these intervals to find out whether the respondent was a novice driver or not. According to Dutch regulations, one is a novice driver if s/he has his/her driver's license for less than five years. However, it was chosen to add a few more options since one can learn a lot within five years and only a time interval between zero to five years might be too broad. The respondent could choose between (almost) never, monthly, once every two weeks, weekly and (almost) daily to describe the driving frequency. Furthermore, the respondent's gender, level of stress and level of tiredness are asked. For the latter, the respondent had to give a number between one and ten in which one means no stress/not tired and ten is very stressed/tired. This scale was maintained since it is the same scale as used in the Dutch school system which means that the respondents are familiar with the distribution. The level of stress and tiredness influences the driver's capability according to Fuller. These questions are presented in Appendix C.1. The Dutch translation of these questions can be found in Appendix C.4.

### 3.5.2. Part 2: Personal Traits and Driving Style Questionnaire

The second part focused on the personal traits and driving style of the respondent. According to French et al., people are mostly well aware of their own behaviour in traffic and that their self-reporting ability is likely to be true in reality (French et al., 1993). Based on the self-reporting driving style questionnaire developed by French, the questions from this part were made. With these questions, three different personal traits that might influence the driving style can be distinguished, which are: the ability to stay calm, the level of sensation seeking and the likeliness of speeding. To estimate one's ability to stay calm, questions about their social resistance towards pressure from other road users, stress and how they self-estimate their ability to stay calm while driving are asked. For the likeliness of speeding, one has to answer questions about how often they are aware of the speed limit and how often they violate the speed limit in general and in built-up areas specifically. Finally, the level of sensation seeking of a respondent is estimated by asking questions about how often they feel unsafe, how often they get distracted and how often they drive cautiously. All the questions in this questionnaire had to be answered on the scale: 'never', 'infrequently', 'sometimes', 'frequently' and 'always'. All the questions are presented in English and in Dutch in Appendix C.2 and C.5 respectively.

### 3.5.3. Part 3: VR Videos Related Questionnaire

In the third part of the questionnaire, the videos were shown to the respondent. After each video, the respondent had to answer fourteen questions. The first five questions relate to the speed of the vehicle and the speed limit on the road. The respondent had to estimate both the speed limit on the road and the speed of the vehicle. Moreover, they had to judge whether the driving speed was appropriate for the road and whether they would have chosen the same speed if they were driving. For the latter they could choose between choosing the same speed, driving a little bit faster, driving much faster, driving a little bit slower and driving much slower to gain more insight into how suitable the speed was. The three next questions were about the overview of the road and at intersections and crossings. The respondents had to rate the overview between one and ten. A distinction was made between the overview at the road section and at crossings and intersections. Both these types of overview had to be rated by the respondents. All the videos had some sort of crossing or intersection, however, the type of crossing or intersection was not the same in each video. The crossing or intersection could be a pedestrian crossing, a bicycle crossing or an exit to an access road. All the crossings and intersections had in common that the vehicles on the distributor road had priority. Moreover, an open question was asked about what factors of the road design influenced their level of overview. Then, a few questions about their estimation of collision avoidance were posed by asking about the collision avoidance estimation were asked. This was divided into the stop-sight distance (the respondents had to estimate whether they would be able to stop and stand still in time to avoid a collision if something unexpectedly happened), the room to swerve (the respondents had to rate the space to swerve to avoid a collision if something unexpectedly happened) and the room to the parked vehicles (to keep enough distance to the parked vehicles and to avoid a collision). This was followed by two questions regarding the task difficulty. The respondents had to rate their workload and the level of attention required to drive over the road at the shown speed. The last question related to their perceived feeling of safety. An overview of the questions can be found in Appendix C.3 in English and in Appendix C.6 in Dutch.

## 3.6. Respondents

As explained in Section 3.3, nine different versions were made. A total of 63 respondents was gathered making that each version is viewed by seven different respondents. The requirements for being a respondent were that one has to be at least 18 years old and one has to be in possession of a driver's license. The respondents were mainly gathered by asking friends, family and colleagues at the office of Arcadis. Since the experiment set-up was movable, the experiment was conducted at multiple different places to lower the barrier for respondents to take part in the experiment. There was also a small pilot study of three people conducted to test whether everything was clear, to practice the procedure and to find out whether the experiment was not too long. More details about the group of respondents can be found in Section 4.1.

## 3.7. Data Analysis

Once all the videos were shown to the respondents and all the data from the questions were collected, the data had to be analysed to determine whether parallel parked vehicles and the speed of the vehicle had a statistically significant influence on the situational workload, the feeling of safety and the credibility of the speed. In total 252 videos were watched by 63 respondents. Since all the respondents had seen four videos, all the videos could not be analysed separately as if they were watched by 252 individual respondents. For example, one respondent could give on average a way higher score to the feeling of safety than another respondent because they might have a very different driving style in reality which could influence their feeling of safety. Moreover, the order of the videos could have influenced the answers of the respondents. The respondents did not know what they would be asked about the videos prior. They went blank into the first video. During the experiment, they learnt what was about to be asked of them resulting in them knowing where to look for. Furthermore, they could have compared the later videos to the videos they had already seen before while the first video had nothing to be compared to (other than the test video about which no questions were asked). As a result, the respondent ID and the order of the video had to be taken into account in the data analysis and this was done by using linear mixed models.

A linear mixed model (LMM) is a statistical method that combines fixed and random effects. LMM is a type of regression model: it tests whether different factors (the predictors) can predict a certain variable (the outcome). LMM extends a traditional linear regression by taking repeated measures into account. By including random effects, LMMs can handle correlations within the answers of each respondent, providing more accurate and reliable estimates. The fixed effects are the overall predictors in the regression model. For each predictor variable, an estimate is given of the magnitude of its influence on the outcome variable and the significance level of the estimate. For each outcome variable, multiple LMMs were run. Each time, a different predictor variable was added to the model. If the predictor variable was statistically significant (a significance level of 95% was chosen in this research) the predictor was kept in the linear mixed model. Once the predictor variable was not significant, it was not further included in the model.

In this research, it is assumed that there is a linear relationship between the analysed data. The LMMs were executed in SPSS. The respondent ID was set to be the subject variable and the order of the videos was set as the repeated measure. It is important to keep in mind that not every respondent was shown the same videos; there were nine different versions that consisted of four different videos. To solve this, every first video of each version was marked with '1', the second with '2' up till '4' in the video order variable. In SPSS, it was assumed that the repeated covariance type was unstructured. Then, linear mixed models were executed for seven different dependent variables. These dependent variables were:

- Overview on the road
- Overview at crossings/intersections
- Room to swerve
- Room to parked vehicles
- Level of attention required
- Self-reported workload
- Feeling of safety

The predictors for the linear mixed model could be split up into three categories: the task demand, the capability and speed estimations. Some of the variables had to be adjusted into dummy variables since they were categorical data. How these dummy variables were determined is given next to the predictor below. The predictors for the task demand were:

- Presence of parking [0=without parking, 1=with parking]
- Speed of the vehicle [30 km/h, 50 km/h]
- Type of parking [0=continuous, 1=interrupted, 2=no parking]
- Type of direction separation [0=centre line, 1=grass/vegetation, 2=crossable stones]

Note that the predictor presence of parking could not be tested in a linear mixed model with the variable room to parking, since this question is not asked after videos that showed roads without parking. For the capability, the following predictors were taken into account:

- Age
- Gender [0=Male, 1=Female]
- Driver's license [0=0-2 years, 1=2-5 years, 2=5-10 years, 3=more than 10 years]
- Driving frequency [0=(almost) never, 1=monthly, 2=once every two weeks, 3=weekly, 4=(almost) daily]
- Level of stress
- Level of tiredness
- Familiarity with the road [0=no, 1=yes, 2=not sure]
- Likeliness of speeding [0=low, 1=medium, 2=high]
- Level of sensation seeking [0=low, 1=medium, 2=high]
- Ability to stay calm [0=low, 1=medium, 2=high]

Familiarity with the road is set to be part of the capability of the driver since it is a form of training. If one knows where the road is and what the road looks like, s/he knows what to expect as potentially dangerous crossings, what the speed limit is etc. Finally, for the speed estimation, a distinction between the speed of the vehicle and the speed limit on the road was made:

- Estimated driven speed
- Estimated speed limit

All these predictor variables were used to establish a regression model for the seven dependent variables. The predictor variables were added one by one to the linear mixed model. If the outcomes were statistically significant (p-value<0.05), the predictor model stayed in the model and a new predictor was added to it. If the p-value was bigger than 0.05, the predictor was replaced with a new predictor variable. Parallel parking and speed were first tested individually before they were combined in one linear mixed model. Moreover, the interaction effect between parallel parking and the speed was tested in the linear mixed model. The predictor type of parking is also firstly tested individually before adding it to a linear mixed model with the presence of parking in it if the presence of parallel parking is tested to be significant. This is because the presence of parallel parking and the type of parking are very comparable to each other, they both include (a type of) parking and no parking.

Finally, for the feeling of safety, additional predictors were added to the linear mixed model which were the other five dependent variables (overview on the road, overview at crossings/intersections, room to swerve, room to parking and level of attention required). This is done to establish whether there is a relationship between situational workload and the feeling of safety.

# 4

# Analysis and Results

In this chapter, the results of the questionnaires are analysed. This is divided into six different sections. Firstly, the respondents' demographics and their personal traits were presented and analysed in Section 4.1. The sections after that are related to the questionnaire regarding the virtual reality videos. Section 4.2 is focused on the overview on the road. In Section 4.3, the results of the questions regarding the collision avoidance estimation are analysed. How the difficulty of the driving task and the feeling of safety are affected by the speed reduction and the presence of parking is presented in Sections 4.4 and 4.5 respectively. Section 4.6 analyses the respondents' estimation of the speed of the vehicle and the speed limit. Moreover, Section 4.7 shows how the respondents' level of tiredness is affected by the experiment.

## 4.1. Respondents

From the 63 respondents, 39 identified themselves as male and 24 as female. This is shown in Figure 4.1. The age distribution is shown in 4.3. The average age is 33.19 years old. The distributions of possession of a driver's license and driving frequency can be found in Figures 4.2 and 4.2 respectively. From Figure 4.4, it could be seen that almost a quarter of the respondents are novice drivers. Finally, Figure 4.5 shows the distribution of the level of stress among the respondents and Figure 4.6 shows the distribution of the level of tiredness among the respondents. The level of stress is in general fairly low while the level of tiredness varies mostly between low and medium. The distribution of the level of tiredness is more flattened out in comparison to the level of stress. Almost no high ratings for the level of stress or tiredness were given.

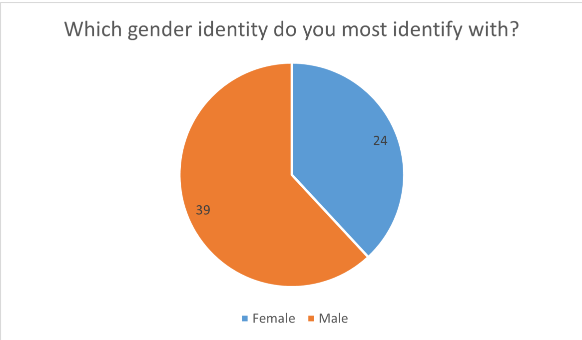


Figure 4.1: Distribution of gender

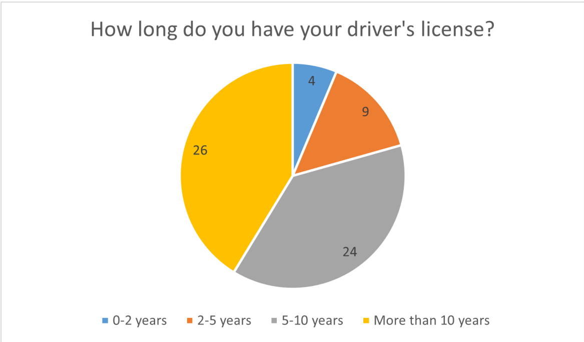


Figure 4.2: Distribution of possession of a driver's license

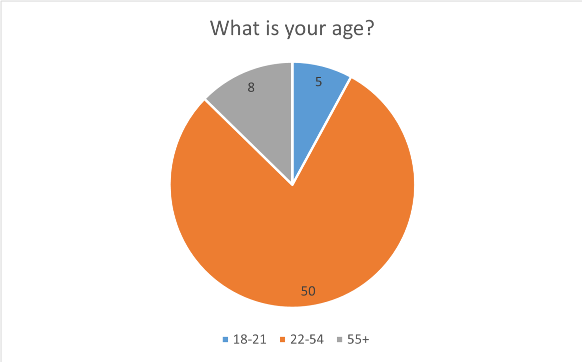


Figure 4.3: Distribution of age

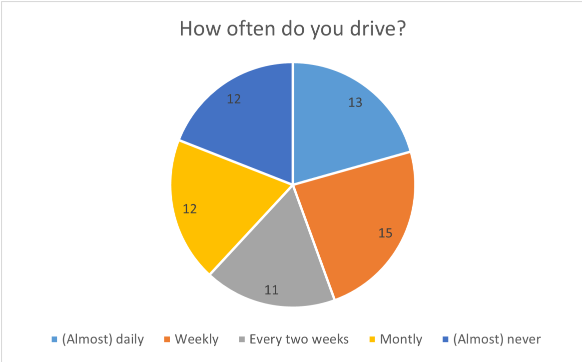


Figure 4.4: Distribution of the driving frequency

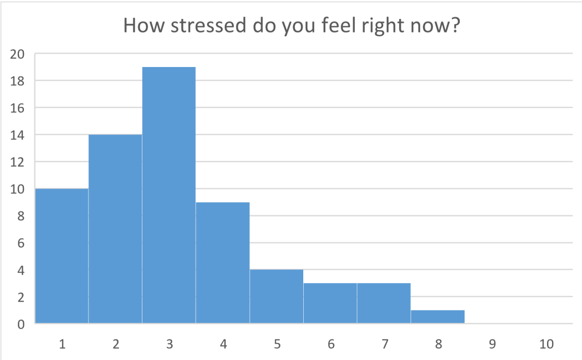


Figure 4.5: Distribution of the level of stress

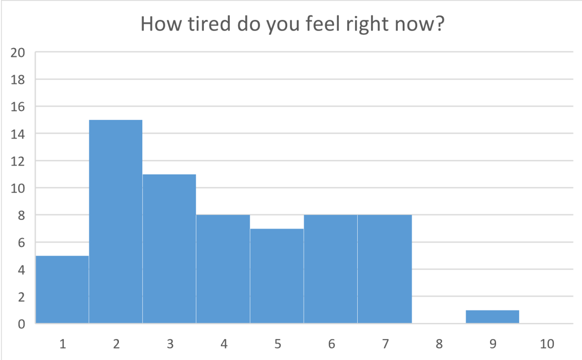


Figure 4.6: Distribution of the level of tiredness

Furthermore, the three personality traits 'Likeliness of speeding', 'level of sensation seeking' and 'ability to stay calm' were analysed. In Subsection 3.5.1, the questions that were used to determine these traits were elaborated. Each question could be answered with 'never', 'infrequently', 'sometimes', 'frequently' and 'always'. Depending on the question, the answers are rated with 1, 2, 3, 4 or 5 points. For example, for the trait 'likeliness of speeding', the answer 'often' is marked as 1 point and the answer 'never' as 5 points for the question 'How often are you aware of the speed limit on a road?'. While for the question 'How often do you exceed the speed limit?', the answer 'never' is worth 1 point and 'often' 5 points. The points of the three questions for the trait 'likeliness of speeding' are added up and if the total is less than 7 points, one is marked as a low likeliness of speeding. A medium likeliness of speeding requires less than 11 points and one has a high likeliness of speeding with a total of 11 points or higher. The questions that are ranked with 'never' as 1 point and 'often' as 5 points are questions 2, 3, 7 and 8 in Appendix C.2. The other questions are ranked the other way around. The distributions of the three traits are shown in Figures 4.7, 4.8 and 4.9. As shown in these figures, one or two of the outcome possibilities per personality trait were underrepresented: 'high' for the likeliness of speeding, 'low' and 'high' for the level of sensation-seeking and 'low' for the ability to stay calm. The under-representation of certain outcomes results into that the personality traits are not further included in the linear mixed model since it would not give statistically significant outcomes.

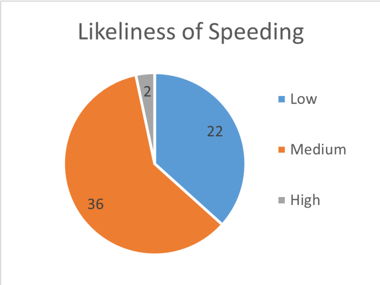


Figure 4.7: Distribution of the Personality Trait 'Likeliness of Speeding'

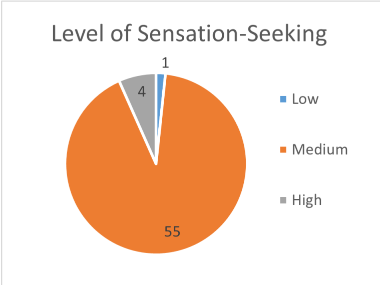


Figure 4.8: Distribution of the Personality Trait 'Level of Sensation Seeking'

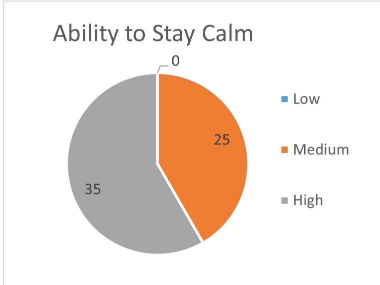


Figure 4.9: Distribution of the Personality Trait 'Ability to Stay Calm'

## 4.2. Overview

The first factor of the situational workload that is analysed is the change in overview. The overview is divided into three parts: the total overview, the overview specifically at crossings for cyclists/pedestrians or intersections with access roads and the answers of the open question about what road design characteristics influenced the level of overview. Each analysed road had some sort of crossing or intersection, however, none of the videos contained an intersection between two distributor roads. It was analysed what the effects of the presence of parallel parking and the speed reduction were on the total overview and at crossing or intersections.

### 4.2.1. Overview on the Road

The first analysed part of the overview is the overview on the road section. The respondents had to rate their level of overview on the road section on a scale from 1 to 10 in which one was equal to 'absolutely no overview' and ten equal to 'everything was super clear to see'. First, the influence of the presence of parallel parking and the driven speed were individually analysed. Figures 4.10 and 4.11 graphically show these individual influences of parallel parking and driven speed respectively by boxplots. From these figures, it could be seen that the overview on road sections is lowered for videos that showed a speed of 50 km/h or for videos that showed a road with parallel parking. The mean for the overview on the road for roads without parallel parking is 8.79. This is lowered to 6.68 for roads with parallel parking (see Table D.2 in Appendix D). The mean for overview on the road is also lowered by the speed of the vehicle from 7.65 for 30 km/h to 6.98 for 50 km/h (see Table D.5). In Figure 4.12, the combined effect of the presence of parallel parking and the speed of the vehicle are shown by boxplots. In this figure, it is visible that the respondents rated this type of overview the highest on roads without parallel parking and a speed of 30 km/h (mean=9.06, see Table D.9) and the lowest on roads with parallel parking and a speed of 50 km/h (mean=6.08, see Table D.9).

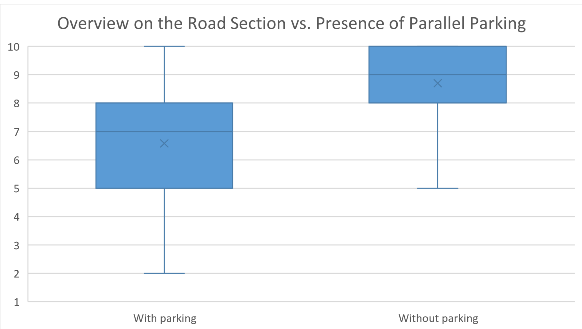


Figure 4.10: Boxplot of the Overview on the Road Section vs. the Presence of Parallel Parking

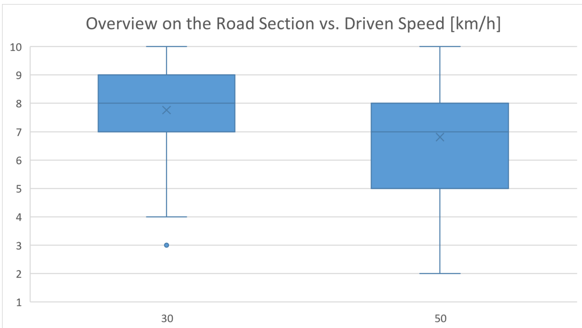


Figure 4.11: Boxplot of the Overview on the Road Section vs. the Driven Speed

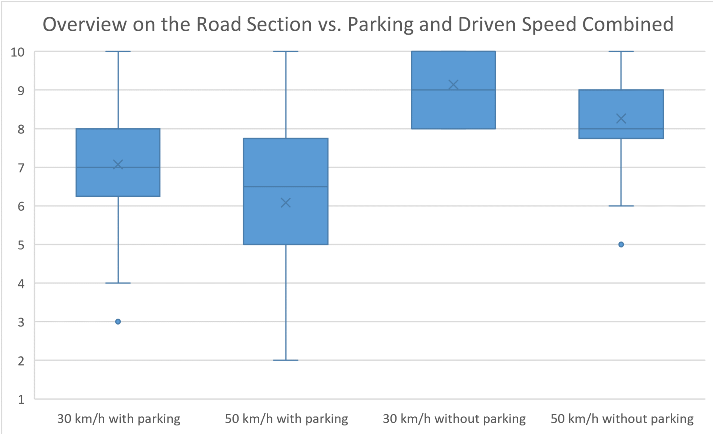


Figure 4.12: Boxplot of the Overview on the Road Section vs. the Presence of Parallel Parking and the Driven Speed combined

To test whether the presence of parallel parking and the speed of the vehicle also have a statistical significant influence on the overview on the road section, linear mixed models were performed. First of all, the presence of parallel parking was tested by this method. According to the linear mixed model, the difference in means between roads with and roads without parallel parking is significant (p-value<0.001, see Table D.1). The reduced mean by a speed of 50 km/h compared to a speed of 30 km/h is also statistically significant according to the performed linear mixed model (p-value<0.001, see Table D.4). Adding both these two variables in one linear mixed model still results in significant results (p-value<0.001 for both the presence of parallel parking and the speed of the vehicle, see Table D.7). According to this linear mixed model, the intercept is 6.271, without parking leads to the rating being increased by 2.067 and the speed of 30 km/h into an increment in the rating by 0.806. The interaction between these two variables is also tested, however, this did not give a significant outcome (p-value=0.257, see Table D.8).

With the knowledge that the presence of parallel parking and the speed of the vehicle influence the overview on the road as a starting point, the other task demand variables (type of parking and type of direction separation) were one at the time added to the linear mixed model. At first glance, it seems like the type of parallel parking has a significant influence on the overview on the road (p-value<0.001, see Table D.10). However, if one zooms in on the three different types of parking in Tables D.11 and D.12, it could be seen that this significance is only due to the category 'no parking' (mean=8.747). The difference between continuous parking (mean=6.396) and interrupted parking (mean=6.893) is not significant (p-value=0.072). The type of direction separation did not give a significant outcome (p-value=0.12, see Table D.13).

In addition, the different capability variables, which are presented in Section 3.7, were one by one tested on significant influence on the overview on the road section. The outcomes of these linear mixed models are presented in Tables D.16 up to D.22.

Finally, the effects of estimations by drivers of the driven speed and the speed limit on the overview on the road are analysed with linear mixed models. The combination of parking, actual speed and estimated speed resulted significant outcomes. The intercept was 7.778 for this model, the effect of parking was 2.165 (p<0.001), the effect of the actual driven speed was 0.444 (p-value) and the effect of the driven speed estimation was -0.031 (p=0.007) (see Table D.23). The effect of the speed limit estimation was not significant (p-value=0.27, see Table D.25).

### 4.2.2. Overview at Crossing and Intersections

The respondents were not only asked to rate their level of overview on the road section, but also the overview at the intersections with access roads and/or crossings that they saw in the video. They also had to give this type of overview a mark between 1 and 10. The data analysis of this dataset is equal to the analysis performed in Subsection 4.2.1. The results are first graphically shown by boxplots. First, the data was divided by the presence of parallel parking which resulted in the boxplot shown in Figure 4.13. The presence of parallel parking lowered the mean level of overview at crossings and intersections from 8.52 to 6.29 (see Table D.28). With LMM, it is demonstrated that this influence is significant (p-value<0.001, see Table D.27). The speed of the vehicle has also found to be a significant influence by LMM on the overview at crossings and intersections (p-value<0.001, see Table D.30): this type of overview is rated higher when the speed of the vehicle is 30 km/h (mean=7.51) than when the speed is 50 km/h (mean=6.61) (see Table D.30).

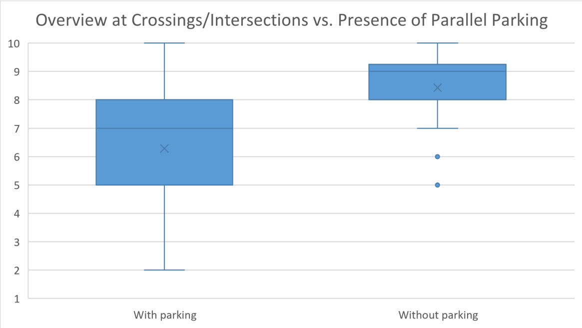


Figure 4.13: Boxplot of the Overview on Intersections or Crossings vs. the Presence of Parallel Parking

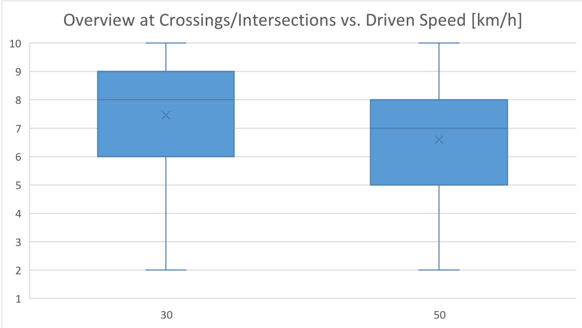


Figure 4.14: Boxplot of the Overview on Intersections or Crossings vs. the Driven Speed

The combined effect of parallel parking and the speed of the vehicle on the overview at crossings and intersections is graphically shown by boxplots in Figure 4.15. This type of overview is on average the lowest rated when the road has parallel parking and the speed is 50 km/h (mean=5.98, See Table D.35). By either removing the parking or lowering the speed, the ratings increase to 7.93 and 6.66 respectively. The combination of those measures results in the highest mean rating of overview at crossings and intersections: 8.91. The linear mixed model also indicates that adding both the presence of parallel parking and the driven speed of the vehicle to the model resulted in statistically significant effects (p-value<0.001, see Table D.33). The effect of parking on overview at crossings and intersections (2.109, see Table D.33) is bigger than the effect of the driven speed (0.789). The interaction between those two parameters is not significant according to the LMM (p-value=0.531, see Table D.34).

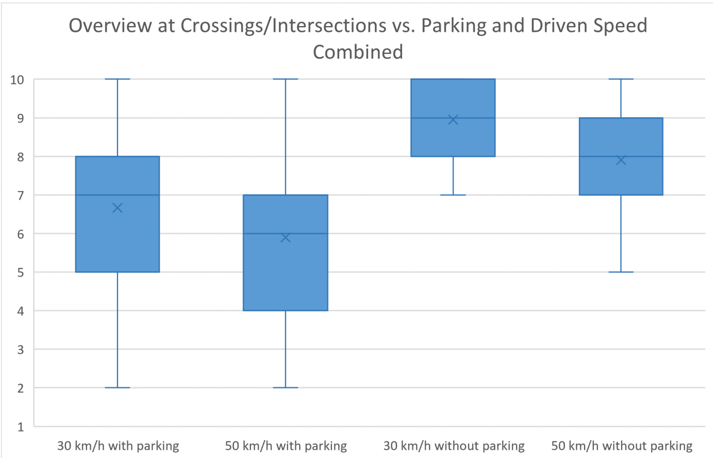


Figure 4.15: Boxplot of the Overview at Crossings and Intersections vs. the Presence of Parallel Parking and the Driven Speed combined

Multiple linear mixed models were performed in which one by one the independent individual variables of capability, task demand and speed estimations (as presented in Section 3.7) were added. All the capability variables did not result in significant influences which means that they all do not affect the ratings of the level of overview at crossings and intersections (see Tables D.42 up to D.48). For the type of parking, the results of the linear mixed model were only significant because of the 'no parking' category (see Table D.36). There was no significant difference in mean rating of overview at crossings and intersections for continuous parking (mean=6.00, see Table D.37) compared to interrupted parking (mean=6.59). The type of direction separation was also found to be of no influence on this type of overview (see Table D.34).

Finally, the estimations of the speed limit and the speed of the vehicle were tested on their influence on the level of overview at crossings and intersections with linear mixed models. The combination of the presence of parallel parking, the actual driven speed and the estimated driven speed resulted in the first two variables being significant and the estimated driven speed not (p-value=0.143, see Table D.49). It was also tested what would happen to the significance if the actual driven speed was removed from this LMM. This showed that the estimated driven speed has a significant influence on this type of overview (p-value<0.001, see Table D.50). The combination of parallel parking, actual driven speed and the estimated speed limit resulted into an almost significant influence of the estimated speed limit (p-value=0.072, see Table D.51). Removing the actual driven speed from this model made the estimated driven speed even more insignificant (p-value=0.255, see Table D.51).

### 4.2.3. Overview Open Answers

Not only did the respondents have to rate the level of overview at the whole situation on the road and at crossings and intersections, but they also had to answer the open question 'Which parts of the road design had an impact on the level of overview for you?'. Of all the 252 videos (of which 168 included roads with parallel parked vehicles), 126 times a respondent answered that the presence of the parallel parked vehicles had an impact on his/her level of overview. This is by far the most mentioned aspect of the road design. The presence of (pedestrian) crossings on the road was the second most frequently mentioned impact on the overview with a frequency of 46 times. Other parts of the road design which were regularly answered were the absence of sight blockages, the separated cycling paths, the wide direction separation for roads with grass/vegetation as direction separation and the width of the road. How often each answer was mentioned is graphically shown in Figure 4.16.

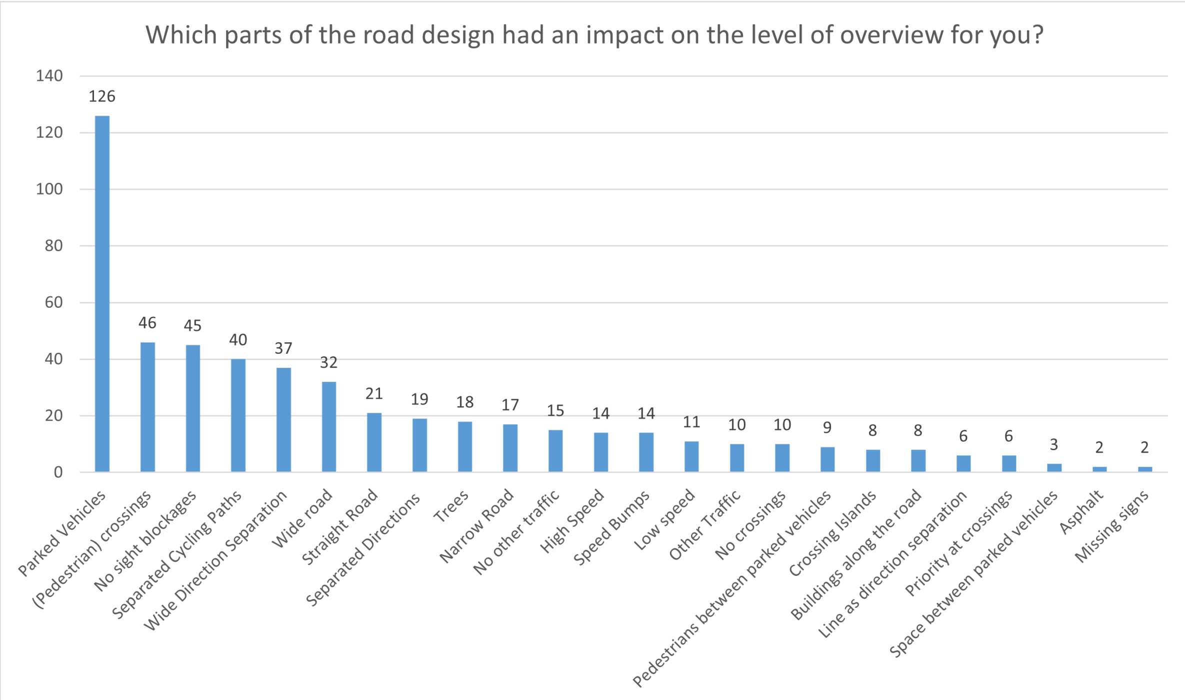


Figure 4.16: Bar chart of how often certain parts of the road design were mentioned as impact on the level of overview

## 4.3. Collision Avoidance Estimation

The second parameter to indicate a change in the situational workload is the collision avoidance estimation. The collision avoidance estimation consists of multiple aspects. The respondents had to estimate their ability to stand brake and stand still in time (Subsection 4.3.2), they had to rate the room to swerve and the room to the parked vehicles (Subsection 4.3.3). Moreover, a part of the collision avoidance estimation is based on the overview at crossings and intersections: Some respondents did not detect the presence of a crossing or intersection at all. This is further elaborated in Subsection 4.3.1.

### 4.3.1. Missed Crossings and Intersections

As already described in Subsection 4.2.2, the respondent had to answer the question: "Did you feel like you had a clear overview at intersections, exits and/or crossing points, on a scale from 1 to 10 in which 1 is 'absolutely no overview' and 10 is 'everything is super clear'?". From the 252 answers, fifteen times a respondent failed to detect the crossing or intersection. Of these fifteen times, thirteen were in videos with parallel parking and two without parallel parking or when it is disaggregated into the speed; eight videos were captured while driving 50 km/h and seven at a speed of 30 km/h. The streets that were in the videos with missed crossings or intersections were the Rode Kruislaan (2 times), the Jaffalaan (4 times), the Oostmeerlaan with parking (3 times), the Laan van Oudpoelgeest (4 times) and the Oostmeerlaan without parking (2 times). Both the Rode Kruislaan and the Jaffalaan have continuous parking, while the Oostmeerlaan and the Laan van Oudpoelgeest have interrupted parking. The distribution between continuous and interrupted parking is thus almost equal. No other patterns were found between failing to detect a crossing or intersection and other independent variables such as gender, age and driving frequency.

### 4.3.2. Reaction Time to Standstill

Section 2.1.3 of the Literature Review described that the stop-sight distance consists of three parts: detecting the hazard, the reaction time and the braking distance to standing still. The respondents had to indicate whether they thought that they would be able to react and stand still in time to prevent a collision. It was for the respondents' own imagination what kind of collision it was. They could answer this question with 'yes' or 'no'. From all the 252 videos, 171 times a respondent answered that s/he thought that s/he could stop and stand still in time. 78 times (which is equal to 31%), the respondent thought that s/he could not prevent a collision by braking in time. Figure 4.17 shows how these answers are subdivided by speed and the presence of parallel parking. 51% of the respondents thought that they were not able to stand still in time in videos with parking and a speed of 50 km/h. This percentage is slightly lower, 36%, when the parallel parked vehicles are removed from the videos. Lowering the speed from 50 km/h to 30 km/h in videos with parallel parking resulted in 23% of the respondents thinking that they would not be able to stand still in time. Almost all the respondents thought that they could anticipate and brake in time for videos without parking and a speed of 30 km/h. This shows that the effect of speed reduction from 50 km/h to 30 km/h is greater than removing the parallel parking facilities from the road, however, they both have a big influence on the estimation to brake and stand still in time.

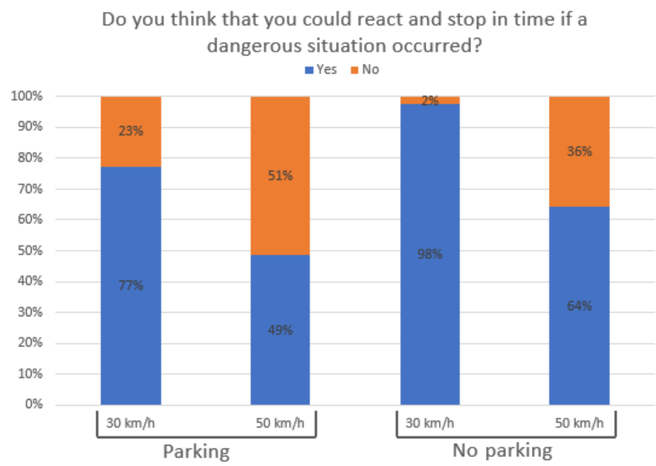


Figure 4.17: The distribution of the answers about whether the respondents thought they could react and stop in time subdivided by parking and speed

### 4.3.3. Room to Swerve

The respondents indicated that they thought that they were unable to react and stand still in time to prevent a collision from happening After one-third of the VR videos. A last resort to avoid a collision could be to swerve around the hazard. However, the road design does not always allow such movement. After each video, the respondents were asked whether they could rate the room to swerve on a scale from 1 to 10. One was equal to 'absolutely no space' and ten to 'lots of space'.

The answers to this question regarding the room to swerve were divided into with or without parallel parking, which is graphically shown with boxplots in Figure 4.18. These ratings are much lower for streets with parallel parking compared to those without parallel parking. This influence of the presence of parallel parking was found to be significant by a linear mixed model (p-value<0.001, see Table D.53). The respondents rated the room to swerve on average 3.98 for roads with parking and 5.18 for roads without parking (See Table

D.54). This means that the respondents thought that they had more room to swerve when the road did not have parallel parking. The influence of the speed of the vehicle has also been found to be significant with LMM (p-value=0.028, see Table D.56): the speed of 30 km/h resulted on average a higher feeling of having space to swerve compared to the 50 km/h (mean=4.86 for 30 km/h, mean=4.20 for 50 km/h, see Table D.57). This is graphically shown with boxplots in Figure 4.19.

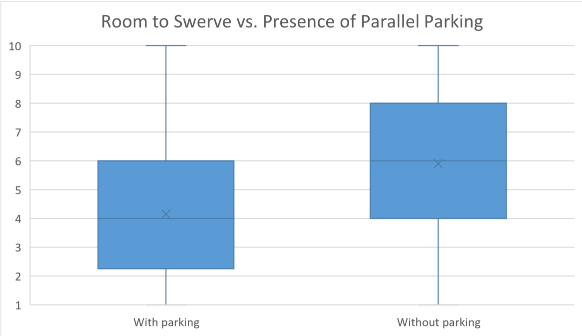


Figure 4.18: Boxplot of the Room to Swerve vs. the Presence of Parking

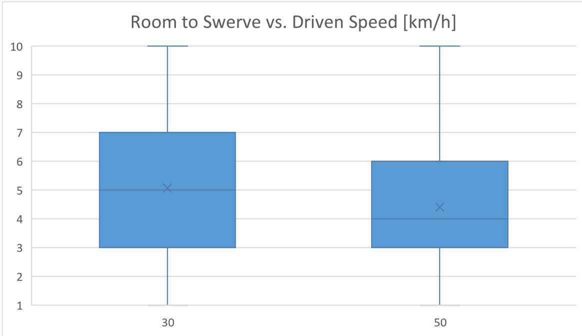


Figure 4.19: Boxplot of the Room to Swerve vs. the Driven Speed

The combined effect of presence of parallel parking and the speed of the vehicle on the room to swerve was also tested with a linear mixed model. Both these variables had a significant effect (p-value<0.001 for parking, p-value=0.02 for speed, see Table D.59), however, the variables did not interact with each other (p-value=0.658, see Table D.60). The influence of the presence of parallel parking on the room to swerve is greater than the influence of the driven speed on the room to swerve (the predictor coefficients are 1.811 and 0.599 respectively). The combination of speed and parking are graphically shown in Figure 4.20.

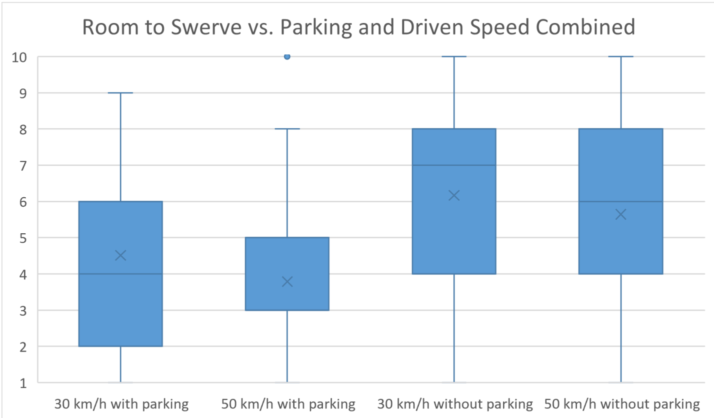


Figure 4.20: Boxplot of the Room to Swerve vs. the Presence of Parallel Parking and the Driven Speed combined

Additionally, it was tested whether the independent variables of task demand, capability and speed estimations significantly influenced the room to swerve by adding the variables one by one to the linear mixed model. Only the variable type of parking had significant results (see Table D.62). Continuous parking resulted in the least space to swerve according to the respondents (mean=3.64) compared to interrupted parking (mean=4.46) and no parking (mean=5.85). A remarkable result was that the type of direction separation did not influence the room to swerve. The average ratings for the centre line (mean=4.68, see Table D.66) and grass/vegetation (mean=4.7) were almost identical. Only the crossable stones resulted in slightly higher ratings and thus more room (mean=5.42). However, this increment was not significant.

### 4.3.4. Room to Parked Vehicles

The last variable of the collision avoidance estimation is the room to the parked vehicles: the respondents had to indicate how much space they had towards the parked vehicles along the road by giving it a rating between 1 and 10. One equalled 'absolutely no space' and ten equalled 'a lot of space'. Since this question was only posed after videos that showed a road with parking, the independent variable presence of parking was left out of the LMM.

First of all, the influence of the speed of the vehicle to the room to parked vehicles was analysed. Figure 4.21 shows the distribution of the rating by the speed of the vehicle. In this figure, it could be seen that the means do not deviate much from each other by the speed of the vehicle. The average rating of the room to the parked vehicles was 4.34 for videos that showed a speed of 30 km/h and 4.07 for videos with a speed of 50 km/h (see Table D.80). This difference is not significant (p-value=0.299, see Table D.79). The speed of the vehicle is thus left out in the further performed linear mixed models.

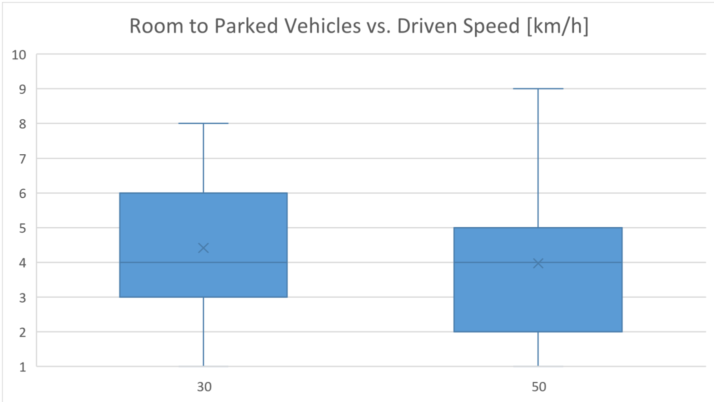


Figure 4.21: Boxplot of the Room to Parked Vehicles vs. the Driven Speed

From all the other independent predictor variables, the type of parking and the gender are found to have a significant influence on how respondents rated the room to the parked vehicles (p-value<0.001, see Table D.82 and p-value=0.046, see Table D.89, respectively). The respondents indicated that they had more space between the driving vehicle and the parked vehicles when the parking was interrupted (mean=4.64, see Table D.83) than when the parking spaces were interrupted (mean=3.79). Male respondents rated their room to the parked vehicles on average as bigger (mean=4.51, see Table D.90) than female respondents (mean=3.81).

## 4.4. Difficulty of the Driving Task

The last parameter that was chosen to analyse the effects of the road situation on the situational workload was the difficulty of the driving task. This parameter is subdivided into the self-reported level of attention required to perform the driving task and the self-reported workload. The respondents had to give their perceived workload a mark between 1 and 10 (1 equalled a low workload and 10 a high workload) and they had to rate the number of things that they had to pay attention to at the same time while driving at the shown road with that speed between 1 and 10 (1 here was expressed as 'I don't have to pay attention to anything' and 10 as 'I have to pay attention to too many things at once'). Note that a lower level of attention required and self-reported workload indicates that the driving task is easier. Hence, this is the other way around compared to the level of overview and room to swerve, in which a low rating was unfavourable.

First of all, the influence of the presence of parallel parking on the level of attention required and the self-reported workload was analysed by linear mixed models. The presence of parallel parking had on both variables a significant influence (attention: p-value<0.001, see Table D.99, workload: p<0.001, see Table D.125). The presence of parallel parking resulted in an increment in the level of attention required from 3.80 to 5.69 (see Table D.100) and an increment in the self-reported workload from 3.04 to 4.98 (see Table D.126). The change in outcomes by the presence of parallel parking are shown in Figure 4.22 by boxplots.

Secondly, the influence of the speed of the vehicle in the videos was tested on these two variables by LMM. This also resulted in significant outcomes (both p-values were smaller than 0.001, see Tables D.102 and D.102 respectively). The higher the speed, the more attention was required for the driving task and the higher the workload was reported. The mean of the level of attention required was increased from 4.58 to 5.42 (see Table D.103) and the mean of the self-reported workload was increased from 3.72 to 4.67 (see Table D.129). This is shown in Figure 4.23. From Figure 4.22 and 4.23, it could also be seen that ratings of the variables level of attention required and the self-reported workload follow the same pattern, however, the self-reported workload is on average rated lower.

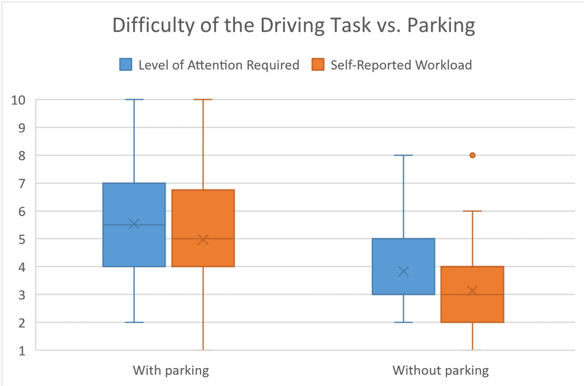


Figure 4.22: Boxplot of the Difficulty of the Driving Task vs. the Presence of Parking

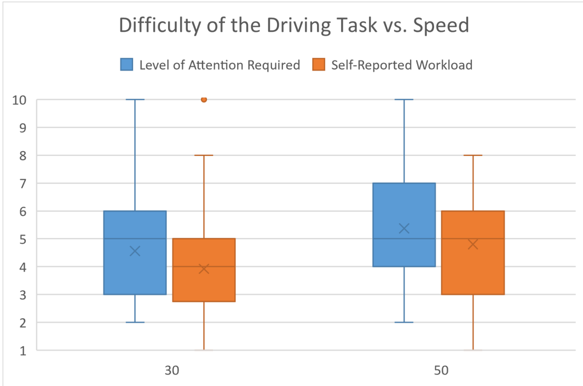


Figure 4.23: Boxplot of the Difficulty of the Driving Task vs. the Driven Speed

Figure 4.24 presents boxplots of the ratings for the self-reported level of attention required and the self-reported workload, categorized by the actual driving speed and parking. The figure clearly shows that driving at 30 km/h without parking is perceived as the easiest scenario by the respondents, whereas the combination of parking and driving at 50 km/h is considered the most challenging. The combination of parking and 30 km/h and the combination no parking and 50 km/h received on average almost the same ratings, however, the latter was found to be slightly easier. Both these predictors significantly impact the two dependent variables when included simultaneously in the linear mixed models, with p-values less than 0.001 (see Tables D.105 and D.131 for details on the level of attention required and self-reported workload, respectively). The predictor variables parking and speed do not have a significant interaction.

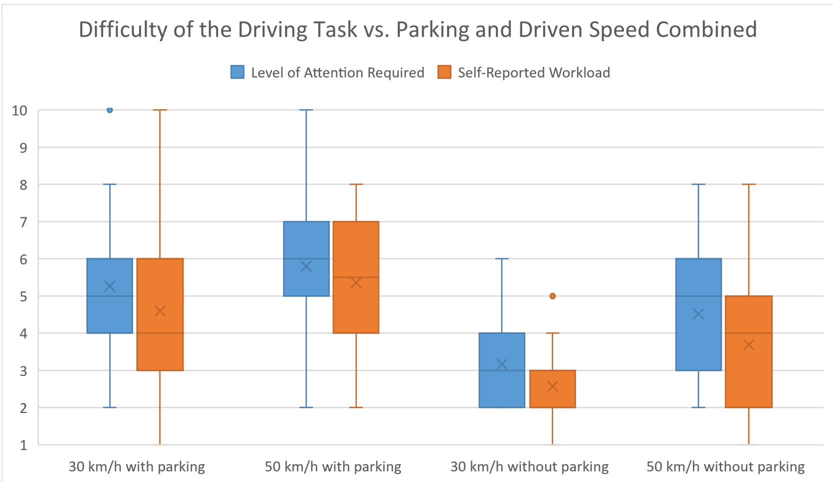


Figure 4.24: Boxplot of the Task Difficulty vs. the Presence of Parallel Parking and the Driven Speed combined

All the other predictor variables did not result in significant effects on the level of attention required. However, it is worth saying that the effect of the age of the respondents was almost significant (p-value=0.082, see table D.114) and the driving frequency 'monthly' and 'once every two weeks' also had significant outcomes (see Table D.117). Moreover, adding the estimated driven speed to a linear mixed model with the actual driven speed and the presence of parking resulted in the estimated speed being significant and the actual speed not anymore (see Table D.121). The latter also applies to the self-reported workload (see Table D.147). The other predictor variables did not have a statistically significant impact on the self-reported workload.

## 4.5. Feeling of Safety

The last variable that the respondents had to rate on a scale between 1 and 10 was their feeling of safety. Not feeling safe at all was rated by 1 and feeling perfectly safe on the road with the shown speed had to be rewarded with a 10. The respondents rated their feeling of safety on average 7.05. Of all the 252 videos, 52 times a respondent rated his/her feeling of safety lower than 6. A mark below six could be seen as insufficient according to the Dutch school system. Of those 52 insufficient marks, 43 were videos with parallel parked cars along the road and 9 of roads without parallel parked vehicles. If the 52 times are divided into videos with a speed of 30 km/h and videos with 50 km/h, the number of ratings below six is 14 and 38 respectively. If those two variables are combined, the number of insufficient marks is 31 for videos with parking and 50 km/h and 12 for videos with parking and 30 km/h. The influences of parking, speed and the combination of parking and speed on the feeling of safety are graphically shown in Figures 4.25, 4.26 and 4.27 respectively. Especially in this last figure, the negative impact of the combination of parking and a speed of 50 km/h on the feeling of safety is greatly visible.

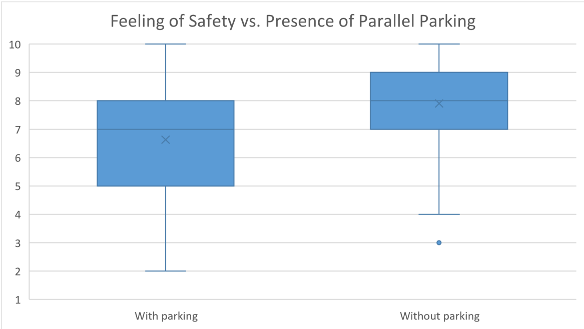


Figure 4.25: Boxplot of the Difficulty of the Feeling of Safety vs. the Presence of Parking

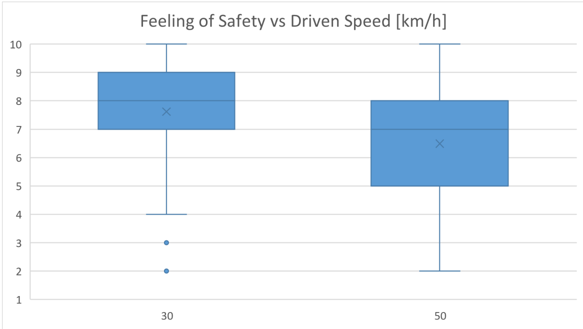


Figure 4.26: Boxplot of the Feeling of Safety vs. the Driven Speed

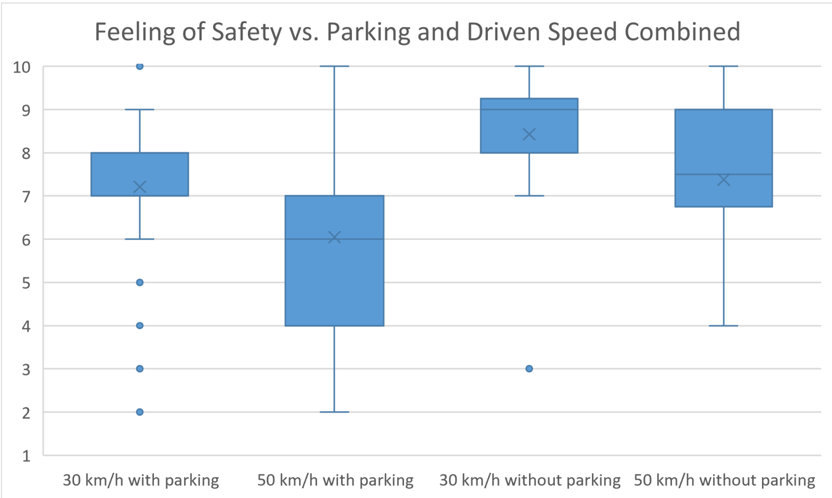


Figure 4.27: Boxplot of the Feeling of Safety vs. the Presence of Parallel Parking and the Driven Speed combined

Several linear mixed models were performed to analyse whether the task demand, capability and speed estimation predictors, given in Section 3.7, have a significant impact on the feeling of safety. First of all, the presence of parallel parking was found to be significant (p-value<0.001, see Table D.151): parking along the road reduced the average feeling of safety from 7.88 to 6.60 (see Table D.152). The feeling of safety is also significantly affected by the speed of the vehicle (p-value<0.001, see Table D.154): the speed reduction resulted in a increment in the feeling of safety from 6.62 to 7.8 (see Table D.155). Adding both these predictors at the same time to the linear mixed model, the values remain significant (see Table D.157). The mean feeling of safety was 6.07, 7.34, 7.33 and 8.47 for the following four combinations respectively: 50 km/h&parking, 50km/h&no parking, 30 km/h&parking and 30km/h&no parking. The difference between 50km/h&no parking and 30 km/h&parking is almost negligibly small (see Table D.159). The driven speed and the presence of parallel parking do not have a significant interaction (see Table D.158).

From all the other predictor variables, the gender of the respondent and the estimated driven speed were found to be significant. women generally felt less safe than men (6.98 compared to 7.48, p-value=0.048, see

Tables D.167 and D.168). Even though the results may not be significant, Table D.171 shows a trend indicating that the feeling of safety tends to increase with more frequent driving. A linear mixed model with both the estimated driven speed and the actual driven speed combined with the presence of parallel parking gave significant results for the estimated speed and parking, the actual driven speed became insignificant (see Table D.175).

Finally, the parameters of the situational workload (overview on the road, overview at crossings and intersections, room to swerve, level of attention required and the self-reported workload) were added one by one to linear mixed models combined with the presence of parallel parking and the estimated driven speed to analyse whether these variables had a significant influence on the feeling of safety. All these parameters had a significant influence on the feeling of safety (see Tables D.179 to D.183). However, for both types of overview, the presence of parallel parking changed to being insignificant. Adding all these situational workload parameters to one LMM gave that they all were significant except the level of attention required (see Table D.184). The following equation (Equation 4.1) for the feeling of safety could be drawn from this LMM:

$$\begin{aligned} FeelingOfSafety = 6.76 &+ (-0.04) * EstimatedDrivenSpeed[km/h] \\ &+ (-0.232) * SelfReportedWorkload + 0.303 * OverviewCrossings + \\ &+ 0.195 * RoomToSwerve \end{aligned} \tag{4.1}$$

## 4.6. Credibility of the Speed

After each VR video, the respondent was asked multiple questions regarding the speed. They had to estimate the speed of the vehicle and the speed limit on the road. Moreover, it was asked whether they thought that the speed of the vehicle was suitable for the road design and if they would also choose this speed if they were the driver. Subsection 4.6.1 focuses on the estimated speed of the vehicle and what the drivers thought about this speed in combination with the road design. Subsection 4.6.2 elaborates on the estimated speed limit on the road in each video.

### 4.6.1. Estimated Driven Speed

First of all, the respondents had to estimate the speed of the vehicle which was either 30 km/h or 50 km/h. If all the respondents had estimated the speed shown in the video correctly, the average would have been 40 km/h. However, the total mean of the estimated speeds is 43.8 km/h. From all the 126 videos with a speed of 30 km/h, 52 times the respondent had estimated the speed correctly: 41% of the videos that showed a speed of 30 km/h have been estimated as a speed of 30 km/h. In the other 74 videos of 30 km/h, the speed was overestimated 69 times and underestimated 5 times. For the videos with a speed of 50 km/h, the distribution between correct and wrong estimates is fairly similar: 56 respondents (44%) estimated the speed correctly and 70 respondents (56%) were wrong. However, if there is zoomed in the wrong estimations, the distribution differs from the wrong estimations of videos with a speed of 30 km/h. 24% of the respondents underestimated the speed while 32% overestimated the speed. Figure 4.28 shows the percentages of correct estimations, overestimations and underestimations subdivided by the speed and presence of parking. From this figure, it could be seen that the presence of parallel parking increased the precision of the estimates for 30 km/h videos while it decreased the precision of the estimates for 50 km/h videos.

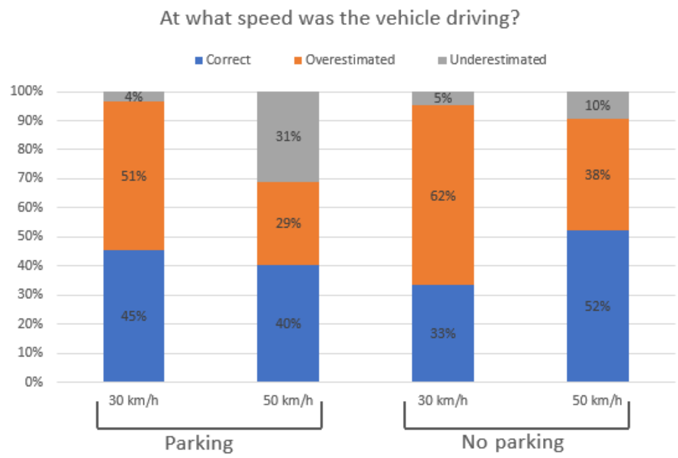


Figure 4.28: Distribution of how well the respondents estimated the speed of the vehicle

Figure 4.29 shows two boxplots of the estimated speed divided over the driven speed. As one can see in these boxplots, the respondents were more accurate in estimating the speed of 50 km/h than 30 km/h. the difference between the mean estimated speed and the actual speed in the videos was smaller for 50 km/h (mean=50.3 km/h) than for 30 km/h (mean=37.2 km/h).

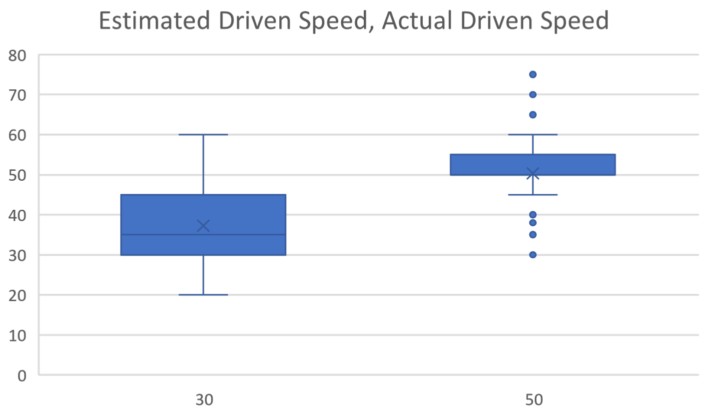


Figure 4.29: Boxplots of the Estimated Driven Speed vs the Actual Driven Speed

The respondents also had to indicate whether they thought that the speed that they saw was suitable for the road. These answers were again split up into the presence of parking and the actual speed of the vehicle. These distributions are graphically shown in Figure 4.30. More than half of the respondents indicated that the speed was suitable for the road in videos with parking and a speed of 30 km/h and in videos without parking combined with a speed of 50 km/h. 57% of the respondents answered that a speed of 50 km/h is too fast for roads with parallel parked vehicles along it although 50 km/h is the legally permitted speed on the road. The speed of 30 km/h is said to be too slow on roads without parking.

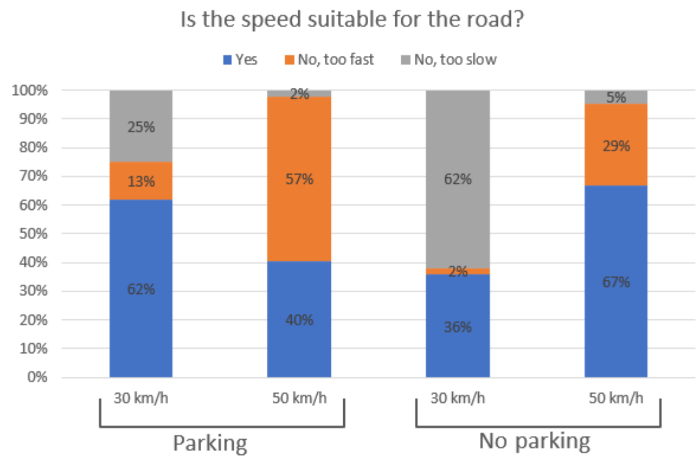


Figure 4.30: Distribution of the suitability of the speed to the presence of parking and the speed in the videos

Whether the respondents thought that the speed was suitable, too fast or too slow for the road, does not automatically mean that they would adjust the speed. The respondents had to indicate whether they would choose the same speed as shown in the video or that they would change the speed. They could choose between a bit slower, much slower, a bit faster and much faster. How this choice was related to the indicated suitability of the speed to the road design and the speed in the video is shown in Figures 4.31 and 4.32 for 30 km/h and 50 km/h respectively. It is remarkable that a quarter of the respondents who said that 30 km/h is a suitable speed for the road, would still choose a faster speed themselves.

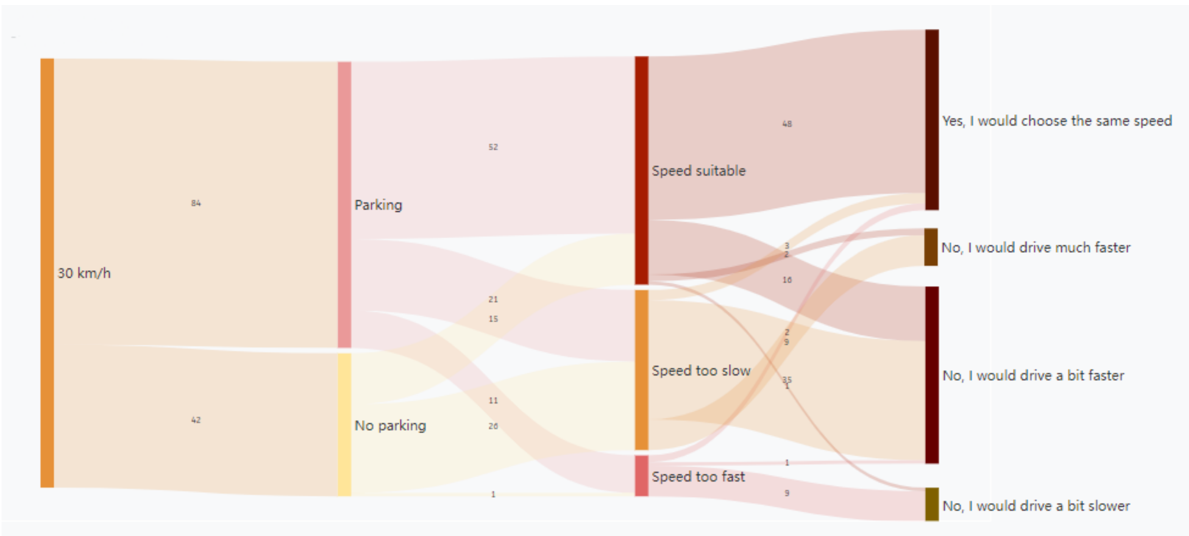


Figure 4.31: Sankey Diagram for the Suitability of the Speed and the Chosen Speed by the Respondents for the Videos with a Speed of 30 km/h

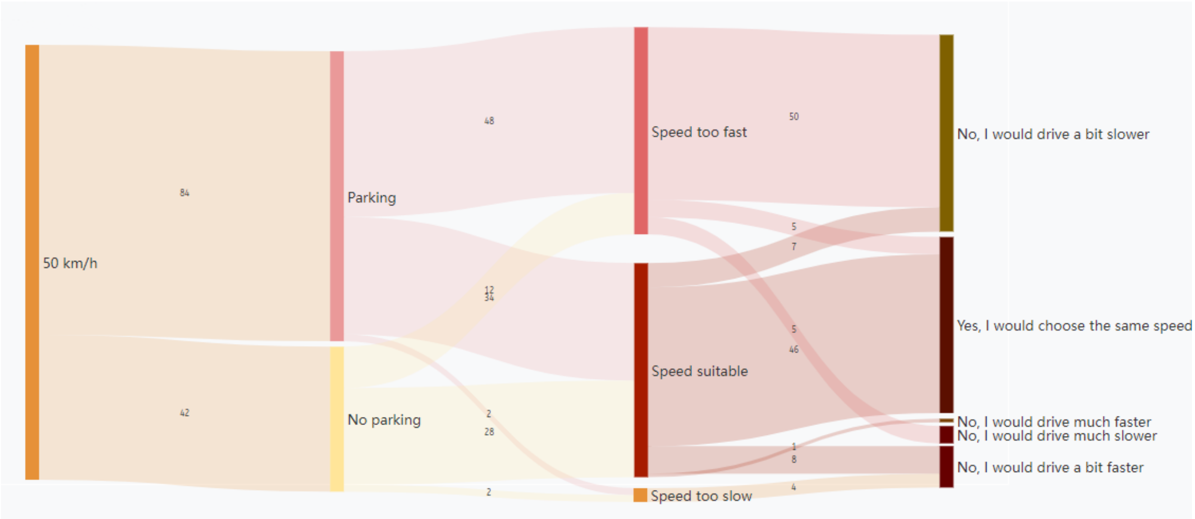


Figure 4.32: Sankey Diagram for the Suitability of the Speed and the Chosen Speed by the Respondents for the Videos with a Speed of 50 km/h

### 4.6.2. Estimated Speed Limit

The last question regarding the credibility of the speed was to estimate the speed limit on the road. On average, the respondents estimated the speed limit to be 46.8 km/h. The average is thus slightly lower than the actual speed limit of the road. Especially the presence of parallel parked vehicles along the road caused a lot of confusion about the speed limit. This is shown in Figure 4.33. The respondents were pretty accurate for indicating the speed limit on roads without parallel parked vehicles. There was more division for the roads with parking. This relationship was also confirmed by a chi-square test (p-value: 1.63E-8<0.05). The respondents underestimated the speed limit more frequently on roads with parallel parked vehicles along it.

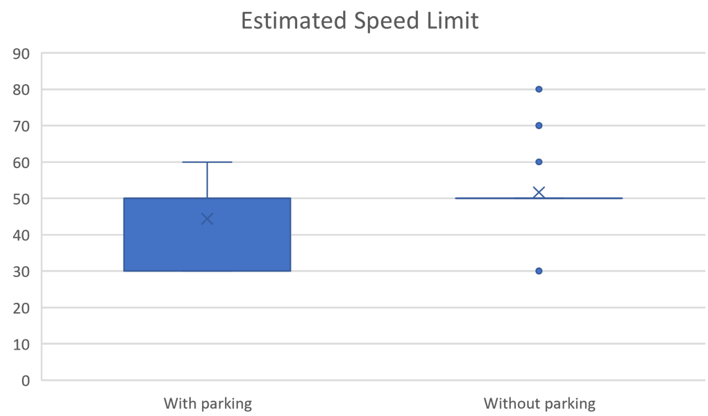


Figure 4.33: Boxplot for the Estimated Speed Limit divided to the Presence of Parking

## 4.7. Virtual Reality Study

Finally, after all the respondents had seen the four VR videos, they had to answer one last question in which they had to rate their level of tiredness on a scale from one to ten (one being not tired and ten being very tired). The same question was asked at the beginning of the experiment. The purpose of this question was to indicate whether the experiment did not take too much time. The respondents could lose their interest and focus on the questions and rush their answers otherwise. In Figure 4.6, the distribution of the questions regarding the level of tiredness at the start of the experiment is shown. The respondents rated their tiredness on average 3.9 before the start. After watching the four videos and answering all the related questions, the respondents rated their tiredness on average with 4.1. There has been a slight increase. In Figure 4.34, the distributions of the level of tiredness before and after the experiment are plotted. It can be seen there, that the distribution is a little bit more flattened after the experiment in comparison to before the experiment.

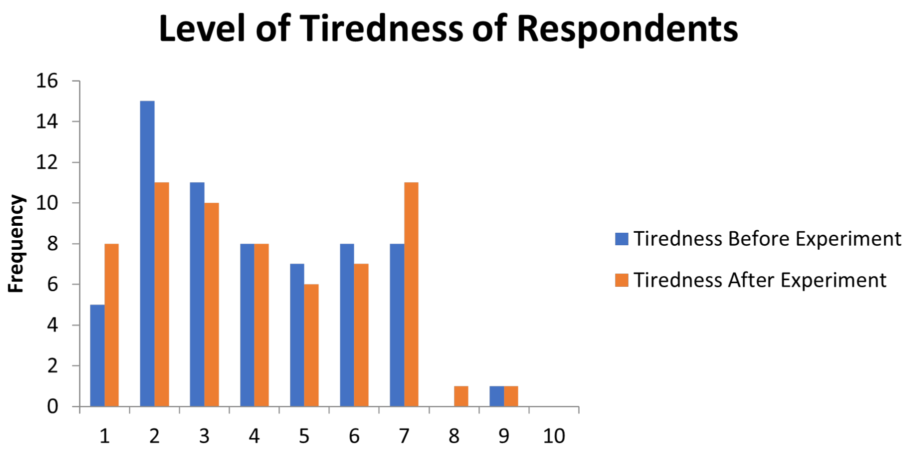


Figure 4.34: Distribution of the level of tiredness after the experiment

# 5

# Discussion

In this chapter, the main findings are discussed. The chapter starts with a recap of the problem statement and why it was important that this research was executed in Section 5.1. Section 5.2 provides a discussion of the results presented in Chapter 4 and it elaborates on how the results can be interpreted. Section 5.3 gives a deeper insight into the strengths and limitations of the virtual reality methodology used in this research. Finally, section 5.4 and 5.5 give an overview of the restrictions in this research and recommendations for further research respectively.

## 5.1. Problem and Research Gap

The aim of this study was to investigate the influence of parallel parking and a speed limit reduction at distribution roads on the situational workload of drivers. This knowledge is important to give recommendations about the new design requirements on GOW30 roads and the tightened design requirements on GOW50 roads. The consideration between GOW30 and GOW50 is an actual theme within the road design principles in the Netherlands. The new standard speed limit in the built-up area has to be 30 km/h and, once it could be realised safely, 50 km/h can be an exception according to a recently accepted motion in the Chamber of Representatives. Some municipalities have already started lowering the speed limits on distributor roads from 50 km/h to 30 km/h in the built-up area with road safety in mind while other parties, such as public transport companies and emergency services, give counter-arguments to these measures with the increasing travel times and the more unreliable travel times as the greatest motive. Moreover, the speed limit should be credible to the road design. The roads now have design features that correspond to a speed limit of 50 km/h and that could (subconsciously) trigger higher driving speeds for road users.

In the recently tightened design requirements for GOW50 roads, it is permitted to realize parallel parking facilities combined with a speed of 50 km/h. However, the literature review suggests that this design requirement may not be entirely logical, as parallel parking introduces several complications. For instance, vehicles parked along the road can obstruct drivers' line of sight, potentially leading to accidents caused by suddenly opened car doors or pedestrians manoeuvring around the parked vehicles. Additionally, maintaining a speed of 50 km/h increases these risks by increasing the stopping sight distance, thereby intensifying the severity of any potential collisions. With this knowledge, it might be favourable to either remove the parking bays or lower the speed from 50 km/h to 30 km/h to make it a GOW30 instead of a GOW50. However, it is uncertain to what extent these adjustments in the road design (by removing the parked vehicles along the road or by lowering the speed limit) increase road safety.

In this research, a surrogate measure, expressed as situational workload, was chosen to examine the potential influence of parallel parking and a speed limit reduction on road safety. Situational workload is an umbrella term derived from the mental workload. Mental workload is the dynamic relationship between capability and task demand. If the task demand fits within the capability, the driver has control over his/her actions and has great situational awareness. Once the task demand exceeds the capability, situational awareness could be reduced, and the risk of making errors increases. The exact level of mental workload is difficult to measure, however, different methods have been developed to estimate whether one has some spare capability to process and react to unexpected hazards and to perform the right driving tasks. These methods are primary task performance measures, secondary task performance measures, physiological measures and subjective reflections.

Driving a vehicle was simulated in virtual reality making the task demand and the left capability not completely the same as in reality. Due to this difference, it is uncertain what the exact level of mental workload is in reality instead of virtual reality, to what extent the combination of parallel parking and a speed of 50 km/h increases the workload and whether the mental workload becomes so high due to this combination that the driving performance and the situational awareness are endangered. Therefore, a new term was developed: situational workload. The situational workload captures the influence of a change in task demand on the self-estimated driving performance, self-reported workload and self-reported situational awareness. These three parameters were based on the methodologies to measure mental workload. The task demand was changed by the presence of parallel parking and the speed of the vehicle. The aim of this report was not to develop a model to define the situational workload based on the three factors. This report focused on finding changes in the three factors. A change in these three factors would indicate that the situational workload is affected by the presence of parallel parking and the speed of the vehicle and thus that the mental workload is changed.

Next to situational workload, the feeling of safety of the drivers and the credibility of the speed limit are taken into account to give a well-considered recommendation regarding the speed limit and parking on distributor roads.

## 5.2. Interpretation of the Results

This section discusses the findings from the three different focus points in this research: the situational workload, the feeling of safety and the credibility of the speed limit.

### 5.2.1. Situational Workload

The situational workload was assessed based on established methodologies for evaluating mental workload. This was done by asking the respondents questions about self-reported situational awareness, self-estimated driving performance and self-reported workload. The self-reported situational awareness was evaluated through questions concerning the drivers' perspective of the road. The self-reported driving performance was analysed by the collision avoidance estimation consisting of the stop-sight distance and the possibility of swerving. Finally, the self-reported workload was supplemented with an evaluation of the estimated level of attention required for the driving task. As earlier described, this report did not aim to provide a model that combines these variables to estimate the level of situational workload.

Firstly, the level of overview was analysed. The overview was split up into two parts: the overview on the road and the overview at crossings and intersections. Both these two types of overviews were decreased by the presence of parallel parking. The average ratings given by the respondents to the overview on the road and the overview at crossings and intersections were decreased by two points on a scale from one to ten by the presence of parking. The speed limit reduction increased both types of overview by one point. The level of overview was never on average below 5.5 and thus it could be argued that the overview is never insufficient according to the Dutch grading standards. (In the Netherlands, marks below 5.5 are seen as insufficient and 5.5 or higher as sufficient.) A scale from one to ten was purposely chosen to make sure that the respondents were familiar with the scale and when they gave a mark that could be seen as insufficient. 29 times of the 252 videos a respondent indicated that his/her total level of overview was five or lower of which 20 times were with the combination of parking and a speed of 50 km/h.

From the linear mixed model with both parking and driven speed as predictors, the combination of "with parking" and 50 km/h resulted in the lowest level of overview: 6.08 for the total overview and 5.98 for the overview at crossings and intersections. Although these marks are still sufficient, it is arguable whether it is favourable to settle for the bare minimum overview. Especially, when these marks are compared to the marks for videos with the same speed without parking (8.44 for the total overview and 7.93 for the overview at crossings and intersections) or to videos with parking and a lowered speed (7.12 for the total overview and 6.65 for the overview at crossings and intersections). These adjustments make a significant difference in the level of overview for the respondents. The respondents also had to indicate what other road design characteristics obstructed or contributed to their overview on the road and at crossings and intersections. The presence of parallel parking was by far the most frequently mentioned aspect, however, the respondents also regularly mentioned the width of the road and the type of direction separation as important factors for the level of overview. The width of the road was further neglected in this research. The type of direction separation was not found to be of significant influence on the level of overview.

The difficulty of the driving task was split up into the self-reported workload and the level of attention required. There was no model developed to determine the exact difficulty of the driving task based on these parameters. The respondents indicated that they needed to pay more attention to the driving task and that a higher level of focus was required on roads with parking and when the speed was 50 km/h in comparison to the situations without parking and with the speed of 30 km/h. The self-reported workload is also significantly affected by the speed of the vehicle and the presence of parking. According to the found literature, people are very accurate in estimating their own workload. However, the workload in this experiment is not the same as when they had to drive themselves in reality. A great part of the task demand is taken away since the respondent could not control the vehicle. Nevertheless, getting familiar with VR and having to answer all the questions can increase the task demand.

The level of attention required could also be affected by the usage of VR compared to the real level of attention required. In the first video, the respondent did not know what to focus on regarding the questions. They were told to watch the videos as if they were driving themselves. However, it was noticeable that the drivers were trying to anticipate the coming questions after the first video, for example, some of them indicated that they were trying to look for the speedometer on the dashboard or that they were focusing on finding signs with the speed limit. The respondents also had to memorize what they were seeing in order to answer the questions about what is not necessary while driving in reality. This made the level of attention required different from the attention required while driving.

The final variable of the situational workload was the estimation of collision avoidance. This involved assessing the ability to react and stop in time to prevent a collision, as well as evaluating the space available for swerving and the distance to parked vehicles. Slightly more than half of the respondents indicated that they were not able to react and stand still in time in videos showing the speed of 50 km/h and roads with parking. It was not researched whether these predictions would also result in actual collisions when a hazard would occur. This was left out for further research. However, that half of the respondents thought that they could not prevent a collision from happening is very concerning. The focus of the respondent was more tested in situations with parking and a high speed and the driver had to be more alert for potential hazards. It was visible in the results that a decrement in speed resulted in more respondents indicating that they would be able to react and stand still in time on roads with parallel parking. The best statistics were for the combination of a speed of 30 km/h and no parking. 50 km/h and no parking scored worse than 30 km/h and parking but better than 50 km/h and parking. It was not specified to the respondents what the potential hazard was and this was left to their imagination. This could have affected the way that they answered the question.

Furthermore, the room to swerve was taken into account in this research since this could be a potential remedy to avoid a collision. The respondents indicated that there was more room to swerve when there were no parking bays along the road. The videos contained roads with almost all the parking spots occupied which can also influence the room to swerve. However, the risk of being unable to stop in time for potential hazards and thus the necessity of needing room to swerve is also smaller without parked vehicles along the road. The type of direction separation also influenced the spatial feeling on the road: respondents indicated that they had the most room to swerve when the road had crossable stones as direction separation. Roads with a center line scored almost identically to those with grass or vegetation in the middle. This could be because crossable stones slightly widen the road without encroaching into the opposite lane, whereas crossing a center line means driving into oncoming traffic, increasing the risk of collisions. The grass or vegetation, on the other hand, had a raised curb, making it more difficult to swerve. The actual width of the road was not taken into account.

The combination of parallel parking and a speed limit of 50 km/h caused a decrement in overview, an increment in the difficulty of the driving task and a negative change in the collision avoidance estimation. This all means that the situational workload is increased by parking combined with a high speed and that the situational awareness is negatively affected. The latter can cause negative effects on driving performance: the chance of missing a potential hazard and reacting to it on time and in the right way to prevent a collision from happening is increased. It does not automatically mean that the drivers are going to cause collisions or make errors. However, the drivers are more in control in situations with either a speed of 30 km/h or without parking (or a combination of those two factors). Referring to Figures 2.4 and 2.5, it is also important to say that it is still unknown where on the x-axis the task demand is with parking and 50 km/h and thus whether the task performance is already in the critical right part of these graphs. This research does not capture the level of spare capacity of the drivers. However, the insufficient ratings could already assume an overload in task demand.

Important to remember is that not the full task demand is captured in this research, the respondents did not have to control the vehicle, other distractions from driving (such as the radio or passengers) were left out of the experiment set-up and all the other characteristics of the road environment (such as the buildings, the width of the road, other traffic etc.) were ignored. Moreover, certain aspects of the respondents which were said to have an influence on the drivers' capability in the existing mental workload models were taken into account. Almost none of these aspects showed a significant relationship to the situational workload parameters. This could be because of variance reasons. The VR study may lack the sensitivity to detect subtle differences present in real-world driving. Additionally, the VR videos simplify the complex driving task, making it easier for all participants to perform regardless of their background, which can lead to similar performance levels across various capability parameters. Furthermore, for most participants, it was their first experience with virtual reality, whether for any purpose or specifically for research. The adaptation process to virtual reality varies among individuals, potentially leading to unrecognized differences in capability measures.

As a result, the measured situational workload is not completely comparable to the actual mental workload. This research gave a first insight into how the presence of parking and high speed has a negative influence on how the situational workload is affected. The actual relationship between the mental workload, speed and presence of parking is more complex than found in this experiment.

### 5.2.2. Feeling of Safety

The feeling of safety of the drivers is significantly lowered by the presence of parking and the speed of 50 km/h. Just like the overview on the road, the average feeling of safety is never an insufficient mark. However, if looked at the individually given ratings, 37% did not feel safe in the videos with parking and a speed of 50 km/h. This percentage is much lower for videos without parking and a speed of 50 km/h (17%) or for videos with parking and 30 km/h (14%). Both the speed and presence of parking lower the feeling of safety by 1.2 on a scale from 1 to 10 according to the linear mixed model. Noteworthy to mention is that the feeling of safety in this VR experiment could deviate from the feeling of safety in reality. The respondents were not able to control the vehicle which could cause a decrement in the feeling of safety. If one is in more control, s/he may feel more empowered and safer. This can boost the confidence and comfort within the virtual environment. Moreover, having control over the vehicle can give the feeling to respondents that can anticipate and react to potential hazards instead of just watching it and letting it happen. On the other hand, the respondents were not in actual danger. They were sitting on a chair in a building with VR glasses on their head. This could cause the real feeling of safety to be lower than the VR feeling of safety. The majority of the respondents indicated that the VR environment felt very realistic. If that is the case, the feeling of safety in the videos may be comparable to the feeling of safety in reality. It is recommended to do further research on the relationship between real safety and virtual safety in this experiment set-up. Finally, it is important to remember that the subjective safety measured in this research is not the same as the objective safety. It does not automatically mean that the number of accidents increases on a road once drivers feel unsafe. A feeling of unsafety may also make the drivers drive more cautiously and be more wary, which can have a positive influence on driving performance. Nevertheless, feeling unsafe can affect the drivers' comfort and it is unwanted that drivers feel that way. The feeling of safety was also found to be negatively influenced by the self-reported workload and the estimated driven speed and positively influenced by the overview at crossings and the room to swerve.

### 5.2.3. Credibility of the Speed

Finally, the credibility of the speed limit on roads with parallel parking was analysed. The respondents had to estimate the speed of the vehicle. The presence of parking caused an increment in the number of correct estimates of the speed for videos with 30 km/h and a decrement of correct estimates for the 50 km/h videos. However, the percentages of overestimates increased for both 50 km/h and 30 km/h in videos without parking compared to videos with parking. The absence of parallel parking created the illusion that the vehicle was driving faster than it really was. This is in contrast to the findings in the literature review. The literature stated that the presence of parallel parking should create the illusion of driving faster than the real speed (Wang et al., 2006). These differences from the literature could be caused by the methodology used. The videos shown through the VR glasses could distort the perception of the speed or the camera angles could be slightly different than what the respondents were used to from reality.

When looking at the actual estimations and not only to whether the speed was correct, over or underestimated, the estimations were on average more accurate and deviated less for videos of 50 km/h than for 30 km/h. Two-thirds of the respondents indicated that a speed of 30 km/h was suitable for a road with parking and that they would choose this speed themselves. More than half of the respondents said that the speed of 50 km/h was too fast for driving along the parked vehicles and that they would drive slower. The actual driving speed was not told to the respondents before they had to answer whether they thought that the speed was suitable for the road and whether they would choose this speed as well. This might have influenced their answers. Some thought that the speed was way faster than it really was. Some of the respondents also complained about the fact that the speedometer was hidden in the videos.

Another remarkable finding was that the estimations of the speed limit on roads without parking were for the majority of the respondents correct, while the roads with parking caused a lot of confusion regarding the speed limit. The confusion about the speed limit could also be caused due to the relatively short videos and the respondents being 'dropped' on a road. They had a short time to adapt to the new situation and to place the road into the road network. This might have made it difficult for the respondents to determine whether the road was a distributor road or an access road. However, according to the design characteristics, this should also be recognizable by the road design.

## 5.3. VR as Research Methodology

Virtual reality is a relatively new type of research methodology and its application can vary in many different work fields. How virtual reality can be used in scientific research is also very diverse. In some virtual reality studies, the respondents have more control than in other studies and the sense of realism could also vary. In this research, virtual reality was used in the following way. 250-degree videos were captured from the driver's point of view on nine different roads while the vehicle was driving at a speed of either 30 km/h or 50 km/h. These videos were edited and shown to the participants using VR glasses. In this method, the drivers had no influence on the trajectory or the speed of the vehicle. The respondents could only watch and look around them due to the multiple-degree video. Before this methodology is recommended for other research purposes, a few considerations have to be taken in mind.

First of all, this research method was a useful tool to gain an initial understanding that situational workload and feeling of safety depend on the presence of parallel parking and the speed driven. However, the relationship between these variables might be more complex than was found in this research. Respondents could not interact with the vehicle, so their task demands were not fully simulated. A more advanced set-up could increase the realism of driving the vehicle and thus increase the accuracy of the results, for example, by making the respondents able to steer the vehicle, adjust their speed or interact with the environment. Nevertheless, the respondents said after the experiment that the usage of real roads instead of virtual roads already contributed a lot to a higher level of realism.

Secondly, the 250-degree videos shown with the VR glasses could have distorted the perception of speed. The angles captured by the camera could be slightly different from the real angles. Moreover, the camera was placed on the forehead of the researcher which resulted in the point of view in the videos being a bit higher than the real point of view of the driver. This could influence the estimations of the driven speed.

Another noteworthy aspect is that some participants had no prior experience with virtual reality. This unfamiliarity may have influenced their overall experience and perceptions of the virtual environment. The respondents indicated that it was useful to have a test video prior to the first real video to become a little bit more familiar with the VR environment. However, the researcher could still see differences in the reactions between the respondents to the VR environment. Some of the respondents were moving their heads a lot and seemed amazed by what was happening. This might have influenced how one experienced the driving. Future research could consider providing participants with training or orientation sessions to ensure a more consistent response across participants.

The camera that was used in the videos was the Nikon KeyMission 360. This camera was developed in 2017 and it had a maximum video resolution of 3840x2160/24p. The camera captured the angle of 360 degrees with two lenses on both sides of the camera. This made that there were two small distortions in the video on the places where the two lenses meet each other. Meanwhile, better 360-degree cameras are developed which do not show such distortions and can capture videos with higher quality (7680x4320). A better video quality can increase the realism of the respondents and it might influence the way that the respondents experienced the speeds. Moreover, a few respondents indicated that the lack of quality made it impossible for them to use the vehicle's side mirrors.

While capturing the videos, attention was paid to the sunlight. The sunlight could create a high contrast which can reduce the quality of the videos. Details could become lost in shadows or overexposed areas. To avoid this problem, the videos were filmed on cloudy days or right before sunset. However, twice a respondent answered the open questions regarding the overview that his/her sight was obstructed due to overexposure to the sun in the videos. These were both stated in a video of the Laan van Oudpoelgeest. Future studies could explore alternative filming strategies or employ advanced VR rendering techniques to minimize the impact of sunlight on video quality.

Additionally, the length of the experiment could impact the respondents' concentration, attention, and patience, potentially leading to inaccurate or incomplete answers. The experiment duration was on average fifteen to twenty minutes. The average level of tiredness was slightly raised after the experiment. For using this research methodology the next time, it is recommended to show only three videos to each respondent instead of four to make the respondents less bored and to increase the quality of the answers. Another possibility is to reduce the number of questions after each video. However, a well-thought-out trait-off has to be made between the number of questions and what to examine in the research.

The duration of the videos varied between fifteen to twenty-five seconds. This might be a little bit too short for the respondents to adapt to the new road situation and form an opinion about his/her situational workload. Some respondents also indicated that certain videos were a little too short. With the chosen roads and used speeds, it was not always possible to elongate the videos because the road design would change too much. For example, the presence of parallel parking would be ended or a roundabout would be encountered and that would take away the focus of the videos and the questions. Further research should choose different roads that would continue with the same road design over a longer length to capture longer videos. The accuracy and reliability of the answers could improve with longer videos.

Overall, the respondents were very positive about participating in the experiment. Frequently mentioned comments after the experiment were that they liked to use virtual reality and that the sense of realism was very high. The respondents also indicated that it was useful to have the countdown before each video started so that they were not surprised by the start. None of the respondents complained about nausea. This could be because of the relatively short duration of each video.

In conclusion, the usage of this VR methodology gave valuable insights into the relationship between parallel parking and speed reduction and the situational workload, feeling of safety and credibility of the speed. It is a great method to establish that these factors influence each other. However, the methodology requires some further improvements to gain better knowledge about the actual relationships between these parameters.

## 5.4. Restrictions in the Research

As already briefly mentioned above, this research has given first insights into the relationship between the situational workload, feeling of safety, credibility of the speed, parallel parking and speed reduction. Virtual Reality as a research methodology had some limitations that prevent making reliable and detailed assumptions about the actual relationship between these variables. The research set-up had also its own limitations which are discussed in this section.

First of all, the group of respondents turned out to be less varied than preferred. The group of respondents was relatively young in comparison to the population causing many novice drivers in the sample. This could influence the situational workload of the drivers. Moreover, the distribution between the three personal traits was not as desired. There were almost no respondents with a high level of likeliness of speeding. Almost all the respondents had a self-reported medium level of sensation-seeking and for the personality trait 'ability to stay calm' was the group 'low' underrepresented. Therefore, the personality traits were not further taken into account in the research. These questions were based on an already existing questionnaire (French et al., 1993). For further research, it is advised to pay more attention to the diversity of the respondents.

Secondly, how some of the capability variables were defined in the analysis could have been changed. For example, the level of stress and tiredness were now a string of numbers between one and ten. However, it could also be defined as 'low', 'medium' and 'high' to reduce the precision of the variables causing more meaningful outcomes in this case. It could also reduce the subjectivity of the self-reporting ratings.

Due to time restrictions, this report did not include other statistical tests than the linear mixed model. A chi-square test would be useful to analyse whether the categorical answers about the stop-sight distance and the speed estimation were significantly influenced by the predictor variables. Moreover, in the performed linear mixed models, it was assumed that there was a linear relationship between the dependent variables and the predictor variables.

Additionally, some limitations arose from the chosen roads. In this experiment, only nine roads were chosen. These choices were based on the type of direction separation (center line, crossable stones or grass or vegetation) and the type of parking (continuous, interrupted or no parking). These criteria were established to facilitate a structured comparison between the roads and to mitigate the influence of certain road design elements on situational workload. However, situational workload is influenced by more factors than just speed, type of parking, and type of directional separation. This research neglects these additional circumstances. To better understand the correlation between situational workload, parking presence, and driving speed, it is necessary to consider these other road design features. Comparing two vastly different roads (one with parking and one without) and making assumptions based solely on parking presence is challenging. For example, the width or narrowness of the road was frequently mentioned to play a role in the level of overview, however, this road design feature is neglected in the whole analysis of the influence on the situational workload. For future research, it is recommended to either increase the number of roads studied or conduct experiments in a controlled road environment where researchers can manipulate road design, such as through simulation in a driving simulator.

Also, the respondents were 'dropped' on a road which made it more challenging for them to estimate the speed limit. The speed limits in the Dutch road network are mainly based on the function of the road (access, distributor or through) and on the location of the road (in or outside the built-up area). The respondent lacks the background information about the location and function of the road when being dropped on it in the videos and the duration of the videos might be too short to figure that out. Moreover, the speed limit should match the road design in a well-designed road which also encourages the estimation of the speed. Furthermore, the chosen roads were all GOW50 roads and thus designed for a speed of 50 km/h. It was therefore to be expected that respondents indicated that a speed of 30 km/h felt as too slow for the road. The influence of further adjustments in the road design to make a speed of 30 km/h more credible was left out in this research.

Moreover, the order of the videos in the nine different versions was tried to make random with some limitations: Every version should contain at least one road without parking, two videos of 30 km/h and two videos of 50 km/h and none of the roads should be used double in one version. This experiment has not tested the influence of the order of the videos on the answers and whether respondents answered differently when a video was shown as first or last. That could also be influenced by the respondents increasing level of tiredness throughout the experiment.

A critical note should also be written about the term situational workload. Situational workload is an umbrella term to assess potential changes in situational awareness affecting driving performance, primarily relying on respondents' self-assessment abilities. Since this is a new term, it is yet unknown what the consequences are in reality, for example, to what extent is road safety endangered when the overview on the road is lowered or when the level of required attention is increased. The questions asked about the situational workload are based on existing questionnaires of the mental workload. However, the combination of introducing a new term and employing a variant of virtual reality that does not fully replicate the entire workload complicates the establishment of a complete relationship between parking, speed and expected driving performance. This study reveals that the presence of parking and driving speed contribute to a change in situational workload. However, the effects on driving performance and road safety necessitate further investigation to be fully understood.

## 5.5. Recommendation for Further Research

As already briefly described in the sections above, some further research has to be done to determine the relationship between parallel parking, the speed and the effects on traffic safety. The methodology used in this research had some limitations which made the driving experience not as realistic as in reality. Moreover, not all the contributing factors to the mental workload, credibility of the speed and the feeling of safety were included in this research. Therefore, the following researches are recommended:

- In this study, the videos were short. It would be interesting to use longer videos so that the respondents could better adapt to the surroundings and the speed of the vehicle. However, the length of the experiment should be considered thus either the number of questions after each video or the amount of videos should be adjusted then.

- The situational workload was used in this experiment. For further research, other methods to measure the mental workload could be used or could be combined with measuring the situational workload. These other methodologies to measure the mental workload could be the usage of physiological measures or a form of secondary task performance to better understand to what extent one has capability left or whether s/he is already fully using his/her capability. This could also help to develop a model to understand the relationship between the difficulty of the driving task, the level of overview, the collision avoidance estimation and the situational workload.

- An experiment set-up could be used in further research in which the driver has more control over the vehicle. This could be done by, for example, using a driving simulator or letting one drive a real vehicle in a (controlled) road environment. Giving the respondent more control could give better insights into the effects on driving performance.
- This experiment did not include all the variables of the road environment that could be influencing the mental workload and the credibility of the speed. It is recommended to use more roads to filter out the external effects on the mental workload and credibility and to make more reliable assumptions about the influence of driving speed and the presence of parking on these variables.
- In this study, the question of whether one thinks that s/he could stop and stand still in time was asked of the respondents. Further research could be done on this estimation and the actual braking distance.
- The analysed speeds in this experiment were 30 km/h and 50 km/h. A part of the respondents answered that the speed of 30 km/h was too slow for the roads with parking, however, a speed of 50 km/h was too fast. It could be interesting to research the effects of a speed of 40 km/h on the situational workload, feeling of safety and the credibility of the speed. Although a speed limit of 40 km/h does not exist in the Netherlands, it is an interesting option to explore to find a middle ground between 30 km/h being too slow and 50 km/h being too fast.
- This report did not analyse the relationship between the situational workload and the credibility of the speed and between the feeling of safety and the credibility of the speed. Further research could dive deeper into this.

# 6 Conclusion

This research was executed to provide an answer to the following research question: "What is the effect of parallel parking in combination with speed reduction from 50 km/h to 30 km/h on the driver's situational workload, the feeling of safety and credibility of the speed?". In this question, distributor roads in the Netherlands with separated cycling paths were specifically meant. To answer the first part of the research question, the effects of parallel parking and a speed reduction on the situational workload, the situational workload was defined into three variables: the level of overview on the street, the collision avoidance estimation and the difficulty of the driving task.

The level of overview was subdivided into the overview on the road section and the overview at crossings and intersections. Both these types of overview were strongly reduced by the presence of parallel parking. The speed reduction improved the level of overview, but its effect was less significant than that of parallel parking. To enhance the overview on roads with parallel parking and a 50 km/h speed limit, removing parking facilities would be more effective than lowering the speed limit. The level of overview was generally lower at crossings and intersections compared to road sections, highlighting the importance of avoiding parallel parking in these areas. A reduced level of overview negatively impacts drivers' situational awareness, increasing the likelihood of missing unexpected hazards from or around parked vehicles.

The second variable of situational workload was the estimation of collision avoidance. The collision avoidance estimation was used as a variable to assess how parallel parking and speed reduction might affect a specific aspect of driving performance. In this research, two aspects of collision avoidance were taken into account. The respondents had to assess whether they would be able to avoid a collision by either reacting and braking to stand still in time and by assessing the room to swerve to avoid the hazard. Over half of the respondents believed they would not be able to avoid a collision based on their self-estimated stop-sight distance when driving at 50 km/h near parallel parked vehicles. Removing these parked vehicles reduced this percentage to one-third, but lowering the speed to 30 km/h had an even greater effect, with only a quarter of respondents doubting their ability to stop in time. Moreover, crossings and intersections were more frequently missed on roads with parking while driving 50 km/h. Respondents also indicated that parallel parking significantly reduced the room to swerve, whereas vehicle speed had a lesser impact on this.

The final component of situational workload was the self-reported workload and the self-reported level of attention required for the driving task, collectively termed the 'difficulty of the driving task'. Both factors were significantly influenced by the presence of parallel parking. Respondents noted that parallel parking substantially increased the difficulty of the driving task, while speed reduction made it easier. The impact of parallel parking was greater than that of speed reduction, making roads with a 50 km/h speed limit without parking easier to drive on than roads with 30 a km/h speed limit and parking.

All three analysed components of situational workload were affected by the presence of parallel parking and speed reduction. Therefore, it can be concluded that parking and speed reduction have an effect on the situational workload. The presence of parallel parking negatively influenced the situational workload whereas the speed reduction has a positive influence. The initial level of situational workload remains unknown in this research. However, reducing situational workload can be achieved by either removing parking facilities or lowering the speed limit, thereby increasing drivers' spare capacity to manage potential hazards effectively. As a result, situational awareness and driving performance improve, allowing drivers to have greater control over their vehicles, being less likely to make errors and creating a safer driving environment.

The respondents' feeling of safety was significantly lower with the presence of parking and a speed of 50 km/h compared to situations without parking or with a reduced speed of 30 km/h. The average safety rating for the combination of parking and 50 km/h was 6.1, which is considered barely sufficient on the scale used. Furthermore, 37% of respondents rated their feeling of safety as insufficient under this condition. Removing parking or reducing the speed to 30 km/h significantly improved the feeling of safety, with both adjustments resulting in an average safety rating of 7.3 which means that either improvement would equally enhance the feeling of safety. The influence of the components of situational workload was also tested on the feeling of safety. If the self-reported workload increased, the feeling of safety decreased. The room to swerve and the overview had a positive influence on the feeling of safety: if these variables increased, the feeling of safety increased as well making the feeling of safety dependent on the situational workload.

Finally, the credibility of the two different speeds (30 km/h and 50 km/h) was analysed in combination with the presence of parking. It was found that the majority of the respondents found a speed of 50 km/h too fast for roads with parallel parking and a speed of 30 km/h suitable for these roads. Almost all of the respondents who indicated that the speed of 50 km/h was too fast, said that they would drive a bit slower than that themselves. Only 10% would drive much slower and 10% would drive the same speed even though they said that shown speed was too fast. It is not analysed what speeds they would actually choose. The speed of 30 km/h was found to be too slow for roads without parking and the respondents indicated that a speed of 50 km/h was more suitable on those roads. The presence of parallel parking also caused more deviations in the estimation of the speed limit, it was for the respondents confusing whether the speed limit was 30 km/h or 50 km/h on those roads. The respondents were more accurate in estimating the speed limit on roads without parking.

The last research question was: "To what extent is virtual reality a useful research methodology to determine the situational workload of drivers?". This research methodology did not capture the whole capability and the whole task demand of drivers. It is, therefore, not possible to say whether the task demand fully exceeded the driver's capability or whether the situational awareness is lowered to such a low level that the driving performance is dangerously affected when driving over a distributor road with a speed of 50 km/h, parallel parking and separated cycling paths. However, this research methodology is greatly useful for gaining insight into whether the situational workload is changed by parallel parking and speed reduction.

Based on the findings in this research, it is recommended to avoid the combination of parallel parking and a speed limit of 50 km/h on distributor roads in the Netherlands. The presence of parking combined with a speed of 50 km/h has a negative influence on the situational workload and the feeling of safety. Although the average ratings were not insufficient, it was judged with the bare minimum level of sufficiency. The decision to allow the combination of parking and a 50 km/h speed limit in the design requirements is also determined by whether it is ethical to accept a minimum level of safety. Road design characteristics have always been established with the terms 'minimal' and 'ideal' design features. The combination of parking and a speed limit of 50 km/h could be seen as a minimum design feature. However, the accepted motion about GOW30 has changed this point of view by replacing the terms minimal and ideal with starting principles and deviation possibilities. With this new approach, it is not desirable to settle for the minimal design requirements and thus a minimal level of safety. Therefore, it is discouraged to keep the distributor roads with parallel parking and a speed limit of 50 km/h in the way that they are now.

The presence of parallel parking on distributor roads also caused a lot of confusion among the respondents regarding the speed limit. Changing the design characteristics into not allowing parallel parking on distributor roads can give the drivers handles to know how fast they can drive: once they see parallel parking on a distributor road, they know that the speed limit is 30 km/h. However, to effectively reduce the average speed to 30 km/h on a distributor road, additional road design adjustments or stricter enforcement might be necessary. Additionally, every road is unique and requires careful consideration of its position within the network, its function, and the surrounding environment to determine an appropriate layout. While design requirements are still under review, this research aims to assist municipalities in deciding whether to remove parking facilities or lower the speed limit to 30 km/h on existing grey roads with parallel parking.

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# A

# Appendix

Table A.1: Basic Requirements GOW30, GOW50 and ETW30 (Translated from Roedoe and Schenk, 2023.)

| **Basic Characteristic Road Section** | **Design Requirements GOW30** | **Tightening Design Requirements** | |
|---|---|---|---|
| | | **GOW50** | **ETW30** |
| A. Paving | Open or partly closed pavement:<br>Starting principle: open pavement (element pavement)<br>In case of closed pavement: one part clinker or clicker-like pavement. | N/A | N/A |
| B. Physical direction separation | No physical direction separation (non-crossable obstacle) and no legal direction separation (white broken or solid centre line). | physical direction separation (non-crossable obstacle) when 2x2 or more lanes per direction. | N/A |
| C. Longitudinal marking | No longitudinal marking other than used as a cycle lane.<br>Forgiving sidewalk directly along the carriage way and cycle lane. | No cycle- or suggestion lane | N/A |
| D. Public lightning | Public lightning present.<br>Starting principle: usage of low light poles. | N/A | N/A |
| E. Facilities for agricultural traffic | No design requirements present. | N/A | N/A |
| F. Road crossing slow traffic on road section | road crossing on road section is allowed for slow traffic.<br>Starting principle: encourage concentrated crossing at crossing facilities.<br>Bicycle crossing facilities: see Design Requirements Intersections. | N/A | N/A |
| G. Residential area "erf" connection to the carriageway | Residential area connections on the carriageway are allowed. | N/A | N/A |
| H. Mixing of traffic modes | Agricultural traffic and mopeds are allowed at the carriageway.<br>Cyclists and light mopeds on cycle lanes (mixing) or at a cycle path (no mixing).<br>A sidewalk has to be present for pedestrians (no mixing). | A sidewalk has to be present for pedestrians (no mixing).<br>Cyclists cycle on mandatory cycle path, parallel road (ETW30) or alternative route (no mixing). | N/A |
| I. Bicycle facilities | Bicycle facilities are present:<br>Starting principle: (red) cycle lanes. | Mandatory cycle path, parallel road or cyclists via an alternate route. | No cycle lanes<br>No suggestion lanes with white markings. |
| K. Distance to obstacles | No requirements for. | N/A | N/A |
| L. PT-stops (bus/tram) | Stop on carriageway (starting principle). | N/A | N/A |
| M. Parking | Parking on the carriageway is not allowed.<br>Parking next to a carriageway with cycle lanes only with additional facilities. | No perpendicular or angle parking adjacent to the carriage way. | N/A |
| N. Horizontal and vertical alignment | Design speed 30 km/h.<br>Starting point: preferably short straight lines and vertical speed bumps at crosswalks and intersections. | N/A | N/A |

# B

# Appendix

Table B.1: Chosen streets

| **Street Name** | **City Name** | **Direction separation** | **Layout of Parking** | **Figure** |
|---|---|---|---|---|
| Rode Kruislaan | Eindhoven | center line | continuously | B.1 |
| Laan van Avant-Garde | Rotterdam | grass/vegetation | continuously | B.2 |
| Jaffalaan | Delft | crossable stones | continuously | B.3 |
| Oostmeerlaan (with parking) | Berkel en Rodenrijs | center line | interrupted | B.4 |
| Laan van Oudpoelgeest | Oegstgeest | grass/vegetation | interrupted | B.5 |
| Ruys de Beerenbrouckstraat | Delft | crossable stones | interrupted | B.6 |
| Oostmeerlaan (without parking) | Berkel en Rodenrijs | center line | no parking | B.7 |
| Zwaluwlaan | Schiedam | grass/vegetation | no parking | B.8 |
| Rotterdamseweg | Delft | crossable stones | no parking | B.9 |

Figure B.1: Rode Kruislaan, Eindhoven (Google, 2022a)

Figure B.2: Laan van Avant-Garde, Rotterdam (Google, 2022d)

Figure B.3: Jaffalaan, Delft (Google, 2022c)

Figure B.4: Oostmeerlaan with parking, Berkel en Rodenrijs (Google, 2022f)

Figure B.5: Laan van Oud Poelgeest, Oegstgeest (Google, 2021)

Figure B.6: Ruys de Beerenbrouckstraat, Delft (Google, 2022e)

Figure B.7: Oostmeerlaan without parking, Berkel en Rodenrijs (Google, 2022g)

Figure B.8: Zwaluwlaan, Schiedam (Google, 2022h)


Figure B.9: Rotterdamseweg, Delft (Google, 2022b)

# C

# Appendix

In this appendix, the questions posed to the respondents are formulated. The questionnaire consists of three different parts as described in Subsection 3.5. First, the questionnaire is presented in English in this appendix. The Dutch version can be found below the English version.

## C.1. Part 1 - English

1. What is your age?
2. To which gender identity do you most identify?
   - Female
   - Male
   - Other
3. How long do you have your driving licence?
   - I don't have my driving licence
   - 0-2 years
   - 2-5 years
   - 5-10 years
   - More than 10 years
4. How often do you drive?
   - (almost) never
   - Monthly
   - Every two weeks
   - Weekly
   - (almost) daily
5. On a scale from 1 to 10, how stressed do you feel right now?
6. On a scale from 1 to 10, how tired do you feel right now?

## C.2. Part 2 - English

The following questions have to be answered on a scale of 'never', 'infrequently', 'sometimes', 'frequently' and 'always'.

1. How often are you aware of the speed limit on a road?
2. How often do you exceed the speed limit?
3. How often do you exceed the speed limit in built-up areas?
4. How often do you experience stress while driving in built-up areas?
5. How often do you feel unsafe while driving in built-up areas?
6. How often do you drive cautiously?
7. How often are you distracted while driving?
8. How often do you remain calm while driving?
9. How often do you respond to pressure from other drivers while driving?

## C.3. Part 3 - English

1. Are you familiar with this road?
   - Yes
   - No
2. What speed do you think was driven?
3. Do you think that the chosen speed in this video was appropriate for this road?
   - Yes
   - No, the speed was too high.
   - No, the speed was too low.
4. If you were the driver in this video, would you choose the same speed?
   - Yes
   - No, I would drive a little faster
   - No, I would drive much faster
   - No, I would drive a little slower
   - No, I would drive much slower
5. What do you think that the speed limit is on this road?
6. Did you feel like you had a clear overview of the situation on the road, on a scale from 1 to 10 in which 1 is 'absolutely no overview' and 10 is 'everything is super clear'?
7. Which parts of the road design had an impact on the level of overview for you?
8. Did you feel like you had a clear overview at intersections, exits and/or crossing points, on a scale from 1 to 10 in which 1 is 'absolutely no overview' and 10 is 'everything is super clear'?
9. Did you feel like you could react and stop in time if a dangerous situation occurred?
   - Yes
   - No
10. Can you rate the space to swerve, if necessary, on a scale from 1 'no space at all' to 10 'lots of space'?
11. Can you rate the distance kept from parked vehicles (if parking spaces are present) on a scale of 1 'no space at all' to 10 'lots of space'?
12. Can you rate the amount of things that you have to pay attention to at once, when driving at this speed on this road on a scale from 1 'I don't have to pay attention to anything' to 10 'I have to pay attention to too many things at once'?
13. Can you rate the perceived workload from 1 'super low' to 10 'super high'?
14. Can you rate the sense of safety on this road at this speed from 1 'hugely unsafe' to 10 'super safe'?

## C.4. Part 1 - Dutch

1. Wat is uw leeftijd?
2. Met welke genderidentiteit identificeert u zich het meest?
   - Vrouw
   - Man
   - Anders
3. Hoe lang heeft u uw rijbewijs?
   - Ik heb geen rijbewijs
   - 0-2 jaar
   - 2-5 jaar
   - 5-10 jaar
   - Meer dan 10 jaar
4. Hoe vaak rijdt u auto?
   - (bijna) nooit
   - Maandeljks
   - Eens in de twee weken
   - Wekelijks
   - (bijna) dagelijks

5. Op een schaal van 1 tot 10, hoe gestrest voelt u zich op dit moment?
6. Op een schaal van 1 tot 10, hoe vermoeid voelt u zich op dit moment?

## C.5. Part 2 - Dutch

De volgende vragen moeten worden beantwoord op een schaal van "nooit", "zelden", "soms", "vaak" en "altijd".

1. Hoe vaak bent u zich bewust van de maximum snelheid op een weg?
2. Hoe vaak rijdt u sneller dan de maximum toegestane snelheid?
3. Hoe vaak rijdt u sneller dan de maximum toegestane snelheid binnen de bebouwde kom?
4. Hoe vaak ervaart u stress tijdens het autorijden binnen de bebouwde kom?
5. Hoe vaak voelt u zich onveilig tijdens het autorijden in de bebouwde kom?
6. Hoe vaak rijdt u voorzichtig?
7. Hoe vaak bent u afgeleid tijdens het autorijden?
8. Hoe vaak blijft u rustig tijdens het rijden?
9. Hoe vaak reageer je op druk van andere bestuurders tijdens het rijden?

## C.6. Part 3 - Dutch

1. Bent u bekend met deze weg?
    - Ja
    - Nee
2. Welke snelheid denkt u dat er gereden werd?
3. Denkt u dat de gekozen snelheid geschikt was voor deze weg?
    - Ja
    - Nee, er werd te hard gereden
    - Nee, er werd te langzaam gereden
4. Als u de bestuurder in deze video was, zou u dan dezelfde snelheid kiezen?
    - Ja
    - Nee, ik zou iets sneller rijden.
    - Nee, ik zou veel sneller rijden.
    - Nee, ik zou iets langzamer rijden.
    - Nee, ik zou veel langzamer rijden.
5. Wat denkt u dat de snelheidslimiet op deze weg is?
6. Had u het gevoel dat u een duidelijk overzicht had van de volledige situatie op de weg, op een schaal van 1 tot 10, waarin 1 ’absoluut geen overzicht’ is en 10 ’alles is super overzichtelijk’ is?
7. Welke onderdelen van het wegontwerp hadden een invloed op de mate van overzichtelijkheid voor u?
8. Had u het gevoel dat u een duidelijk overzicht had bij kruispunten, uitritten en/of oversteekpunten, op een schaal van 1 tot 10, waarin 1 ’absoluut geen overzicht’ is en 10 ’alles is super overzichtelijk’ is?
9. Had u het idee dat u op tijd kon reageren en stilstaan, als er een gevaarlijke situatie zou optreden?
    - Ja
    - Nee
10. Kunt u de ruimte om uit te wijken, indien nodig, beoordelen op een schaal van 1 ’totaal geen ruimte’ tot 10 ’heel veel ruimte’?
11. Kunt u de gehouden afstand tot de geparkeerde auto’s beoordelen op een schaal van 1 ’totaal geen ruimte’ tot 10 ’heel veel ruimte’? (indien er parkeervakken aanwezig zijn)
12. Kunt u inschatten op hoeveel dingen je tegelijk moet letten, wanneer je met deze snelheid op deze weg rijdt, op een schaal van 1 tot 10, waarin 1 ’ik hoef nergens op te letten’ is en 10 ’ik moet op teveel dingen tegelijk letten’?
13. Kunt u de ervaren werklast een cijfer geven van 1 ’super laag’ naar 10 ’super hoog’?
14. Kunt u uw gevoel van veiligheid op deze weg met deze snelheid een cijfer geven van 1 ’enorm onveilig’ naar 10 ’super veilig’?

# D
# Appendix

## D.1. Overview on the Road

### Presence of Parallel Parking

Parking=0: Without Parking
Parking=1: With Parking

Table D.1: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 6.677 | 0.13 | 92.523 | 51.277 | <.001 | 6.418 | 6.935 |
| [Parking=0] | 2.109 | 0.197 | 143.169 | 10.684 | <.001 | 1.719 | 2.499 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |

Table D.2: Estimates

| Parking | Mean | Std. Error | df | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|
| Without parking | 8.786 | 0.173 | 160.886 | 8.444 | 9.127 |
| With parking | 6.677 | 0.13 | 92.523 | 6.418 | 6.935 |

Table D.3: Pairwise Comparisons

| (I) Parking | (J) Parking | Mean Difference (I-J) | Std. Error | df | Sig | 95% Confidence Interval for Difference Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Without parking | With parking | 2.109 | 0.197 | 143.169 | <.001 | 1.719 | 2.499 |
| With parking | Without parking | -2.109 | 0.197 | 143.169 | <.001 | -2.499 | -1.719 |

## Speed of the Vehicle

Table D.4: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 6.994 | 0.155 | 131.02 | 45.091 | <.001 | 6.687 | 7.301 |
| [DrivenSpeed=30] | 0.9 | 0.211 | 108.328 | 4.271 | <.001 | 0.482 | 1.318 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |

Table D.5: Estimates

| DrivenSpeed | Mean | Std. Error | df | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|
| 30 | 7.645 | 0.157 | 223.659 | 7.335 | 7.954 |
| 50 | 6.982 | 0.156 | 204.539 | 6.675 | 7.29 |

Table D.6: Pairwise Comparisons

| (I) DrivenSpeed | (J) DrivenSpeed | Mean Difference (I-J) | Std. Error | df | Sig.c | 95% Confidence Interval for Difference Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| 30 | 50 | .662 | 0.221 | 216.668 | 0.003 | 0.226 | 1.099 |
| 50 | 30 | -.662 | 0.221 | 216.668 | 0.003 | -1.099 | -0.226 |

## Speed of the Vehicle and Presence of Parallel Parking

Table D.7: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 6.271 | 0.157 | 134.979 | 39.986 | <.001 | 5.961 | 6.582 |
| [Parking=0] | 2.076 | 0.189 | 139.989 | 10.961 | <.001 | 1.702 | 2.45 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| [DrivenSpeed=30] | 0.806 | 0.176 | 121.384 | 4.583 | <.001 | 0.458 | 1.155 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |

Table D.8: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 6.082 | 0.185 | 60.936 | 32.963 | <.001 | 5.713 | 6.451 |
| [Parking=0] | 2.363 | 0.259 | 181.052 | 9.107 | <.001 | 1.851 | 2.875 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| [DrivenSpeed=30] | 1.038 | 0.204 | 153.625 | 5.088 | <.001 | 0.635 | 1.441 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] * [DrivenSpeed=30] | -0.427 | 0.375 | 125.532 | -1.139 | 0.257 | -1.168 | 0.314 |
| [Parking=0] * [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=1] * [DrivenSpeed=30] | 0 | 0 | . | . | . | . | . |
| [Parking=1] * [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |

Table D.9: Estimates

| Parking | DrivenSpeed | Mean | Std. Error | df | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|
| Without Parking | 30 | 9.056 | 0.236 | 111.967 | 8.588 | 9.524 |
| | 50 | 8.445 | 0.237 | 93.948 | 7.975 | 8.915 |
| With Parking | 30 | 7.120 | 0.182 | 57.912 | 6.756 | 7.484 |
| | 50 | 6.082 | 0.185 | 60.936 | 5.713 | 6.451 |

## Speed of the Vehicle and Type of Parking

TypeofParking=0: continuous parking
TypeofParking=1: Interrupted parking
TypeofParking=2: No parking

Table D.10: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 8.335 | 0.195 | 172.69 | 42.739 | <.001 | 7.95 | 8.72 |
| [DrivenSpeed=30] | 0.825 | 0.173 | 120.62 | 4.762 | <.001 | 0.482 | 1.168 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [TypeofParking=0] | -2.351 | 0.219 | 176.927 | -10.74 | <.001 | -2.783 | -1.919 |
| [TypeofParking=1] | -1.854 | 0.217 | 148.242 | -8.551 | <.001 | -2.282 | -1.426 |
| [TypeofParking=2] | 0 | 0 | . | . | . | . | . |

Table D.11: Estimates

| TypeOfParking | Mean | Std. Error | df | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|
| continuous parking | 6.396 | 0.172 | 171.771 | 6.056 | 6.736 |
| Interrupted parking | 6.893 | 0.168 | 157.74 | 6.561 | 7.225 |
| No parking | 8.747 | 0.173 | 157.734 | 8.405 | 9.089 |

Table D.12: Pairwise Comparisons

| (I) TypeOfParking | (J) TypeOfParking | Mean Difference (I-J) | Std. Error | df | Sig. | 95% Confidence Interval for Difference Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| continuous parking | Interrupted parking | -.497 | 0.217 | 129.145 | 0.072 | -1.024 | 0.031 |
| | No parking | -2.351 | 0.219 | 176.927 | <.001 | -2.88 | -1.822 |
| Interrupted parking | continuous parking | 0.497 | 0.217 | 129.145 | 0.072 | -0.031 | 1.024 |
| | No parking | -1.854 | 0.217 | 148.242 | <.001 | -2.379 | -1.329 |
| No parking | continuous parking | 2.351 | 0.219 | 176.927 | <.001 | 1.822 | 2.88 |
| | Interrupted parking | 1.854 | 0.217 | 148.242 | <.001 | 1.329 | 2.379 |

## Speed of the Vehicle, Presence of Parking and Type of Direction Separation

DirectionSeparation=0: Centre Line
DirectionSeparation=1: Grass/Vegetation
DirectionSeparation=2: Crossable Stones

Table D.13: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 6.556 | 0.199 | 144.769 | 32.974 | <.001 | 6.163 | 6.949 |
| [DrivenSpeed=30] | 0.847 | 0.174 | 119.655 | 4.874 | <.001 | 0.503 | 1.191 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | 2.097 | 0.189 | 143.675 | 11.098 | <.001 | 1.723 | 2.47 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| [DirectionSeparation=0] | -0.614 | 0.222 | 151.998 | -2.764 | 0.006 | -1.053 | -0.175 |
| [DirectionSeparation=1] | -0.332 | 0.212 | 156.668 | -1.562 | 0.12 | -0.751 | 0.088 |
| [DirectionSeparation=2] | 0 | 0 | . | . | . | . | . |

Table D.14: Estimates

| DirectionSeparation | Mean | Std. Error | df | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|
| Centre line | 7.414 | 0.183 | 124.953 | 7.052 | 7.777 |
| Grass/Vegetation | 7.697 | 0.166 | 93.256 | 7.368 | 8.025 |
| Crossable stones | 8.028 | 0.176 | 121.14 | 7.68 | 8.376 |

Table D.15: Pairwise Comparisons

| (I) DirectionSeparation | (J) DirectionSeparation | Mean Difference (I-J) | Std. Error | df | Sig. | 95% Confidence Interval for Difference Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| centre line | Grass/Vegetation | -0.282 | 0.223 | 157.163 | 0.623 | -0.823 | 0.258 |
| | Crossable stones | -.614 | 0.222 | 151.998 | 0.019 | -1.152 | -0.076 |
| Grass/Vegetation | centre line | 0.282 | 0.223 | 157.163 | 0.623 | -0.258 | 0.823 |
| | Crossable stones | -0.332 | 0.212 | 156.668 | 0.361 | -0.845 | 0.182 |
| Crossable stones | centre line | .614 | 0.222 | 151.998 | 0.019 | 0.076 | 1.152 |
| | Grass/Vegetation | 0.332 | 0.212 | 156.668 | 0.361 | -0.182 | 0.845 |

## Speed of the Vehicle, Presence of Parking and Age

Table D.16: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 6.672 | 0.324 | 66.851 | 20.578 | <.001 | 6.025 | 7.32 |
| [DrivenSpeed=30] | 0.837 | 0.177 | 123.045 | 4.73 | <.001 | 0.486 | 1.187 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | 2.106 | 0.19 | 138.53 | 11.086 | <.001 | 1.731 | 2.482 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| Age | -0.013 | 0.009 | 61.172 | -1.519 | 0.134 | -0.031 | 0.004 |

## Speed of the Vehicle, Presence of Parking and Gender

Gender=0: Male
Gender=1: Female

Table D.17: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 6.071 | 0.217 | 94.392 | 28.004 | <.001 | 5.64 | 6.501 |
| [DrivenSpeed=30] | 0.829 | 0.177 | 120.769 | 4.683 | <.001 | 0.478 | 1.179 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | 2.075 | 0.189 | 139.869 | 10.982 | <.001 | 1.702 | 2.449 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| [Gender=0] | 0.285 | 0.242 | 60.012 | 1.178 | 0.243 | -0.199 | 0.768 |
| [Gender=1] | 0 | 0 | . | . | . | . | . |

## Speed of the Vehicle, Presence of Parking and driver's license

DriversLicense=0: 0-2 years
DriversLicense=1: 2-5 years
DriversLicense=2: 5-10 years
DriversLicense=3: more than 10 years

Table D.18: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 6.096 | 0.216 | 97.341 | 28.22 | <.001 | 5.667 | 6.525 |
| [DrivenSpeed=30] | 0.816 | 0.176 | 121.918 | 4.637 | <.001 | 0.467 | 1.164 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | 2.104 | 0.19 | 138.929 | 11.101 | <.001 | 1.729 | 2.479 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| [DriversLicense=0] | 0.036 | 0.508 | 58.033 | 0.07 | 0.944 | -0.981 | 1.053 |
| [DriversLicense=1] | 0.37 | 0.366 | 58.31 | 1.009 | 0.317 | -0.364 | 1.103 |
| [DriversLicense=2] | 0.244 | 0.268 | 58.277 | 0.912 | 0.366 | -0.292 | 0.781 |
| [DriversLicense=3] | 0 | 0 | . | . | . | . | . |

## Speed of the Vehicle, Presence of Parking and Driving Frequency

DriversFrequency=0: (Almost) never
DriversFrequency=1: Monthly
DriversFrequency=2: Once every two weeks
DriversFrequency=3: Weekly
DriversFrequency=4: (Almost) daily

Table D.19: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 6.017 | 0.287 | 78.787 | 20.957 | <.001 | 5.446 | 6.589 |
| [DrivenSpeed=30] | 0.841 | 0.177 | 122.563 | 4.755 | <.001 | 0.491 | 1.191 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | 2.112 | 0.19 | 138.067 | 11.094 | <.001 | 1.735 | 2.488 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| [DriversFrequency=0] | 0.129 | 0.379 | 57.437 | 0.339 | 0.736 | -0.631 | 0.888 |
| [DriversFrequency=1] | 0.278 | 0.379 | 57.487 | 0.734 | 0.466 | -0.481 | 1.038 |
| [DriversFrequency=2] | 0.568 | 0.389 | 58.092 | 1.46 | 0.15 | -0.211 | 1.348 |
| [DriversFrequency=3] | 0.137 | 0.359 | 57.485 | 0.38 | 0.705 | -0.583 | 0.856 |
| [DriversFrequency=4] | 0 | 0 | . | . | . | . | . |

## Speed of the Vehicle, Presence of Parking and Level of Stress

Table D.20: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 7.205 | 0.971 | 54.968 | 7.422 | <.001 | 5.26 | 9.151 |
| [DrivenSpeed=30] | 0.824 | 0.177 | 120.934 | 4.664 | <.001 | 0.474 | 1.174 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | 2.091 | 0.19 | 138.886 | 10.977 | <.001 | 1.714 | 2.468 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| [Stress=1] | -0.929 | 1.013 | 53.987 | -0.916 | 0.364 | -2.961 | 1.103 |
| [Stress=2] | -0.881 | 1 | 53.982 | -0.881 | 0.382 | -2.886 | 1.124 |
| [Stress=3] | -0.93 | 0.992 | 54.026 | -0.938 | 0.352 | -2.918 | 1.058 |
| [Stress=4] | -1.19 | 1.019 | 54.005 | -1.168 | 0.248 | -3.232 | 0.853 |
| [Stress=5] | -1.415 | 1.08 | 53.982 | -1.31 | 0.196 | -3.581 | 0.751 |
| [Stress=6] | -0.894 | 1.116 | 54.017 | -0.801 | 0.427 | -3.131 | 1.344 |
| [Stress=7] | -0.647 | 1.116 | 54.025 | -0.58 | 0.564 | -2.885 | 1.59 |
| [Stress=8] | 0 | 0 | . | . | . | . | . |

## Speed of the Vehicle, Presence of Parking and Level of Tiredness

Table D.21: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 6.177 | 0.976 | 55.281 | 6.33 | <.001 | 4.222 | 8.133 |
| [DrivenSpeed=30] | 0.835 | 0.177 | 121.379 | 4.713 | <.001 | 0.484 | 1.185 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | 2.105 | 0.191 | 137.552 | 11.03 | <.001 | 1.728 | 2.482 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| [Tiredness=1] | 0.478 | 1.064 | 54.291 | 0.449 | 0.655 | -1.655 | 2.611 |
| [Tiredness=2] | -0.006 | 1.003 | 54.311 | -0.006 | 0.995 | -2.017 | 2.005 |
| [Tiredness=3] | 0.042 | 1.015 | 54.291 | 0.042 | 0.967 | -1.992 | 2.076 |
| [Tiredness=4] | 0.028 | 1.03 | 54.291 | 0.027 | 0.979 | -2.038 | 2.093 |
| [Tiredness=5] | 0.292 | 1.039 | 54.374 | 0.281 | 0.78 | -1.791 | 2.375 |
| [Tiredness=6] | -0.289 | 1.031 | 54.358 | -0.281 | 0.78 | -2.355 | 1.777 |
| [Tiredness=7] | 0.075 | 1.03 | 54.29 | 0.073 | 0.942 | -1.99 | 2.141 |
| [Tiredness=9] | 0 | 0 | . | . | . | . | . |

## Speed of the Vehicle, Presence of Parking and Familiarity

Familiarity=0: No
Familiarity=1: Yes
Familiarity=0=2: Not sure

Table D.22: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 6.177 | 0.976 | 55.281 | 6.33 | <.001 | 4.222 | 8.133 |
| Intercept | 6.736 | 0.519 | 143.271 | 12.984 | <.001 | 5.71 | 7.761 |
| [DrivenSpeed=30] | 0.807 | 0.174 | 120.001 | 4.644 | <.001 | 0.463 | 1.15 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | 2.089 | 0.188 | 138.225 | 11.138 | <.001 | 1.718 | 2.46 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| [Familiarity=0] | -0.542 | 0.514 | 151.185 | -1.055 | 0.293 | -1.557 | 0.473 |
| [Familiarity=1] | -0.004 | 0.588 | 174.326 | -0.006 | 0.995 | -1.165 | 1.157 |
| [Familiarity=2] | 0 | 0 | . | . | . | . | . |

## Speed of the Vehicle, Presence of Parking and Estimated Driven Speed

Table D.23: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 7.778 | 0.577 | 184.001 | 13.491 | <.001 | 6.641 | 8.916 |
| [Parking=0] | 2.165 | 0.19 | 143 | 11.396 | <.001 | 1.79 | 2.541 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| EstimatedDrivenSpeed | -0.031 | 0.011 | 191.695 | -2.732 | 0.007 | -0.053 | -0.009 |
| [DrivenSpeed=30] | 0.444 | 0.223 | 158.862 | 1.99 | 0.048 | 0.003 | 0.885 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |

## Presence of Parking and Estimated Driven Speed

Table D.24: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 8.567 | 0.414 | 219.152 | 20.677 | <.001 | 7.75 | 9.383 |
| [Parking=0] | 2.22 | 0.189 | 141.192 | 11.738 | <.001 | 1.846 | 2.594 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| EstimatedDrivenSpeed | -0.044 | 0.009 | 222.162 | -4.852 | <.001 | -0.062 | -0.026 |

## Speed of the Vehicle, Presence of Parking and Estimated Speed Limit

Table D.25: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 5.604 | 0.515 | 7.958 | 10.887 | <.001 | 4.416 | 6.792 |
| [DrivenSpeed=30] | 0.907 | 0.164 | 2.581 | 5.528 | 0.017 | 0.334 | 1.481 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | 2.034 | 0.191 | 2.867 | 10.626 | 0.002 | 1.408 | 2.659 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| EstimatedSpeedLimit | 0.013 | 0.011 | 6.521 | 1.206 | 0.27 | -0.013 | 0.038 |

### Presence of Parking and Estimated Speed Limit

Table D.26: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 6.608 | 0.53 | 214.202 | 12.461 | <.001 | 5.563 | 7.653 |
| [Parking=0] | 2.099 | 0.214 | 154.419 | 9.83 | <.001 | 1.677 | 2.521 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| EstimatedSpeedLimit | 0.002 | 0.011 | 210.104 | 0.132 | 0.895 | -0.021 | 0.024 |

## D.2. Overview at Crossings and Intersections

### Presence of Parallel Parking

Parking=0: Without Parking
Parking=1: With Parking

Table D.27: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 6.292 | 0.159 | 93.423 | 39.499 | <.001 | 5.976 | 6.609 |
| [Parking=0] | 2.228 | 0.228 | 117.238 | 9.79 | <.001 | 1.777 | 2.679 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |

Table D.28: Estimates

| Parking | Mean | Std. Error | df | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|
| Without parking | 8.521 | 0.202 | 145.26 | 8.121 | 8.921 |
| With parking | 6.292 | 0.159 | 93.423 | 5.976 | 6.609 |

Table D.29: Pairwise Comparisons

| (I) Parking | (J) Parking | Mean Difference (I-J) | Std. Error | df | Sig. | 95% Confidence Interval for Difference Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Without parking | With parking | 2.228 | 0.228 | 117.238 | <.001 | 1.777 | 2.679 |
| With parking | Without parking | -2.228 | 0.228 | 117.238 | <.001 | -2.679 | -1.777 |

### Speed of the Vehicle

Table D.30: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 6.606 | 0.207 | 25.63 | 31.875 | <.001 | 6.18 | 7.032 |
| [DrivenSpeed=30] | 0.9 | 0.216 | 143.31 | 4.16 | <.001 | 0.472 | 1.327 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |

Table D.31: Estimates

| DrivenSpeed | Mean | Std. Error | df | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|
| 30 | 7.506 | 0.206 | 24.267 | 7.081 | 7.93 |
| 50 | 6.606 | 0.207 | 25.63 | 6.18 | 7.032 |

Table D.32: Pairwise Comparisons

| (I) DrivenSpeed | (J) DrivenSpeed | Mean Difference (I-J) | Std. Error | df | Sig. | 95% Confidence Interval for Difference Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| 30 | 50 | .900 | 0.216 | 143.31 | <.001 | 0.472 | 1.327 |
| 50 | 30 | -.900 | 0.216 | 143.31 | <.001 | -1.327 | -0.472 |

## Speed of the Vehicle and Presence of Parallel Parking

Table D.33: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 5.917 | 0.181 | 127.854 | 32.639 | <.001 | 5.558 | 6.276 |
| [DrivenSpeed=30] | 0.789 | 0.199 | 113.189 | 3.953 | <.001 | 0.393 | 1.184 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | 2.109 | 0.217 | 111.489 | 9.713 | <.001 | 1.679 | 2.54 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |

Table D.34: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 5.976 | 0.204 | 147.095 | 29.229 | <.001 | 5.572 | 6.38 |
| [DrivenSpeed=30] | 0.679 | 0.266 | 133.585 | 2.552 | 0.012 | 0.153 | 1.205 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | 1.954 | 0.321 | 157.923 | 6.084 | <.001 | 1.32 | 2.588 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| [DrivenSpeed=30] * [Parking=0] | 0.301 | 0.479 | 117.143 | 0.628 | 0.531 | -0.648 | 1.25 |
| [DrivenSpeed=30] * [Parking=1] | 0 | 0 | . | . | . | . | . |
| [DrivenSpeed=50] * [Parking=0] | 0 | 0 | . | . | . | . | . |
| [DrivenSpeed=50] * [Parking=1] | 0 | 0 | . | . | . | . | . |

Table D.35: Estimates

| DrivenSpeed | Parking | Mean | Std. Error | df | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|
| 30 | Without parking | 8.91 | 0.268 | 135.002 | 8.38 | 9.439 |
| | With parking | 6.655 | 0.207 | 162.189 | 6.246 | 7.063 |
| 50 | Without parking | 7.93 | 0.271 | 163.129 | 7.394 | 8.465 |
| | With parking | 5.976 | 0.204 | 147.095 | 5.572 | 6.38 |

## Speed of the Vehicle and Type of Parking

TypeofParking=0: continuous parking
TypeofParking=1: Interrupted parking
TypeofParking=2: No parking

Table D.36: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 8.003 | 0.23 | 165.205 | 34.731 | <.001 | 7.548 | 8.458 |
| [DrivenSpeed=30] | 0.813 | 0.2 | 114.547 | 4.074 | <.001 | 0.418 | 1.208 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [TypeofParking=0] | -2.412 | 0.254 | 147.245 | -9.501 | <.001 | -2.913 | -1.91 |
| [TypeofParking=1] | -1.823 | 0.249 | 124.096 | -7.313 | <.001 | -2.316 | -1.33 |
| [TypeofParking=2] | 0 | 0 | . | . | . | . | . |

Table D.37: Estimates

| TypeofParking | Mean | Std. Error | df | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|
| continuous parking | 5.998 | 0.203 | 162.016 | 5.597 | 6.398 |
| Interrupted parking | 6.586 | 0.201 | 155.702 | 6.19 | 6.983 |
| No parking | 8.409 | 0.199 | 145.687 | 8.016 | 8.803 |

Table D.38: Pairwise Comparisons

| (I) TypeofParking | (J) TypeofParking | Mean Difference (I-J) | Std. Error | df | Sig. | 95% Confidence Interval for Difference Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| continuous parking | Interrupted parking | -0.589 | 0.257 | 115.658 | 0.072 | -1.214 | 0.036 |
| | No parking | -2.412 | 0.254 | 147.245 | <.001 | -3.026 | -1.797 |
| Interrupted parking | continuous parking | 0.589 | 0.257 | 115.658 | 0.072 | -0.036 | 1.214 |
| | No parking | -1.823 | 0.249 | 124.096 | <.001 | -2.428 | -1.218 |
| No parking | continuous parking | 2.412 | 0.254 | 147.245 | <.001 | 1.797 | 3.026 |
| | Interrupted parking | 1.823 | 0.249 | 124.096 | <.001 | 1.218 | 2.428 |

## Speed of the Vehicle, Presence of Parking and Type of Direction Separation

DirectionSeparation=0: Centre Line
DirectionSeparation=1: Grass/Vegetation
DirectionSeparation=2: Crossable Stones

Table D.39: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 6.01 | 0.239 | 132.087 | 25.147 | <.001 | 5.537 | 6.482 |
| [DrivenSpeed=30] | 0.786 | 0.2 | 111.956 | 3.931 | <.001 | 0.39 | 1.182 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | 2.111 | 0.219 | 114.224 | 9.631 | <.001 | 1.676 | 2.545 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| [DirectionSeparation=0] | -0.194 | 0.282 | 171.511 | -0.689 | 0.492 | -0.75 | 0.362 |
| [DirectionSeparation=1] | -0.08 | 0.255 | 140.1 | -0.315 | 0.753 | -0.583 | 0.423 |
| [DirectionSeparation=2] | 0 | 0 | . | . | . | . | . |

Table D.40: Estimates

| DirectionSeparation | Mean | Std. Error | df | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|
| Center line | 7.264 | 0.221 | 128.094 | 6.826 | 7.701 |
| Grass/Vegetation | 7.378 | 0.197 | 95.734 | 6.988 | 7.768 |
| Crossable stones | 7.458 | 0.214 | 117.042 | 7.034 | 7.882 |

Table D.41: Pairwise Comparisons

| (I) DirectionSeparation | (J) DirectionSeparation | Mean Difference (I-J) | Std. Error | df | Sig. | 95% Confidence Interval for Difference Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Center line | Grass/Vegetation | -0.114 | 0.266 | 141.776 | 1 | -0.758 | 0.531 |
| | Crossable stones | -0.194 | 0.282 | 171.511 | 1 | -0.875 | 0.487 |
| Grass/Vegetation | Center line | 0.114 | 0.266 | 141.776 | 1 | -0.531 | 0.758 |
| | Crossable stones | -0.08 | 0.255 | 140.1 | 1 | -0.697 | 0.537 |
| Crossable stones | Center line | 0.194 | 0.282 | 171.511 | 1 | -0.487 | 0.875 |
| | Grass/Vegetation | 0.08 | 0.255 | 140.1 | 1 | -0.537 | 0.697 |

## Speed of the Vehicle, Presence of Parking and Age

Table D.42: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 6.15 | 0.385 | 67.834 | 15.957 | <.001 | 5.381 | 6.919 |
| [DrivenSpeed=30] | 0.801 | 0.2 | 113.454 | 4.007 | <.001 | 0.405 | 1.197 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | 2.123 | 0.217 | 110.746 | 9.766 | <.001 | 1.692 | 2.553 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| Age | -0.007 | 0.01 | 60.481 | -0.709 | 0.481 | -0.028 | 0.013 |

## Speed of the Vehicle, Presence of Parking and Gender

Gender=0: Male
Gender=1: Female

Table D.43: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 5.672 | 0.253 | 92.737 | 22.454 | <.001 | 5.17 | 6.174 |
| [DrivenSpeed=30] | 0.791 | 0.2 | 112.321 | 3.95 | <.001 | 0.394 | 1.187 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | 2.116 | 0.217 | 111.047 | 9.744 | <.001 | 1.685 | 2.546 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| [Gender=0] | 0.374 | 0.284 | 61.377 | 1.316 | 0.193 | -0.194 | 0.943 |
| [Gender=1] | 0 | 0 | . | . | . | . | . |

## Speed of the Vehicle, Presence of Parking and driver's license

DriversLicense=0: 0-2 years
DriversLicense=1: 2-5 years
DriversLicense=2: 5-10 years
DriversLicense=3: more than 10 years

Table D.44: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 5.873 | 0.253 | 93.008 | 23.241 | <.001 | 5.371 | 6.375 |
| [DrivenSpeed=30] | 0.792 | 0.2 | 113.136 | 3.965 | <.001 | 0.396 | 1.188 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | 2.115 | 0.217 | 110.479 | 9.723 | <.001 | 1.684 | 2.546 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| [DriversLicense=0] | 0.03 | 0.595 | 56.322 | 0.05 | 0.96 | -1.163 | 1.222 |
| [DriversLicense=1] | 0.067 | 0.445 | 62.962 | 0.15 | 0.881 | -0.822 | 0.955 |
| [DriversLicense=2] | 0.07 | 0.319 | 59.194 | 0.221 | 0.826 | -0.568 | 0.708 |
| [DriversLicense=3] | 0 | 0 | . | . | . | . | . |

## Speed of the Vehicle, Presence of Parking and Driving Frequency

DriversFrequency=0: (Almost) never
DriversFrequency=1: Monthly
DriversFrequency=2: Once every two weeks
DriversFrequency=3: Weekly
DriversFrequency=4: (Almost) daily

Table D.45: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 5.661 | 0.319 | 80.601 | 17.725 | <.001 | 5.026 | 6.297 |
| [DrivenSpeed=30] | 0.829 | 0.187 | 142.303 | 4.429 | <.001 | 0.459 | 1.2 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | 2.144 | 0.203 | 146.376 | 10.58 | <.001 | 1.744 | 2.545 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| [DriversFrequency=0] | 0.068 | 0.431 | 62.146 | 0.157 | 0.875 | -0.793 | 0.928 |
| [DriversFrequency=1] | 0.383 | 0.425 | 59.815 | 0.901 | 0.371 | -0.467 | 1.232 |
| [DriversFrequency=2] | 0.533 | 0.443 | 63.978 | 1.203 | 0.233 | -0.352 | 1.418 |
| [DriversFrequency=3] | 0.135 | 0.406 | 62.064 | 0.333 | 0.74 | -0.677 | 0.947 |
| [DriversFrequency=4] | 0 | 0 | . | . | . | . | . |

## Speed of the Vehicle, Presence of Parking and Level of Stress

Table D.46: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 6.742 | 1.089 | 54.068 | 6.189 | <.001 | 4.558 | 8.926 |
| [DrivenSpeed=30] | 0.79 | 0.199 | 112.756 | 3.964 | <.001 | 0.395 | 1.184 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | 2.056 | 0.218 | 111.1 | 9.431 | <.001 | 1.624 | 2.488 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| [Stress=1] | -0.87 | 1.138 | 53.256 | -0.764 | 0.448 | -3.153 | 1.413 |
| [Stress=2] | -0.674 | 1.123 | 53.175 | -0.6 | 0.551 | -2.925 | 1.578 |
| [Stress=3] | -0.54 | 1.112 | 53.052 | -0.485 | 0.629 | -2.77 | 1.69 |
| [Stress=4] | -1.242 | 1.144 | 53.289 | -1.085 | 0.283 | -3.536 | 1.053 |
| [Stress=5] | -1.779 | 1.216 | 53.687 | -1.463 | 0.149 | -4.218 | 0.659 |
| [Stress=6] | -0.916 | 1.276 | 55.77 | -0.718 | 0.476 | -3.472 | 1.64 |
| [Stress=7] | -0.26 | 1.292 | 59.775 | -0.202 | 0.841 | -2.845 | 2.324 |
| [Stress=8] | 0 | 0 | . | . | . | . | . |

## Speed of the Vehicle, Presence of Parking and Level of Tiredness

Table D.47: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 5.865 | 1.088 | 52.535 | 5.392 | <.001 | 3.683 | 8.047 |
| [DrivenSpeed=30] | 0.795 | 0.2 | 113.332 | 3.976 | <.001 | 0.399 | 1.191 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | 2.118 | 0.218 | 110.373 | 9.711 | <.001 | 1.686 | 2.551 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| [Tiredness=1] | 0.413 | 1.185 | 51.547 | 0.349 | 0.729 | -1.966 | 2.792 |
| [Tiredness=2] | -0.164 | 1.118 | 51.63 | -0.147 | 0.884 | -2.408 | 2.08 |
| [Tiredness=3] | 0.279 | 1.132 | 51.863 | 0.246 | 0.806 | -1.993 | 2.551 |
| [Tiredness=4] | -0.091 | 1.152 | 52.204 | -0.079 | 0.937 | -2.403 | 2.221 |
| [Tiredness=5] | 0.738 | 1.159 | 51.937 | 0.637 | 0.527 | -1.588 | 3.065 |
| [Tiredness=6] | -0.49 | 1.149 | 51.796 | -0.426 | 0.672 | -2.796 | 1.817 |
| [Tiredness=7] | -0.056 | 1.157 | 52.794 | -0.049 | 0.961 | -2.376 | 2.264 |
| [Tiredness=9] | 0 | 0 | . | . | . | . | . |

## Speed of the Vehicle, Presence of Parking and Familiarity

Familiarity=0: No
Familiarity=1: Yes
Familiarity=0=2: Not sure

Table D.48: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 5.908 | 0.627 | 148.022 | 9.424 | <.001 | 4.669 | 7.147 |
| [DrivenSpeed=30] | 0.785 | 0.201 | 112.752 | 3.907 | <.001 | 0.387 | 1.183 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | 2.114 | 0.219 | 109.201 | 9.666 | <.001 | 1.681 | 2.548 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| [Familiarity=0] | -0.001 | 0.617 | 151.899 | -0.002 | 0.998 | -1.22 | 1.217 |
| [Familiarity=1] | 0.109 | 0.711 | 179.091 | 0.154 | 0.878 | -1.294 | 1.512 |
| [Familiarity=2] | 0 | 0 | . | . | . | . | . |

## Speed of the Vehicle, Presence of Parking and Estimated Driven Speed

Table D.49: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 6.908 | 0.697 | 188.3 | 9.914 | <.001 | 5.533 | 8.282 |
| [DrivenSpeed=30] | 0.548 | 0.263 | 159.584 | 2.086 | 0.039 | 0.029 | 1.067 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | 2.175 | 0.223 | 122.573 | 9.734 | <.001 | 1.733 | 2.617 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| EstimatedDrivenSpeed | -0.02 | 0.014 | 193.559 | -1.472 | 0.143 | -0.047 | 0.007 |

### Presence of Parking and Estimated Driven Speed

Table D.50: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval | |
|---|---|---|---|---|---|---|---|
| | | | | | | Lower Bound | Upper Bound |
| Intercept | 7.964 | 0.487 | 181.711 | 16.342 | <.001 | 7.002 | 8.925 |
| [Parking=0] | 2.282 | 0.22 | 113.982 | 10.357 | <.001 | 1.846 | 2.719 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| EstimatedDrivenSpeed | -0.039 | 0.011 | 175.002 | -3.618 | <.001 | -0.06 | -0.018 |

### Speed of the Vehicle, Presence of Parking and Estimated Speed Limit

Table D.51: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval | |
|---|---|---|---|---|---|---|---|
| | | | | | | Lower Bound | Upper Bound |
| Intercept | 4.754 | 0.672 | 204.089 | 7.071 | <.001 | 3.429 | 6.08 |
| [DrivenSpeed=30] | 0.837 | 0.199 | 115.757 | 4.197 | <.001 | 0.442 | 1.232 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | 1.933 | 0.239 | 131.766 | 8.083 | <.001 | 1.46 | 2.406 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| EstimatedSpeedLimit | 0.026 | 0.014 | 202.139 | 1.809 | 0.072 | -0.002 | 0.053 |

### Presence of Parking and Estimated Speed Limit

Table D.52: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval | |
|---|---|---|---|---|---|---|---|
| | | | | | | Lower Bound | Upper Bound |
| Intercept | 5.55 | 0.672 | 201.396 | 8.261 | <.001 | 4.225 | 6.875 |
| [Parking=0] | 2.119 | 0.248 | 136.602 | 8.532 | <.001 | 1.628 | 2.61 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| EstimatedSpeedLimit | 0.017 | 0.014 | 201.819 | 1.141 | 0.255 | -0.012 | 0.045 |

## D.3. Room to Swerve

### Presence of Parallel Parking

Parking=0: Without Parking
Parking=1: With Parking

Table D.53: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval | |
|---|---|---|---|---|---|---|---|
| | | | | | | Lower Bound | Upper Bound |
| Intercept | 3.977 | 0.169 | 85.482 | 23.545 | <.001 | 3.641 | 4.312 |
| [Parking=0] | 1.837 | 0.264 | 137.477 | 6.959 | <.001 | 1.315 | 2.359 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |

Table D.54: Estimates

| Parking | Mean | Std. Error | df | 95% Confidence Interval | |
|---|---|---|---|---|---|
| | | | | Lower Bound | Upper Bound |
| Without parking | 5.813 | 0.241 | 167.657 | 5.338 | 6.289 |
| With parking | 3.977 | 0.169 | 85.482 | 3.641 | 4.312 |

Table D.55: Pairwise Comparisons

| (I) Parking | (J) Parking | Mean Difference (I-J) | Std. Error | df | Sig. | 95% Confidence Interval for Difference Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Without parking | With parking | 1.837 | 0.264 | 137.477 | <.001 | 1.315 | 2.359 |
| With parking | Without parking | -1.837 | 0.264 | 137.477 | <.001 | -2.359 | -1.315 |

## Speed of the Vehicle

Table D.56: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 4.197 | 0.22 | 150.536 | 19.094 | <.001 | 3.763 | 4.631 |
| [DrivenSpeed=30] | 0.664 | 0.298 | 123.329 | 2.227 | 0.028 | 0.074 | 1.254 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |

Table D.57: Estimates

| DrivenSpeed | Mean | Std. Error | df | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|
| 30 | 4.861 | 0.219 | 150.756 | 4.427 | 5.294 |
| 50 | 4.197 | 0.22 | 150.536 | 3.763 | 4.631 |

Table D.58: Pairwise Comparisons

| (I) DrivenSpeed | (J) DrivenSpeed | Mean Difference (I-J) | Std. Error | df | Sig. | 95% Confidence Interval for Difference Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| 30 | 50 | .664 | 0.298 | 123.329 | 0.028 | 0.074 | 1.254 |
| 50 | 30 | -.664 | 0.298 | 123.329 | 0.028 | -1.254 | -0.074 |

## Speed of the Vehicle and Presence of Parallel Parking

Table D.59: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 3.721 | 0.211 | 145.189 | 17.596 | <.001 | 3.303 | 4.139 |
| [DrivenSpeed=30] | 0.599 | 0.254 | 110.625 | 2.356 | 0.02 | 0.095 | 1.103 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | 1.811 | 0.262 | 134.812 | 6.925 | <.001 | 1.294 | 2.328 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |

Table D.60: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 3.771 | 0.246 | 162.543 | 15.327 | <.001 | 3.285 | 4.257 |
| [DrivenSpeed=30] | 0.51 | 0.336 | 147.525 | 1.521 | 0.13 | -0.153 | 1.173 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | 1.664 | 0.416 | 186.855 | 4.004 | <.001 | 0.844 | 2.484 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| [DrivenSpeed=30] * [Parking=0] | 0.286 | 0.645 | 155.308 | 0.443 | 0.658 | -0.988 | 1.559 |
| [DrivenSpeed=30] * [Parking=1] | 0 | 0 | . | . | . | . | . |
| [DrivenSpeed=50] * [Parking=0] | 0 | 0 | . | . | . | . | . |
| [DrivenSpeed=50] * [Parking=1] | 0 | 0 | . | . | . | . | . |

Table D.61: Estimates

| DrivenSpeed | Parking | Mean | Std. Error | df | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|
| 30 | Without parking | 6.231 | 0.355 | 158.463 | 5.53 | 6.932 |
| | With parking | 4.281 | 0.232 | 159.457 | 3.824 | 4.739 |
| 50 | Without parking | 5.435 | 0.335 | 167.833 | 4.773 | 6.097 |
| | With parking | 3.771 | 0.246 | 162.543 | 3.285 | 4.257 |

## Speed of the Vehicle and Type of Parking

TypeofParking=0: continuous parking
TypeofParking=1: Interrupted parking
TypeofParking=2: No parking

Table D.62: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 5.533 | 0.269 | 157.693 | 20.599 | <.001 | 5.003 | 6.064 |
| [DrivenSpeed=30] | 0.625 | 0.254 | 112.403 | 2.46 | 0.015 | 0.122 | 1.128 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [TypeofParking=0] | -2.208 | 0.31 | 165.998 | -7.126 | <.001 | -2.82 | -1.596 |
| [TypeofParking=1] | -1.386 | 0.306 | 156.883 | -4.528 | <.001 | -1.99 | -0.781 |
| [TypeofParking=2] | 0 | 0 | . | . | . | . | . |

Table D.63: Estimates

| TypeofParking | Mean | Std. Error | df | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|
| continuous parking | 3.638 | 0.237 | 180.347 | 3.169 | 4.106 |
| Interrupted parking | 4.46 | 0.235 | 165.361 | 3.996 | 4.925 |
| No parking | 5.846 | 0.237 | 164.259 | 5.378 | 6.314 |

Table D.64: Pairwise Comparisons

| (I) TypeofParking | (J) TypeofParking | Mean Difference (I-J) | Std. Error | df | Sig. | 95% Confidence Interval for Difference Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| continuous parking | Interrupted parking | -.823 | 0.332 | 143.281 | 0.043 | -1.627 | -0.018 |
| | No parking | -2.208 | 0.31 | 165.998 | <.001 | -2.958 | -1.459 |
| Interrupted parking | continuous parking | .823 | 0.332 | 143.281 | 0.043 | 0.018 | 1.627 |
| | No parking | -1.386 | 0.306 | 156.883 | <.001 | -2.126 | -0.645 |
| No parking | continuous parking | 2.208 | 0.31 | 165.998 | <.001 | 1.459 | 2.958 |
| | Interrupted parking | 1.386 | 0.306 | 156.883 | <.001 | 0.645 | 2.126 |

## Speed of the Vehicle, Presence of Parking and Type of Direction Separation

DirectionSeparation=0: Centre Line
DirectionSeparation=1: Grass/Vegetation
DirectionSeparation=2: Crossable Stones

Table D.65: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 4.224 | 0.277 | 158.134 | 15.273 | <.001 | 3.678 | 4.771 |
| [DrivenSpeed=30] | 0.56 | 0.249 | 114.732 | 2.252 | 0.026 | 0.067 | 1.052 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | 1.834 | 0.264 | 132.504 | 6.945 | <.001 | 1.311 | 2.356 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| [DirectionSeparation=0] | -0.741 | 0.327 | 147.181 | -2.269 | 0.025 | -1.386 | -0.095 |
| [DirectionSeparation=1] | -0.721 | 0.326 | 178.839 | -2.216 | 0.028 | -1.364 | -0.079 |
| [DirectionSeparation=2] | 0 | 0 | . | . | . | . | . |

Table D.66: Estimates

| DrivenSpeed | Mean | Std. Error | df | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|
| Center line | 4.68 | 0.268 | 142.692 | 4.151 | 5.209 |
| Grass/Vegetation | 4.7 | 0.252 | 124.714 | 4.202 | 5.198 |
| Crossable stones | 5.421 | 0.23 | 129.69 | 4.967 | 5.876 |

Table D.67: Pairwise Comparisons

| (I) TypeofParking | (J) TypeofParking | Mean Difference (I-J) | Std. Error | df | Sig. | 95% Confidence Interval for Difference Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Center line | Grass/Vegetation | -0.019 | 0.345 | 172.892 | 1 | -0.853 | 0.814 |
| | Crossable stones | -0.741 | 0.327 | 147.181 | 0.074 | -1.532 | 0.05 |
| Grass/Vegetation | Center line | 0.019 | 0.345 | 172.892 | 1 | -0.814 | 0.853 |
| | Crossable stones | -0.721 | 0.326 | 178.839 | 0.084 | -1.508 | 0.065 |
| Crossable stones | Center line | 0.741 | 0.327 | 147.181 | 0.074 | -0.05 | 1.532 |
| | Grass/Vegetation | 0.721 | 0.326 | 178.839 | 0.084 | -0.065 | 1.508 |

## Speed of the Vehicle, Presence of Parking and Age

Table D.68: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | 95% Confidence Interval Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 4.37 | 0.423 | 73.679 | 10.324 | <.001 | 3.526 | 5.213 |
| [DrivenSpeed=30] | 0.589 | 0.254 | 110.887 | 2.322 | 0.022 | 0.086 | 1.092 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | 1.831 | 0.261 | 133.909 | 7.02 | <.001 | 1.315 | 2.347 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| Age | -0.02 | 0.011 | 60.855 | -1.818 | 0.074 | -0.043 | 0.002 |

## Speed of the Vehicle, Presence of Parking and Gender

Gender=0: Male
Gender=1: Female

Table D.69: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | 95% Confidence Interval Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 3.501 | 0.285 | 101.568 | 12.297 | <.001 | 2.936 | 4.065 |
| [DrivenSpeed=30] | 0.597 | 0.254 | 110.556 | 2.346 | 0.021 | 0.093 | 1.101 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | 1.794 | 0.261 | 135.193 | 6.871 | <.001 | 1.278 | 2.311 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| [Gender=0] | 0.343 | 0.311 | 61.022 | 1.103 | 0.274 | -0.279 | 0.966 |
| [Gender=1] | 0 | 0 | . | . | . | . | . |

## Speed of the Vehicle, Presence of Parking and driver's license

DriversLicense=0: 0-2 years
DriversLicense=1: 2-5 years
DriversLicense=2: 5-10 years
DriversLicense=3: more than 10 years

Table D.70: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | 95% Confidence Interval Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 3.504 | 0.282 | 93.645 | 12.417 | <.001 | 2.944 | 4.065 |
| [DrivenSpeed=30] | 0.632 | 0.231 | 9.71E+08 | 2.737 | 0.034 | 0.18 | 1.085 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | 1.766 | 0.244 | 11488.84 | 7.244 | <.001 | 1.288 | 2.244 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| [DriversLicense=0] | 0 | 0.669 | 53.191 | 0 | 1 | -1.341 | 1.341 |
| [DriversLicense=1] | 0.489 | 0.482 | 53.268 | 1.015 | 0.315 | -0.477 | 1.455 |
| [DriversLicense=2] | 0.512 | 0.352 | 53.257 | 1.453 | 0.152 | -0.195 | 1.219 |
| [DriversLicense=3] | 0 | 0 | . | . | . | . | . |

## Speed of the Vehicle, Presence of Parking and Driving Frequency

DriversFrequency=0: (Almost) never
DriversFrequency=1: Monthly
DriversFrequency=2: Once every two weeks
DriversFrequency=3: Weekly
DriversFrequency=4: (Almost) daily

Table D.71: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 3.224 | 0.357 | 82.365 | 9.025 | <.001 | 2.514 | 3.935 |
| [DrivenSpeed=30] | 0.616 | 0.254 | 110.864 | 2.425 | 0.017 | 0.113 | 1.12 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | 1.838 | 0.261 | 134.231 | 7.046 | <.001 | 1.322 | 2.354 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| [DriversFrequency=0] | 1.275 | 0.465 | 57.695 | 2.744 | 0.008 | 0.345 | 2.206 |
| [DriversFrequency=1] | 0.48 | 0.465 | 57.877 | 1.031 | 0.307 | -0.451 | 1.411 |
| [DriversFrequency=2] | 0.601 | 0.476 | 57.779 | 1.262 | 0.212 | -0.352 | 1.553 |
| [DriversFrequency=3] | 0.287 | 0.44 | 57.644 | 0.652 | 0.517 | -0.594 | 1.167 |
| [DriversFrequency=4] | 0 | 0 | . | . | . | . | . |

## Speed of the Vehicle, Presence of Parking and Level of Stress

Table D.72: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 4.735 | 1.22 | 56.314 | 3.883 | <.001 | 2.292 | 7.178 |
| [DrivenSpeed=30] | 0.618 | 0.255 | 109.682 | 2.421 | 0.017 | 0.112 | 1.124 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | 1.761 | 0.266 | 131.456 | 6.612 | <.001 | 1.234 | 2.288 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| [Stress=1] | -1.467 | 1.271 | 54.98 | -1.154 | 0.253 | -4.015 | 1.08 |
| [Stress=2] | -1.224 | 1.255 | 55.014 | -0.976 | 0.334 | -3.739 | 1.29 |
| [Stress=3] | -0.643 | 1.245 | 55.155 | -0.516 | 0.608 | -3.137 | 1.851 |
| [Stress=4] | -0.81 | 1.278 | 55.117 | -0.633 | 0.529 | -3.372 | 1.752 |
| [Stress=5] | -1.022 | 1.355 | 55 | -0.754 | 0.454 | -3.738 | 1.694 |
| [Stress=6] | -1.387 | 1.399 | 54.975 | -0.991 | 0.326 | -4.191 | 1.418 |
| [Stress=7] | -0.109 | 1.401 | 55.138 | -0.078 | 0.938 | -2.915 | 2.698 |
| [Stress=8] | 0 | 0 | . | . | . | . | . |

## Speed of the Vehicle, Presence of Parking and Level of Tiredness

Table D.73: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 5.376 | 1.213 | 56.191 | 4.433 | <.001 | 2.947 | 7.805 |
| [DrivenSpeed=30] | 0.61 | 0.254 | 110.592 | 2.399 | 0.018 | 0.106 | 1.115 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | 1.777 | 0.261 | 135.06 | 6.807 | <.001 | 1.261 | 2.293 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| [Tiredness=1] | -1.783 | 1.321 | 54.938 | -1.35 | 0.183 | -4.429 | 0.864 |
| [Tiredness=2] | -2.035 | 1.245 | 55.002 | -1.634 | 0.108 | -4.531 | 0.461 |
| [Tiredness=3] | -1.756 | 1.259 | 54.967 | -1.394 | 0.169 | -4.279 | 0.768 |
| [Tiredness=4] | -1.499 | 1.279 | 54.941 | -1.173 | 0.246 | -4.062 | 1.063 |
| [Tiredness=5] | -1.132 | 1.291 | 55.252 | -0.877 | 0.384 | -3.719 | 1.454 |
| [Tiredness=6] | -2.126 | 1.28 | 55.087 | -1.661 | 0.102 | -4.69 | 0.438 |
| [Tiredness=7] | -1.265 | 1.279 | 54.947 | -0.989 | 0.327 | -3.827 | 1.298 |
| [Tiredness=9] | 0 | 0 | . | . | . | . | . |

## Speed of the Vehicle, Presence of Parking and Familiarity

Familiarity=0: No
Familiarity=1: Yes
Familiarity=0=2: Not sure

Table D.74: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 2.915 | 0.774 | 133.342 | 3.765 | <.001 | 1.384 | 4.447 |
| [DrivenSpeed=30] | 0.555 | 0.252 | 110.441 | 2.205 | 0.03 | 0.056 | 1.053 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | 1.896 | 0.261 | 132.826 | 7.26 | <.001 | 1.379 | 2.412 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| [Familiarity=0] | 0.78 | 0.765 | 137.275 | 1.02 | 0.31 | -0.732 | 2.293 |
| [Familiarity=1] | 1.582 | 0.852 | 159.129 | 1.857 | 0.065 | -0.101 | 3.265 |
| [Familiarity=2] | 0 | 0 | . | . | . | . | . |

## Speed of the Vehicle, Presence of Parking and Estimated Driven Speed

Table D.75: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 4.155 | 0.835 | 178.391 | 4.974 | <.001 | 2.507 | 5.803 |
| [DrivenSpeed=30] | 0.496 | 0.335 | 162.939 | 1.483 | 0.14 | -0.164 | 1.157 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | 1.828 | 0.265 | 136.509 | 6.895 | <.001 | 1.304 | 2.352 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| EstimatedDrivenSpeed | -0.009 | 0.016 | 178.423 | -0.539 | 0.591 | -0.041 | 0.023 |

## Presence of Parking and Estimated Driven Speed

Table D.76: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 4.991 | 0.563 | 188.893 | 8.862 | <.001 | 3.88 | 6.102 |
| [Parking=0] | 1.863 | 0.266 | 137.39 | 7.017 | <.001 | 1.338 | 2.388 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| EstimatedDrivenSpeed | -0.023 | 0.012 | 190.99 | -1.828 | 0.069 | -0.047 | 0.002 |

## Speed of the Vehicle, Presence of Parking and Estimated Speed Limit

Table D.77: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 3.037 | 0.751 | 196.741 | 4.044 | <.001 | 1.556 | 4.518 |
| [Parking=0] | 1.703 | 0.286 | 141.661 | 5.964 | <.001 | 1.139 | 2.268 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| EstimatedSpeedLimit | 0.015 | 0.016 | 193.221 | 0.947 | 0.345 | -0.016 | 0.046 |
| [DrivenSpeed=30] | 0.625 | 0.256 | 111.166 | 2.441 | 0.016 | 0.118 | 1.133 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |

### Presence of Parking and Estimated Speed Limit

Table D.78: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 3.508 | 0.714 | 185.368 | 4.911 | <.001 | 2.099 | 4.918 |
| [Parking=0] | 1.762 | 0.288 | 147.315 | 6.11 | <.001 | 1.192 | 2.332 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| EstimatedSpeedLimit | 0.01 | 0.016 | 187.696 | 0.663 | 0.508 | -0.021 | 0.041 |

## D.4. Room to Parked Vehicles

### Speed of the Vehicle

Table D.79: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 4.065 | 0.217 | 87.47 | 18.717 | <.001 | 3.634 | 4.497 |
| [DrivenSpeed=30] | 0.276 | 0.264 | 74.269 | 1.045 | 0.299 | -0.25 | 0.801 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |

Table D.80: Estimates

| DrivenSpeed | Mean | Std. Error | df | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|
| 30 | 4.341 | 0.217 | 101.909 | 3.91 | 4.772 |
| 50 | 4.065 | 0.217 | 87.47 | 3.634 | 4.497 |

Table D.81: Pairwise Comparisons

| (I) DrivenSpeed | (J) DrivenSpeed | Mean Difference (I-J) | Std. Error | df | Sig. | 95% Confidence Interval for Difference Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| 30 | 50 | 0.276 | 0.264 | 74.269 | 0.299 | -0.25 | 0.801 |
| 50 | 30 | -0.276 | 0.264 | 74.269 | 0.299 | -0.801 | 0.25 |

### Type of Parking

TypeofParking=0: continuous parking
TypeofParking=1: Interrupted parking
TypeofParking=2: No parking

Table D.82: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 4.642 | 0.205 | 87.254 | 22.628 | <.001 | 4.235 | 5.05 |
| [TypeofParking=0] | -0.849 | 0.217 | 56.769 | -3.903 | <.001 | -1.284 | -0.413 |
| [TypeofParking=1] | 0 | 0 | . | . | . | . | . |

Table D.83: Estimates

| TypeofParking | Mean | Std. Error | df | 95% Confidence Interval<br>Lower Bound | <br>Upper Bound |
|---|---|---|---|---|---|
| continuous parking | 3.794 | 0.2 | 81.415 | 3.397 | 4.191 |
| Interrupted parking | 4.642 | 0.205 | 87.254 | 4.235 | 5.05 |

Table D.84: Pairwise Comparisons

| (I) TypeofParking | (J) TypeofParking | Mean Difference (I-J) | Std. Error | df | Sig. | 95% Confidence Interval for Difference<br>Lower Bound | <br>Upper Bound |
|---|---|---|---|---|---|---|---|
| continuous parking | Interrupted parking | -.849 | 0.217 | 56.769 | <.001 | -1.284 | -0.413 |
| Interrupted parking | continuous parking | .849 | 0.217 | 56.769 | <.001 | 0.413 | 1.284 |

## Type of Parking and Type of Direction Separation

DirectionSeparation=0: Centre Line
DirectionSeparation=1: Grass/Vegetation
DirectionSeparation=2: Crossable Stones

Table D.85: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval<br>Lower Bound | <br>Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 5.25 | 0.251 | 83.264 | 20.928 | <.001 | 4.751 | 5.749 |
| [TypeofParking=0] | -0.694 | 0.202 | 61.416 | -3.441 | 0.001 | -1.097 | -0.291 |
| [TypeofParking=1] | 0 | 0 | . | . | . | . | . |
| [DirectionSeparation=0] | -1.686 | 0.264 | 73.889 | -6.388 | <.001 | -2.212 | -1.16 |
| [DirectionSeparation=1] | -0.261 | 0.312 | 86.248 | -0.836 | 0.406 | -0.882 | 0.36 |
| [DirectionSeparation=2] | 0 | 0 | . | . | . | . | . |

Table D.86: Estimates

| DrivenSpeed | Mean | Std. Error | df | 95% Confidence Interval<br>Lower Bound | <br>Upper Bound |
|---|---|---|---|---|---|
| Center line | 3.217 | 0.248 | 98.277 | 2.724 | 3.71 |
| Grass/Vegetation | 4.642 | 0.267 | 102.103 | 4.112 | 5.172 |
| Crossable stones | 4.903 | 0.231 | 88.359 | 4.443 | 5.363 |

Table D.87: Pairwise Comparisons

| (I) TypeofParking | (J) TypeofParking | Mean Difference (I-J) | Std. Error | df | Sig. | 95% Confidence Interval for Difference<br>Lower Bound | <br>Upper Bound |
|---|---|---|---|---|---|---|---|
| Center line | Grass/Vegetation | -1.425 | 0.341 | 99.722 | <.001 | -2.256 | -0.594 |
| | Crossable stones | -1.686 | 0.264 | 73.889 | <.001 | -2.332 | -1.039 |
| Grass/Vegetation | Center line | 1.425 | 0.341 | 99.722 | <.001 | 0.594 | 2.256 |
| | Crossable stones | -0.261 | 0.312 | 86.248 | 1 | -1.024 | 0.502 |
| Crossable stones | Center line | 1.686 | 0.264 | 73.889 | <.001 | 1.039 | 2.332 |
| | Grass/Vegetation | 0.261 | 0.312 | 86.248 | 1 | -0.502 | 1.024 |

## Type of Parking and Age

Table D.88: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 4.986 | 0.474 | 57.932 | 10.521 | <.001 | 4.037 | 5.934 |
| [TypeofParking=0] | -0.848 | 0.217 | 57.043 | -3.914 | <.001 | -1.282 | -0.414 |
| [TypeofParking=1] | 0 | 0 | . | . | . | . | . |
| Age | -0.01 | 0.013 | 47.506 | -0.806 | 0.424 | -0.036 | 0.015 |

## Type of Parking and Gender

Gender=0: Male
Gender=1: Female

Table D.89: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 4.232 | 0.294 | 71.318 | 14.391 | <.001 | 3.646 | 4.818 |
| [TypeofParking=0] | -0.855 | 0.218 | 53.109 | -3.926 | <.001 | -1.291 | -0.418 |
| [TypeofParking=1] | 0 | 0 | . | . | . | . | . |
| [Gender=0] | 0.701 | 0.343 | 54.923 | 2.044 | 0.046 | 0.014 | 1.389 |
| [Gender=1] | 0 | 0 | . | . | . | . | . |

Table D.90: Estimates

| Gender | Mean | Std. Error | df | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|
| Man | 4.506 | 0.216 | 57.557 | 4.074 | 4.938 |
| Woman | 3.805 | 0.267 | 52.763 | 3.269 | 4.34 |

Table D.91: Pairwise Comparisons

| (I) Gender | (J) Gender | Mean Difference (I-J) | Std. Error | df | Sig. | 95% Confidence Interval for Difference Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Man | Woman | .701 | 0.343 | 54.923 | 0.046 | 0.014 | 1.389 |
| Woman | Man | -.701 | 0.343 | 54.923 | 0.046 | -1.389 | -0.014 |

## Type of Parking and driver's license

DriversLicense=0: 0-2 years
DriversLicense=1: 2-5 years
DriversLicense=2: 5-10 years
DriversLicense=3: more than 10 years

Table D.92: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 4.095 | 0.373 | 56.576 | 10.981 | <.001 | 3.348 | 4.842 |
| [TypeofParking=0] | -0.845 | 0.218 | 51.157 | -3.874 | <.001 | -1.283 | -0.407 |
| [TypeofParking=1] | 0 | 0 | . | . | . | . | . |
| [Gender=0] | 0.713 | 0.345 | 49.281 | 2.066 | 0.044 | 0.019 | 1.408 |
| [Gender=1] | 0 | 0 | . | . | . | . | . |
| [DriversLicense=0] | 0.848 | 0.71 | 37.768 | 1.194 | 0.24 | -0.59 | 2.287 |
| [DriversLicense=1] | 0.464 | 0.513 | 48.101 | 0.905 | 0.37 | -0.568 | 1.496 |
| [DriversLicense=2] | -0.043 | 0.38 | 52.001 | -0.112 | 0.911 | -0.805 | 0.72 |
| [DriversLicense=3] | 0 | 0 | . | . | . | . | . |

## Type of Parking, Gender and Driving Frequency

DriversFrequency=0: (Almost) never
DriversFrequency=1: Monthly
DriversFrequency=2: Once every two weeks
DriversFrequency=3: Weekly
DriversFrequency=4: (Almost) daily

Table D.93: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 3.714 | 0.453 | 58.313 | 8.193 | <.001 | 2.807 | 4.621 |
| [TypeofParking=0] | -0.852 | 0.216 | 54.09 | -3.939 | <.001 | -1.285 | -0.418 |
| [TypeofParking=1] | 0 | 0 | . | . | . | . | . |
| [Gender=0] | 0.813 | 0.357 | 54.485 | 2.28 | 0.027 | 0.098 | 1.528 |
| [Gender=1] | 0 | 0 | . | . | . | . | . |
| [DriversFrequency=0] | 0.675 | 0.534 | 51.988 | 1.263 | 0.212 | -0.398 | 1.747 |
| [DriversFrequency=1] | 0.258 | 0.534 | 52.243 | 0.484 | 0.631 | -0.813 | 1.33 |
| [DriversFrequency=2] | 1.154 | 0.555 | 54.996 | 2.079 | 0.042 | 0.042 | 2.266 |
| [DriversFrequency=3] | 0.309 | 0.515 | 54.744 | 0.6 | 0.551 | -0.723 | 1.341 |
| [DriversFrequency=4] | 0 | 0 | . | . | . | . | . |

## Type of Parking, Gender and Level of Stress

Table D.94: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 4.05 | 1.344 | 33.519 | 3.012 | 0.005 | 1.316 | 6.783 |
| [TypeofParking=0] | -0.842 | 0.22 | 55.253 | -3.827 | <.001 | -1.283 | -0.401 |
| [TypeofParking=1] | 0 | 0 | . | . | . | . | . |
| [Gender=0] | 0.814 | 0.392 | 46.995 | 2.076 | 0.043 | 0.025 | 1.603 |
| [Gender=1] | 0 | 0 | . | . | . | . | . |
| [Stress=1] | -0.248 | 1.355 | 33.566 | -0.183 | 0.856 | -3.003 | 2.506 |
| [Stress=2] | -0.126 | 1.339 | 33.351 | -0.094 | 0.925 | -2.85 | 2.597 |
| [Stress=3] | 0.272 | 1.333 | 33.512 | 0.204 | 0.84 | -2.44 | 2.983 |
| [Stress=4] | 0.349 | 1.385 | 34.291 | 0.252 | 0.802 | -2.465 | 3.163 |
| [Stress=5] | 0.686 | 1.465 | 36.037 | 0.468 | 0.643 | -2.286 | 3.657 |
| [Stress=6] | 0.096 | 1.533 | 33.047 | 0.063 | 0.95 | -3.022 | 3.214 |
| [Stress=7] | -0.01 | 1.555 | 42.929 | -0.006 | 0.995 | -3.146 | 3.126 |
| [Stress=8] | 0 | 0 | . | . | . | . | . |

### Type of Parking, Gender and Level of Tiredness

Table D.95: Estimates of Fixed Effects

| | | | | | | 95% Confidence Interval | |
|---|---|---|---|---|---|---|---|
| Parameter | Estimate | Std. Error | df | t | Sig. | Lower Bound | Upper Bound |
| Intercept | 3.073 | 1.229 | 31.047 | 2.501 | 0.018 | 0.567 | 5.578 |
| [TypeofParking=0] | -0.869 | 0.216 | 53.35 | -4.016 | <.001 | -1.303 | -0.435 |
| [TypeofParking=1] | 0 | 0 | . | . | . | . | . |
| [Gender=0] | 0.883 | 0.356 | 47.481 | 2.48 | 0.017 | 0.167 | 1.599 |
| [Gender=1] | 0 | 0 | . | . | . | . | . |
| [Tiredness=1] | 2.569 | 1.314 | 31.832 | 1.955 | 0.059 | -0.108 | 5.247 |
| [Tiredness=2] | 0.62 | 1.226 | 30.69 | 0.506 | 0.617 | -1.882 | 3.122 |
| [Tiredness=3] | 0.965 | 1.238 | 31.343 | 0.78 | 0.441 | -1.558 | 3.489 |
| [Tiredness=4] | 1.278 | 1.281 | 33.495 | 0.998 | 0.325 | -1.326 | 3.883 |
| [Tiredness=5] | 0.865 | 1.29 | 34.005 | 0.671 | 0.507 | -1.756 | 3.487 |
| [Tiredness=6] | 0.613 | 1.272 | 31.816 | 0.482 | 0.633 | -1.978 | 3.204 |
| [Tiredness=7] | 1.247 | 1.266 | 31.717 | 0.985 | 0.332 | -1.333 | 3.827 |
| [Tiredness=9] | 0 | 0 | . | . | . | . | . |

### Type of Parking, Gender and Familiarity

Familiarity=0: No
Familiarity=1: Yes
Familiarity=0=2: Not sure

Table D.96: Estimates of Fixed Effects

| | | | | | | 95% Confidence Interval | |
|---|---|---|---|---|---|---|---|
| Parameter | Estimate | Std. Error | df | t | Sig. | Lower Bound | Upper Bound |
| Intercept | 5.265 | 0.692 | 30.997 | 7.613 | <.001 | 3.855 | 6.675 |
| [TypeofParking=0] | -0.871 | 0.212 | 55.314 | -4.1 | <.001 | -1.296 | -0.445 |
| [TypeofParking=1] | 0 | 0 | . | . | . | . | . |
| [Gender=0] | 0.724 | 0.361 | 53.34 | 2.008 | 0.05 | 0.001 | 1.447 |
| [Gender=1] | 0 | 0 | . | . | . | . | . |
| [Familiarity=0] | -1.16 | 0.658 | 22.681 | -1.764 | 0.091 | -2.521 | 0.201 |
| [Familiarity=1] | -0.163 | 0.809 | 47.358 | -0.202 | 0.841 | -1.791 | 1.465 |
| [Familiarity=2] | 0 | 0 | . | . | . | . | . |

### Type of Parking and Estimated Driven Speed

Table D.97: Estimates of Fixed Effects

| | | | | | | 95% Confidence Interval | |
|---|---|---|---|---|---|---|---|
| Parameter | Estimate | Std. Error | df | t | Sig. | Lower Bound | Upper Bound |
| Intercept | 5.066 | 0.603 | 115.546 | 8.397 | <.001 | 3.871 | 6.26 |
| [TypeofParking=0] | -0.864 | 0.225 | 61.667 | -3.841 | <.001 | -1.314 | -0.414 |
| [TypeofParking=1] | 0 | 0 | . | . | . | . | . |
| EstimatedDrivenSpeed | -0.01 | 0.013 | 111.503 | -0.755 | 0.452 | -0.035 | 0.016 |

### Type of Parking and Estimated Speed Limit

Table D.98: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 4.285 | 0.745 | 129.755 | 5.752 | <.001 | 2.811 | 5.759 |
| [TypeofParking=0] | -0.752 | 0.23 | 54.171 | -3.268 | 0.002 | -1.213 | -0.291 |
| [TypeofParking=1] | 0 | 0 | . | . | . | . | . |
| EstimatedSpeedLimit | 0.007 | 0.016 | 125.593 | 0.447 | 0.656 | -0.024 | 0.038 |

## D.5. Level of Attention Required

### Presence of Parallel Parking

Parking=0: Without Parking
Parking=1: With Parking

Table D.99: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 5.694 | 0.139 | 83.278 | 40.945 | <.001 | 5.417 | 5.97 |
| [Parking=0] | -1.897 | 0.18 | 134.237 | -10.521 | <.001 | -2.254 | -1.541 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |

Table D.100: Estimates

| Parking | Mean | Std. Error | df | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|
| Without parking | 3.796 | 0.176 | 147.994 | 3.449 | 4.144 |
| With parking | 5.694 | 0.139 | 83.278 | 5.417 | 5.97 |

Table D.101: Pairwise Comparisons

| (I) Parking | (J) Parking | Mean Difference (I-J) | Std. Error | df | Sig. | 95% Confidence Interval for Difference Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Without parking | With parking | -1.897 | 0.18 | 134.237 | <.001 | -2.254 | -1.541 |
| With parking | Without parking | 1.897 | 0.18 | 134.237 | <.001 | 1.541 | 2.254 |

### Speed of the Vehicle

Table D.102: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 5.423 | 0.157 | 125.534 | 34.447 | <.001 | 5.111 | 5.734 |
| [DrivenSpeed=30] | -0.844 | 0.193 | 113.956 | -4.363 | <.001 | -1.228 | -0.461 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |

Table D.103: Estimates

| DrivenSpeed | Mean | Std. Error | df | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|
| 30 | 4.579 | 0.157 | 124.872 | 4.268 | 4.889 |
| 50 | 5.423 | 0.157 | 125.534 | 5.111 | 5.734 |

Table D.104: Pairwise Comparisons

| (I) DrivenSpeed | (J) DrivenSpeed | Mean Difference (I-J) | Std. Error | df | Sig. | 95% Confidence Interval for Difference Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| 30 | 50 | -.844 | 0.193 | 113.956 | <.001 | -1.228 | -0.461 |
| 50 | 30 | .844 | 0.193 | 113.956 | <.001 | 0.461 | 1.228 |

## Speed of the Vehicle and Presence of Parallel Parking

Table D.105: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 5.919 | 0.157 | 118.043 | 37.675 | <.001 | 5.608 | 6.23 |
| [DrivenSpeed=30] | -0.561 | 0.168 | 123.173 | -3.344 | 0.001 | -0.893 | -0.229 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | -1.758 | 0.182 | 136.249 | -9.668 | <.001 | -2.117 | -1.398 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |

Table D.106: Estimates

| DrivenSpeed | Parking | Mean | Std. Error | df | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|
| 30 | Without parking | 3.42 | 0.233 | 149.051 | 2.96 | 3.88 |
| | With parking | 5.434 | 0.178 | 153.908 | 5.083 | 5.785 |
| 50 | Without parking | 4.345 | 0.236 | 174.894 | 3.879 | 4.812 |
| | With parking | 5.829 | 0.172 | 135.598 | 5.49 | 6.168 |

Table D.107: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 5.829 | 0.172 | 135.598 | 33.973 | <.001 | 5.49 | 6.168 |
| [DrivenSpeed=30] | -0.395 | 0.214 | 139.633 | -1.852 | 0.066 | -0.818 | 0.027 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | -1.484 | 0.264 | 169.741 | -5.623 | <.001 | -2.005 | -0.963 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| [DrivenSpeed=30] * [Parking=0] | -0.53 | 0.388 | 118.832 | -1.366 | 0.175 | -1.299 | 0.238 |
| [DrivenSpeed=30] * [Parking=1] | 0 | 0 | . | . | . | . | . |
| [DrivenSpeed=50] * [Parking=0] | 0 | 0 | . | . | . | . | . |
| [DrivenSpeed=50] * [Parking=1] | 0 | 0 | . | . | . | . | . |

## Speed of the Vehicle and Type of Parking

TypeofParking=0: continuous parking
TypeofParking=1: Interrupted parking
TypeofParking=2: No parking

Table D.108: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 4.162 | 0.206 | 175.394 | 20.23 | <.001 | 3.756 | 4.568 |
| [DrivenSpeed=30] | -0.564 | 0.17 | 123.371 | -3.327 | 0.001 | -0.9 | -0.228 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [TypeofParking=0] | 1.766 | 0.21 | 163.381 | 8.397 | <.001 | 1.35 | 2.181 |
| [TypeofParking=1] | 1.75 | 0.209 | 142.722 | 8.392 | <.001 | 1.338 | 2.162 |
| [TypeofParking=2] | 0 | 0 | . | . | . | . | . |

Table D.109: Estimates

| TypeofParking | Mean | Std. Error | df | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|
| continuous parking | 5.646 | 0.175 | 152.259 | 5.3 | 5.992 |
| Interrupted parking | 5.63 | 0.172 | 147.429 | 5.29 | 5.971 |
| No parking | 3.88 | 0.178 | 151.004 | 3.528 | 4.232 |

Table D.110: Pairwise Comparisons

| (I) TypeofParking | (J) TypeofParking | Mean Difference (I-J) | Std. Error | df | Sig. | 95% Confidence Interval for Difference Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| continuous parking | Interrupted parking | 0.015 | 0.206 | 124.602 | 1 | -0.486 | 0.516 |
| | No parking | 1.766 | 0.21 | 163.381 | <.001 | 1.257 | 2.274 |
| Interrupted parking | continuous parking | -0.015 | 0.206 | 124.602 | 1 | -0.516 | 0.486 |
| | No parking | 1.750 | 0.209 | 142.722 | <.001 | 1.245 | 2.255 |
| No parking | continuous parking | -1.766 | 0.21 | 163.381 | <.001 | -2.274 | -1.257 |
| | Interrupted parking | -1.750 | 0.209 | 142.722 | <.001 | -2.255 | -1.245 |

### Speed of the Vehicle, Presence of Parking and Type of Direction Separation

DirectionSeparation=0: Centre Line
DirectionSeparation=1: Grass/Vegetation
DirectionSeparation=2: Crossable Stones

Table D.111: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 5.843 | 0.194 | 114.724 | 30.119 | <.001 | 5.459 | 6.227 |
| [DrivenSpeed=30] | -0.664 | 0.16 | 141.038 | -4.153 | <.001 | -0.981 | -0.348 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | -1.72 | 0.172 | 154.172 | -9.986 | <.001 | -2.061 | -1.38 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| [DirectionSeparation=0] | -0.096 | 0.208 | 183.03 | -0.464 | 0.643 | -0.506 | 0.313 |
| [DirectionSeparation=1] | 0.342 | 0.199 | 150.161 | 1.716 | 0.088 | -0.052 | 0.736 |
| [DirectionSeparation=2] | 0 | 0 | . | . | . | . | . |

Table D.112: Estimates

| DirectionSeparation | Mean | Std. Error | df | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|
| Center line | 4.554 | 0.182 | 116.419 | 4.193 | 4.916 |
| Grass/Vegetation | 4.993 | 0.177 | 91.162 | 4.64 | 5.345 |
| Crossable stones | 4.651 | 0.177 | 103.506 | 4.299 | 5.002 |

Table D.113: Pairwise Comparisons

| (I) DirectionSeparation | (J) DirectionSeparation | Mean Difference (I-J) | Std. Error | df | Sig. | 95% Confidence Interval for Difference Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Center line | Grass/Vegetation | -0.438 | 0.208 | 163.518 | 0.111 | -0.942 | 0.066 |
| | Crossable stones | -0.096 | 0.208 | 183.03 | 1 | -0.598 | 0.405 |
| Grass/Vegetation | Center line | 0.438 | 0.208 | 163.518 | 0.111 | -0.066 | 0.942 |
| | Crossable stones | 0.342 | 0.199 | 150.161 | 0.264 | -0.14 | 0.824 |
| Crossable stones | Center line | 0.096 | 0.208 | 183.03 | 1 | -0.405 | 0.598 |
| | Grass/Vegetation | -0.342 | 0.199 | 150.161 | 0.264 | -0.824 | 0.14 |

## Speed of the Vehicle, Presence of Parking and Age

Table D.114: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 5.366 | 0.348 | 67.41 | 15.436 | <.001 | 4.672 | 6.059 |
| [DrivenSpeed=30] | -0.572 | 0.168 | 123.436 | -3.407 | <.001 | -0.904 | -0.24 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | -1.777 | 0.182 | 135.129 | -9.749 | <.001 | -2.138 | -1.417 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| Age | 0.017 | 0.009 | 61.176 | 1.77 | 0.082 | -0.002 | 0.036 |

## Speed of the Vehicle, Presence of Parking and Gender

Gender=0: Male
Gender=1: Female

Table D.115: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 6.146 | 0.225 | 85.319 | 27.365 | <.001 | 5.7 | 6.593 |
| [DrivenSpeed=30] | -0.575 | 0.168 | 123.178 | -3.416 | <.001 | -0.908 | -0.242 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | -1.749 | 0.182 | 136.625 | -9.625 | <.001 | -2.109 | -1.39 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| [Gender=0] | -0.378 | 0.26 | 60.814 | -1.452 | 0.152 | -0.898 | 0.142 |
| [Gender=1] | 0 | 0 | . | . | . | . | . |

## Speed of the Vehicle, Presence of Parking and driver's license

DriversLicense=0: 0-2 years
DriversLicense=1: 2-5 years
DriversLicense=2: 5-10 years
DriversLicense=3: more than 10 years

Table D.116: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 5.869 | 0.224 | 84.795 | 26.175 | <.001 | 5.423 | 6.315 |
| [DrivenSpeed=30] | -0.562 | 0.168 | 123.318 | -3.349 | 0.001 | -0.895 | -0.23 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | -1.76 | 0.182 | 135.861 | -9.667 | <.001 | -2.12 | -1.4 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| [DriversLicense=0] | 0.365 | 0.554 | 58.764 | 0.658 | 0.513 | -0.744 | 1.474 |
| [DriversLicense=1] | 0.036 | 0.399 | 58.862 | 0.091 | 0.928 | -0.762 | 0.835 |
| [DriversLicense=2] | 0.056 | 0.292 | 58.856 | 0.191 | 0.849 | -0.529 | 0.641 |
| [DriversLicense=3] | 0 | 0 | . | . | . | . | . |

## Speed of the Vehicle, Presence of Parking and Driving Frequency

DriversFrequency=0: (Almost) never
DriversFrequency=1: Monthly
DriversFrequency=2: Once every two weeks
DriversFrequency=3: Weekly
DriversFrequency=4: (Almost) daily

Table D.117: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 6.537 | 0.275 | 74.458 | 23.764 | <.001 | 5.989 | 7.085 |
| [DrivenSpeed=30] | -0.57 | 0.166 | 123.427 | -3.431 | <.001 | -0.898 | -0.241 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | -1.783 | 0.182 | 135.046 | -9.803 | <.001 | -2.143 | -1.423 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| [DriversFrequency=0] | -0.375 | 0.371 | 58.033 | -1.012 | 0.316 | -1.117 | 0.367 |
| [DriversFrequency=1] | -1.05 | 0.371 | 58.066 | -2.831 | 0.006 | -1.792 | -0.307 |
| [DriversFrequency=2] | -1.375 | 0.38 | 58.432 | -3.617 | <.001 | -2.135 | -0.614 |
| [DriversFrequency=3] | -0.348 | 0.351 | 58.066 | -0.991 | 0.326 | -1.05 | 0.355 |
| [DriversFrequency=4] | 0 | 0 | . | . | . | . | . |

## Speed of the Vehicle, Presence of Parking and Level of Stress

Table D.118: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 6.793 | 1.036 | 55.471 | 6.557 | <.001 | 4.717 | 8.869 |
| [DrivenSpeed=30] | -0.549 | 0.168 | 123.487 | -3.269 | 0.001 | -0.881 | -0.216 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | -1.765 | 0.183 | 136.159 | -9.627 | <.001 | -2.128 | -1.403 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| [Stress=1] | -1.1 | 1.083 | 54.813 | -1.015 | 0.314 | -3.271 | 1.071 |
| [Stress=2] | -1.079 | 1.069 | 54.817 | -1.009 | 0.317 | -3.222 | 1.064 |
| [Stress=3] | -0.91 | 1.06 | 54.852 | -0.858 | 0.395 | -3.034 | 1.215 |
| [Stress=4] | -0.358 | 1.089 | 54.838 | -0.329 | 0.744 | -2.54 | 1.824 |
| [Stress=5] | -0.668 | 1.155 | 54.817 | -0.579 | 0.565 | -2.983 | 1.646 |
| [Stress=6] | -1.085 | 1.193 | 54.842 | -0.91 | 0.367 | -3.476 | 1.305 |
| [Stress=7] | -1.089 | 1.193 | 54.876 | -0.913 | 0.365 | -3.481 | 1.302 |
| [Stress=8] | 0 | 0 | . | . | . | . | . |

## Speed of the Vehicle, Presence of Parking and Level of Tiredness

Table D.119: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 5.164 | 1.036 | 55.147 | 4.983 | <.001 | 3.087 | 7.241 |
| [DrivenSpeed=30] | -0.583 | 0.168 | 123.02 | -3.463 | <.001 | -0.917 | -0.25 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | -1.738 | 0.182 | 136.242 | -9.559 | <.001 | -2.098 | -1.379 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| [Tiredness=1] | 0.741 | 1.132 | 54.538 | 0.654 | 0.516 | -1.529 | 3.01 |
| [Tiredness=2] | 1.014 | 1.068 | 54.564 | 0.95 | 0.346 | -1.126 | 3.154 |
| [Tiredness=3] | 0.991 | 1.08 | 54.551 | 0.918 | 0.363 | -1.173 | 3.155 |
| [Tiredness=4] | 0.636 | 1.096 | 54.538 | 0.58 | 0.564 | -1.561 | 2.833 |
| [Tiredness=5] | 0.245 | 1.106 | 54.676 | 0.221 | 0.826 | -1.971 | 2.461 |
| [Tiredness=6] | 0.499 | 1.097 | 54.613 | 0.455 | 0.651 | -1.699 | 2.697 |
| [Tiredness=7] | 0.868 | 1.096 | 54.546 | 0.792 | 0.432 | -1.329 | 3.065 |
| [Tiredness=9] | 0 | 0 | . | . | . | . | . |

## Speed of the Vehicle, Presence of Parking and Familiarity

Familiarity=0: No
Familiarity=1: Yes
Familiarity=0=2: Not sure

Table D.120: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 6.166 | 0.54 | 158.69 | 11.412 | <.001 | 5.099 | 7.233 |
| [DrivenSpeed=30] | -0.531 | 0.167 | 122.817 | -3.172 | 0.002 | -0.862 | -0.2 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | -1.791 | 0.182 | 136.026 | -9.829 | <.001 | -2.151 | -1.43 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| [Familiarity=0] | -0.215 | 0.534 | 166.017 | -0.404 | 0.687 | -1.269 | 0.838 |
| [Familiarity=1] | -0.692 | 0.601 | 188.318 | -1.153 | 0.25 | -1.877 | 0.492 |
| [Familiarity=2] | 0 | 0 | . | . | . | . | . |

## Speed of the Vehicle, Presence of Parking and Estimated Driven Speed

Table D.121: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 3.488 | 0.563 | 198.677 | 6.193 | <.001 | 2.377 | 4.599 |
| [DrivenSpeed=30] | 0.049 | 0.218 | 165.773 | 0.223 | 0.824 | -0.382 | 0.479 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | -1.841 | 0.181 | 138.555 | -10.145 | <.001 | -2.2 | -1.482 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| EstimatedDrivenSpeed | 0.049 | 0.011 | 205.034 | 4.429 | <.001 | 0.027 | 0.071 |

### Presence of Parking and Estimated Driven Speed

Table D.122: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 3.577 | 0.399 | 218.537 | 8.972 | <.001 | 2.791 | 4.363 |
| [Parking=0] | -1.831 | 0.177 | 135.259 | -10.357 | <.001 | -2.181 | -1.482 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| EstimatedDrivenSpeed | 0.047 | 0.009 | 209.937 | 5.487 | <.001 | 0.03 | 0.064 |

### Speed of the Vehicle, Presence of Parking and Estimated Speed Limit

Table D.123: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 6.376 | 0.521 | 212.959 | 12.247 | <.001 | 5.35 | 7.403 |
| [Parking=0] | -1.69 | 0.201 | 148.724 | -8.428 | <.001 | -2.087 | -1.294 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| EstimatedSpeedLimit | -0.01 | 0.011 | 201.539 | -0.923 | 0.357 | -0.031 | 0.011 |
| [DrivenSpeed=30] | -0.59 | 0.17 | 126.676 | -3.466 | <.001 | -0.927 | -0.253 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |

### Presence of Parking and Estimated Speed Limit

Table D.124: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 5.839 | 0.497 | 198.71 | 11.749 | <.001 | 4.859 | 6.819 |
| [Parking=0] | -1.876 | 0.197 | 145.854 | -9.503 | <.001 | -2.266 | -1.486 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| EstimatedSpeedLimit | -0.003 | 0.011 | 190.637 | -0.304 | 0.761 | -0.024 | 0.018 |

## D.6. Self-Reported Workload

### Presence of Parallel Parking

Parking=0: Without Parking
Parking=1: With Parking

Table D.125: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 4.975 | 0.151 | 74186.33 | 32.989 | <.001 | 4.679 | 5.271 |
| [Parking=0] | -1.933 | 0.188 | 129426 | -10.29 | <.001 | -2.301 | -1.564 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |

Table D.126: Estimates

| Parking | Mean | Std. Error | df | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|
| Without parking | 3.042 | 0.184 | 280428.3 | 2.682 | 3.403 |
| With parking | 4.975 | 0.151 | 74186.33 | 4.679 | 5.271 |

Table D.127: Pairwise Comparisons

| (I) Parking | (J) Parking | Mean Difference (I-J) | Std. Error | df | Sig. | 95% Confidence Interval for Difference Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Without parking | With parking | -1.933 | 0.188 | 129426 | <.001 | -2.301 | -1.564 |
| With parking | Without parking | 1.933 | 0.188 | 129426 | <.001 | 1.564 | 2.301 |

## Speed of the Vehicle

Table D.128: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 4.671 | 0.166 | 144.107 | 28.115 | <.001 | 4.343 | 4.999 |
| [DrivenSpeed=30] | -0.955 | 0.214 | 121.132 | -4.47 | <.001 | -1.377 | -0.532 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |

Table D.129: Estimates

| DrivenSpeed | Mean | Std. Error | df | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|
| 30 | 3.716 | 0.161 | 127.62 | 3.399 | 4.034 |
| 50 | 4.671 | 0.166 | 144.107 | 4.343 | 4.999 |

Table D.130: Pairwise Comparisons

| (I) DrivenSpeed | (J) DrivenSpeed | Mean Difference (I-J) | Std. Error | df | Sig. | 95% Confidence Interval for Difference Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| 30 | 50 | -.955 | 0.214 | 121.132 | <.001 | -1.377 | -0.532 |
| 50 | 30 | .955 | 0.214 | 121.132 | <.001 | 0.532 | 1.377 |

## Speed of the Vehicle and Presence of Parallel Parking

Table D.131: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 5.377 | 0.178 | 68.717 | 30.128 | <.001 | 5.021 | 5.733 |
| [DrivenSpeed=30] | -0.828 | 0.168 | 172.755 | -4.92 | <.001 | -1.16 | -0.496 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | -1.85 | 0.177 | 165.177 | -10.472 | <.001 | -2.199 | -1.501 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |

Table D.132: Estimates

| Parking | | Mean | Std. Error | df | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|
| Without parking | 30 | 2.681916 | 0.23683 | 106.4254 | 2.212399 | 3.151433 |
| | 50 | 3.545433 | 0.2468 | 137.6909 | 3.057424 | 4.033441 |
| With parking | 30 | 4.556409 | 0.188853 | 79.61807 | 4.180552 | 4.932267 |
| | 50 | 5.366264 | 0.192455 | 85.99461 | 4.983677 | 5.748852 |

Table D.133: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 5.31 | 0.187 | 163.678 | 28.331 | <.001 | 4.94 | 5.681 |
| [DrivenSpeed=30] | -0.741 | 0.237 | 144.769 | -3.123 | 0.002 | -1.209 | -0.272 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | -1.756 | 0.29 | 171.33 | -6.059 | <.001 | -2.329 | -1.184 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| [DrivenSpeed=30] * [Parking=0] | -0.142 | 0.415 | 119.187 | -0.342 | 0.733 | -0.964 | 0.68 |
| [DrivenSpeed=30] * [Parking=1] | 0 | 0 | . | . | . | . | . |
| [DrivenSpeed=50] * [Parking=0] | 0 | 0 | . | . | . | . | . |
| [DrivenSpeed=50] * [Parking=1] | 0 | 0 | . | . | . | . | . |

## Speed of the Vehicle and Type of Parking

TypeofParking=0: continuous parking
TypeofParking=1: Interrupted parking
TypeofParking=2: No parking

Table D.134: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 3.517 | 0.202 | 158.76 | 17.426 | <.001 | 3.118 | 3.915 |
| [DrivenSpeed=30] | -0.803 | 0.185 | 121.679 | -4.34 | <.001 | -1.169 | -0.437 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [TypeofParking=0] | 1.662 | 0.222 | 165.434 | 7.476 | <.001 | 1.223 | 2.101 |
| [TypeofParking=1] | 1.961 | 0.219 | 138.284 | 8.963 | <.001 | 1.529 | 2.394 |
| [TypeofParking=2] | 0 | 0 | . | . | . | . | . |

Table D.135: Estimates

| TypeofParking | Mean | Std. Error | df | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|
| continuous parking | 4.777 | 0.185 | 162.184 | 4.413 | 5.142 |
| Interrupted parking | 5.077 | 0.185 | 166.227 | 4.712 | 5.442 |
| No parking | 3.115 | 0.176 | 132.928 | 2.767 | 3.464 |

Table D.136: Pairwise Comparisons

| (I) TypeofParking | (J) TypeofParking | Mean Difference (I-J) | Std. Error | df | Sig. | 95% Confidence Interval for Difference Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| continuous parking | Interrupted parking | -0.299 | 0.233 | 141.841 | 0.603 | -0.864 | 0.265 |
| | No parking | 1.662 | 0.222 | 165.434 | <.001 | 1.124 | 2.2 |
| Interrupted parking | continuous parking | 0.299 | 0.233 | 141.841 | 0.603 | -0.265 | 0.864 |
| | No parking | 1.961 | 0.219 | 138.284 | <.001 | 1.431 | 2.492 |
| No parking | continuous parking | -1.662 | 0.222 | 165.434 | <.001 | -2.2 | -1.124 |
| | Interrupted parking | -1.961 | 0.219 | 138.284 | <.001 | -2.492 | -1.431 |

## Speed of the Vehicle, Presence of Parking and Type of Direction Separation

DirectionSeparation=0: Centre Line
DirectionSeparation=1: Grass/Vegetation
DirectionSeparation=2: Crossable Stones

Table D.137: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 5.421 | 0.214 | 131.099 | 25.312 | <.001 | 4.997 | 5.845 |
| [DrivenSpeed=30] | -0.79 | 0.185 | 120.713 | -4.262 | <.001 | -1.157 | -0.423 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | -1.81 | 0.187 | 117.255 | -9.684 | <.001 | -2.181 | -1.44 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| [DirectionSeparation=0] | -0.288 | 0.23 | 143.195 | -1.251 | 0.213 | -0.743 | 0.167 |
| [DirectionSeparation=1] | 0.002 | 0.228 | 143.053 | 0.009 | 0.993 | -0.449 | 0.453 |
| [DirectionSeparation=2] | 0 | 0 | . | . | . | . | . |

Table D.138: Estimates

| DirectionSeparation | Mean | Std. Error | df | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|
| Center line | 3.833 | 0.189 | 114.484 | 3.458 | 4.207 |
| Grass/Vegetation | 4.123 | 0.183 | 110.964 | 3.759 | 4.486 |
| Crossable stones | 4.121 | 0.187 | 110.101 | 3.75 | 4.491 |

Table D.139: Pairwise Comparisons

| (I) DirectionSeparation | (J) DirectionSeparation | Mean Difference (I-J) | Std. Error | df | Sig. | 95% Confidence Interval for Difference Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Center line | Grass/Vegetation | -0.29 | 0.231 | 130.344 | 0.636 | -0.851 | 0.271 |
| | Crossable stones | -0.288 | 0.23 | 143.195 | 0.639 | -0.845 | 0.269 |
| Grass/Vegetation | Center line | 0.29 | 0.231 | 130.344 | 0.636 | -0.271 | 0.851 |
| | Crossable stones | 0.002 | 0.228 | 143.053 | 1 | -0.55 | 0.554 |
| Crossable stones | Center line | 0.288 | 0.23 | 143.195 | 0.639 | -0.269 | 0.845 |
| | Grass/Vegetation | -0.002 | 0.228 | 143.053 | 1 | -0.554 | 0.55 |

## Speed of the Vehicle, Presence of Parking and Age

Table D.140: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 5.288 | 0.361 | 71.746 | 14.665 | <.001 | 4.569 | 6.007 |
| [DrivenSpeed=30] | -0.79 | 0.185 | 121.504 | -4.27 | <.001 | -1.156 | -0.424 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | -1.84E+00 | 0.19 | 125.577 | -9.697 | <.001 | -2.214 | -1.463 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| Age | 0.002 | 0.01 | 61.554 | 0.166 | 0.868 | -0.018 | 0.021 |

## Speed of the Vehicle, Presence of Parking and Gender

Gender=0: Male
Gender=1: Female

Table D.141: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 5.553 | 0.231 | 93.472 | 24.024 | <.001 | 5.094 | 6.012 |
| [DrivenSpeed=30] | -0.784 | 0.185 | 121.87 | -4.232 | <.001 | -1.151 | -0.417 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | -1.84E+00 | 0.189 | 126.17 | -9.732 | <.001 | -2.214 | -1.466 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| [Gender=0] | -0.338 | 0.26 | 60.995 | -1.3 | 0.199 | -0.857 | 0.182 |
| [Gender=1] | 0 | 0 | . | . | . | . | . |

## Speed of the Vehicle, Presence of Parking and driver's license

DriversLicense=0: 0-2 years
DriversLicense=1: 2-5 years
DriversLicense=2: 5-10 years
DriversLicense=3: more than 10 years

Table D.142: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 5.106 | 0.229 | 98.322 | 22.314 | <.001 | 4.652 | 5.561 |
| [DrivenSpeed=30] | -0.799 | 0.185 | 121.094 | -4.327 | <.001 | -1.164 | -0.433 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | -1.815 | 0.189 | 125.699 | -9.584 | <.001 | -2.189 | -1.44 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| [DriversLicense=0] | 0.87 | 0.538 | 58.723 | 1.616 | 0.112 | -0.208 | 1.947 |
| [DriversLicense=1] | 0.437 | 0.388 | 58.896 | 1.127 | 0.264 | -0.339 | 1.213 |
| [DriversLicense=2] | 0.269 | 0.284 | 59.021 | 0.948 | 0.347 | -0.299 | 0.838 |
| [DriversLicense=3] | 0 | 0 | . | . | . | . | . |

## Speed of the Vehicle, Presence of Parking and Driving Frequency

DriversFrequency=0: (Almost) never
DriversFrequency=1: Monthly
DriversFrequency=2: Once every two weeks
DriversFrequency=3: Weekly
DriversFrequency=4: (Almost) daily

Table D.143: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 5.594 | 0.301 | 78.366 | 18.563 | <.001 | 4.994 | 6.193 |
| [DrivenSpeed=30] | -0.775 | 0.186 | 121.594 | -4.174 | <.001 | -1.143 | -0.407 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | -1.871 | 0.19 | 124.912 | -9.837 | <.001 | -2.247 | -1.494 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| [DriversFrequency=0] | -0.08 | 0.4 | 58.041 | -0.2 | 0.842 | -0.88 | 0.72 |
| [DriversFrequency=1] | -0.437 | 0.4 | 58.15 | -1.093 | 0.279 | -1.237 | 0.363 |
| [DriversFrequency=2] | -0.789 | 0.409 | 58.346 | -1.926 | 0.059 | -1.608 | 0.031 |
| [DriversFrequency=3] | -0.054 | 0.378 | 58.095 | -0.142 | 0.887 | -0.811 | 0.703 |
| [DriversFrequency=4] | 0 | 0 | . | . | . | . | . |

## Speed of the Vehicle, Presence of Parking and Level of Stress

Table D.144: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 7.067 | 0.98 | 56.739 | 7.211 | <.001 | 5.105 | 9.03 |
| [DrivenSpeed=30] | -0.807 | 0.185 | 121.649 | -4.364 | <.001 | -1.173 | -0.441 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | -1.829 | 0.19 | 124.907 | -9.624 | <.001 | -2.205 | -1.453 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| [Stress=1] | -2.3 | 1.019 | 54.825 | -2.258 | 0.028 | -4.342 | -0.258 |
| [Stress=2] | -1.948 | 1.005 | 54.818 | -1.937 | 0.058 | -3.963 | 0.068 |
| [Stress=3] | -1.788 | 0.997 | 54.793 | -1.794 | 0.078 | -3.785 | 0.209 |
| [Stress=4] | -1.213 | 1.024 | 54.761 | -1.185 | 0.241 | -3.265 | 0.839 |
| [Stress=5] | -1.093 | 1.086 | 54.799 | -1.007 | 0.318 | -3.27 | 1.083 |
| [Stress=6] | -1.566 | 1.122 | 54.868 | -1.396 | 0.168 | -3.815 | 0.682 |
| [Stress=7] | -1.852 | 1.121 | 54.754 | -1.651 | 0.104 | -4.099 | 0.396 |
| [Stress=8] | 0 | 0 | . | . | . | . | . |

## Speed of the Vehicle, Presence of Parking and Level of Tiredness

Table D.145: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 4.484 | 1.03 | 56.42 | 4.353 | <.001 | 2.421 | 6.547 |
| [DrivenSpeed=30] | -0.776 | 0.186 | 121.587 | -4.179 | <.001 | -1.144 | -0.408 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | -1.842 | 0.189 | 125.18 | -9.731 | <.001 | -2.216 | -1.467 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| [Tiredness=1] | 0.796 | 1.121 | 54.939 | 0.71 | 0.481 | -1.45 | 3.042 |
| [Tiredness=2] | 0.728 | 1.057 | 54.942 | 0.689 | 0.494 | -1.39 | 2.845 |
| [Tiredness=3] | 1.07 | 1.069 | 54.927 | 1.001 | 0.321 | -1.072 | 3.211 |
| [Tiredness=4] | 0.585 | 1.085 | 54.916 | 0.539 | 0.592 | -1.59 | 2.759 |
| [Tiredness=5] | 0.497 | 1.094 | 54.931 | 0.455 | 0.651 | -1.695 | 2.689 |
| [Tiredness=6] | 1.146 | 1.085 | 54.938 | 1.056 | 0.296 | -1.029 | 3.321 |
| [Tiredness=7] | 1.312 | 1.085 | 54.923 | 1.209 | 0.232 | -0.863 | 3.487 |
| [Tiredness=9] | 0 | 0 | . | . | . | . | . |

## Speed of the Vehicle, Presence of Parking and Familiarity

Familiarity=0: No
Familiarity=1: Yes
Familiarity=0=2: Not sure

Table D.146: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 6.203 | 0.588 | 181.692 | 10.548 | <.001 | 5.042 | 7.363 |
| [DrivenSpeed=30] | -0.796 | 0.185 | 121.604 | -4.302 | <.001 | -1.162 | -0.43 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | -1.878 | 0.19 | 129.113 | -9.894 | <.001 | -2.253 | -1.502 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| [Familiarity=0] | -0.823 | 0.574 | 175.705 | -1.434 | 0.153 | -1.956 | 0.31 |
| [Familiarity=1] | -1.154 | 0.643 | 196.032 | -1.795 | 0.074 | -2.421 | 0.114 |
| [Familiarity=2] | 0 | 0 | . | . | . | . | . |

## Speed of the Vehicle, Presence of Parking and Estimated Driven Speed

Table D.147: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 3.18 | 0.602 | 196.067 | 5.286 | <.001 | 1.994 | 4.367 |
| [DrivenSpeed=30] | -0.24 | 0.24 | 179.279 | -0.999 | 0.319 | -0.714 | 0.234 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | -1.959 | 0.19 | 130.844 | -10.306 | <.001 | -2.334 | -1.583 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| EstimatedDrivenSpeed | 0.044 | 0.012 | 200.858 | 3.731 | <.001 | 0.021 | 0.067 |

## Presence of Parking and Estimated Driven Speed

Table D.148: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 2.765 | 0.405 | 186.626 | 6.829 | <.001 | 1.966 | 3.563 |
| [Parking=0] | -1.992 | 0.186 | 128.546 | -10.705 | <.001 | -2.36 | -1.624 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| EstimatedDrivenSpeed | 5.10E-02 | 0.009 | 202.728 | 5.649 | <.001 | 0.033 | 0.069 |

## Speed of the Vehicle, Presence of Parking and Estimated Speed Limit

Table D.149: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 5.339 | 0.552 | 210.035 | 9.673 | <.001 | 4.251 | 6.427 |
| [Parking=0] | -1.835 | 0.208 | 136.274 | -8.827 | <.001 | -2.246 | -1.424 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| EstimatedSpeedLimit | 3.32E-05 | 0.012 | 202.515 | 0.003 | 0.998 | -0.023 | 0.023 |
| [DrivenSpeed=30] | -0.791 | 0.188 | 122.296 | -4.209 | <.001 | -1.163 | -0.419 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |

### Presence of Parking and Estimated Speed Limit

Table D.150: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 4.6 | 0.528 | 196.149 | 8.711 | <.001 | 3.559 | 5.641 |
| [Parking=0] | -1.989 | 0.206 | 133.646 | -9.635 | <.001 | -2.397 | -1.58 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| EstimatedSpeedLimit | 8.00E-03 | 0.011 | 193.158 | 0.732 | 0.465 | -0.014 | 0.031 |

## D.7. Feeling of Safety

### Presence of Parallel Parking

Parking=0: Without Parking
Parking=1: With Parking

Table D.151: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 6.604 | 0.142 | 90.087 | 46.501 | <.001 | 6.322 | 6.886 |
| [Parking=0] | 1.275 | 0.227 | 133.146 | 5.627 | <.001 | 0.827 | 1.723 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |

Table D.152: Estimates

| Parking | Mean | Std. Error | df | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|
| Without parking | 7.878 | 0.198 | 174.461 | 7.487 | 8.27 |
| With parking | 6.604 | 0.142 | 90.087 | 6.322 | 6.886 |

Table D.153: Pairwise Comparisons

| (I) Parking | (J) Parking | Mean Difference (I-J) | Std. Error | df | Sig. | 95% Confidence Interval for Difference Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Without parking | With parking | 1.275 | 0.227 | 133.146 | <.001 | 0.827 | 1.723 |
| With parking | Without parking | -1.275 | 0.227 | 133.146 | <.001 | -1.723 | -0.827 |

### Speed of the Vehicle

Table D.154: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 6.62 | 0.188 | 14.42 | 35.181 | <.001 | 6.218 | 7.023 |
| [DrivenSpeed=30] | 1.18 | 0.189 | 172.998 | 6.225 | <.001 | 0.806 | 1.554 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |

Table D.155: Estimates

| DrivenSpeed | Mean | Std. Error | df | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|
| 30 | 7.8 | 0.184 | 13.427 | 7.405 | 8.195 |
| 50 | 6.62 | 0.188 | 14.42 | 6.218 | 7.023 |

Table D.156: Pairwise Comparisons

| (I) TypeofParking | (J) TypeofParking | Mean Difference (I-J) | Std. Error | df | Sig. | 95% Confidence Interval for Difference Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| 30 | 50 | 1.180 | 0.189 | 172.998 | <.001 | 0.806 | 1.554 |
| 50 | 30 | -1.180 | 0.189 | 172.998 | <.001 | -1.554 | -0.806 |

## Speed of the Vehicle and Presence of Parallel Parking

Table D.157: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 6.089 | 0.175 | 154.029 | 34.8 | <.001 | 5.743 | 6.434 |
| [DrivenSpeed=30] | 1.219 | 0.201 | 121.189 | 6.072 | <.001 | 0.822 | 1.617 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | 1.20E+00 | 0.217 | 140.888 | 5.535 | <.001 | 0.773 | 1.632 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |

Table D.158: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 6.065 | 0.192 | 167.361 | 31.509 | <.001 | 5.685 | 6.445 |
| [DrivenSpeed=30] | 1.264 | 0.252 | 127.906 | 5.006 | <.001 | 0.764 | 1.763 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | 1.27E+00 | 0.318 | 184.274 | 4.001 | <.001 | 0.646 | 1.902 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| [DrivenSpeed=30] * [Parking=0] | -0.134 | 0.455 | 136.659 | -0.295 | 0.769 | -1.034 | 0.765 |
| [DrivenSpeed=30] * [Parking=1] | 0 | 0 | . | . | . | . | . |
| [DrivenSpeed=50] * [Parking=0] | 0 | 0 | . | . | . | . | . |
| [DrivenSpeed=50] * [Parking=1] | 0 | 0 | . | . | . | . | . |

Table D.159: Estimates

| DrivenSpeed | DrivenSpeed | Mean | Std. Error | df | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|
| 30 | Without parking | 8.468 | 0.264 | 155.004 | 7.946 | 8.99 |
| | With parking | 7.328 | 0.184 | 159.871 | 6.964 | 7.693 |
| 50 | Without parking | 7.338 | 0.264 | 195.888 | 6.818 | 7.859 |
| | With parking | 6.065 | 0.192 | 167.361 | 5.685 | 6.445 |

## Speed of the Vehicle and Type of Parking

TypeofParking=0: continuous parking
TypeofParking=1: Interrupted parking
TypeofParking=2: No parking

Table D.160: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 7.314 | 0.212 | 134.495 | 34.453 | <.001 | 6.895 | 7.734 |
| [DrivenSpeed=30] | 1.189 | 0.186 | 163.729 | 6.407 | <.001 | 0.822 | 1.555 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [TypeofParking=0] | -1.28 | 0.231 | 227.053 | -5.552 | <.001 | -1.735 | -0.826 |
| [TypeofParking=1] | -1.147 | 0.231 | 199.075 | -4.959 | <.001 | -1.603 | -0.691 |
| [TypeofParking=2] | 0 | 0 | . | . | . | . | . |

Table D.161: Estimates

| DrivenSpeed | Mean | Std. Error | df | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|
| continuous parking | 6.628 | 0.185 | 97.711 | 6.261 | 6.996 |
| Interrupted parking | 6.762 | 0.188 | 106.013 | 6.389 | 7.135 |
| No parking | 7.909 | 0.192 | 108.297 | 7.528 | 8.289 |

Table D.162: Pairwise Comparisons

| (I) TypeofParking | (J) TypeofParking | Mean Difference (I-J) | Std. Error | df | Sig. | 95% Confidence Interval for Difference Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| continuous parking | Interrupted parking | -0.134 | 0.227 | 157.709 | 1 | -0.682 | 0.415 |
| | No parking | -1.280 | 0.231 | 227.053 | <.001 | -1.837 | -0.724 |
| Interrupted parking | continuous parking | 0.134 | 0.227 | 157.709 | 1 | -0.415 | 0.682 |
| | No parking | -1.147 | 0.231 | 199.075 | <.001 | -1.705 | -0.588 |
| No parking | continuous parking | 1.280 | 0.231 | 227.053 | <.001 | 0.724 | 1.837 |
| | Interrupted parking | 1.147 | 0.231 | 199.075 | <.001 | 0.588 | 1.705 |

## Speed of the Vehicle, Presence of Parking and Type of Direction Separation

DirectionSeparation=0: Centre Line
DirectionSeparation=1: Grass/Vegetation
DirectionSeparation=2: Crossable Stones

Table D.163: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 6.415 | 0.216 | 142.276 | 29.726 | <.001 | 5.989 | 6.842 |
| [DrivenSpeed=30] | 1.234 | 0.197 | 116.881 | 6.251 | <.001 | 0.843 | 1.625 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | 1.198 | 0.218 | 147.16 | 5.496 | <.001 | 0.767 | 1.629 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| [DirectionSeparation=0] | -0.657 | 0.258 | 158.249 | -2.547 | 0.012 | -1.166 | -0.148 |
| [DirectionSeparation=1] | -0.451 | 0.245 | 147.638 | -1.838 | 0.068 | -0.936 | 0.034 |
| [DirectionSeparation=2] | 0 | 0 | . | . | . | . | . |

Table D.164: Estimates

| DirectionSeparation | Mean | Std. Error | df | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|
| Center line | 6.974 | 0.209 | 132.838 | 6.561 | 7.387 |
| Grass/Vegetation | 7.18 | 0.196 | 134.499 | 6.792 | 7.569 |
| Crossable stones | 7.631 | 0.178 | 108.924 | 7.279 | 7.984 |

Table D.165: Pairwise Comparisons

| (I) DirectionSeparation | (J) DirectionSeparation | Mean Difference (I-J) | Std. Error | df | Sig. | 95% Confidence Interval for Difference Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Center line | Grass/Vegetation | -0.206 | 0.269 | 163.142 | 1 | -0.857 | 0.445 |
| | Crossable stones | -.657 | 0.258 | 158.249 | 0.035 | -1.281 | -0.033 |
| Grass/Vegetation | Center line | 0.206 | 0.269 | 163.142 | 1 | -0.445 | 0.857 |
| | Crossable stones | -0.451 | 0.245 | 147.638 | 0.204 | -1.045 | 0.143 |
| Crossable stones | Center line | .657 | 0.258 | 158.249 | 0.035 | 0.033 | 1.281 |
| | Grass/Vegetation | 0.451 | 0.245 | 147.638 | 0.204 | -0.143 | 1.045 |

## Speed of the Vehicle, Presence of Parking and Age

Table D.166: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 6.331 | 0.353 | 78.648 | 17.952 | <.001 | 5.629 | 7.033 |
| [DrivenSpeed=30] | 1.207 | 0.201 | 122.068 | 5.999 | <.001 | 0.809 | 1.605 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | 1.215 | 0.218 | 138.421 | 5.564 | <.001 | 0.783 | 1.646 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| Age | -0.007 | 0.009 | 61.618 | -0.784 | 0.436 | -0.026 | 0.011 |

## Speed of the Vehicle, Presence of Parking and Gender

Gender=0: Male
Gender=1: Female

Table D.167: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 5.792 | 0.226 | 103.335 | 25.653 | <.001 | 5.345 | 6.24 |
| [DrivenSpeed=30] | 1.196 | 0.201 | 121.552 | 5.941 | <.001 | 0.798 | 1.595 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | 1.185 | 0.216 | 141.689 | 5.491 | <.001 | 0.758 | 1.611 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| [Gender=0] | 0.493 | 0.244 | 60.891 | 2.019 | 0.048 | 0.005 | 0.982 |
| [Gender=1] | 0 | 0 | . | . | . | . | . |

Table D.168: Estimates

| Gender | Mean | Std. Error | df | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|
| Man | 7.476 | 0.155 | 67.419 | 7.166 | 7.786 |
| Woman | 6.983 | 0.197 | 66.08 | 6.59 | 7.376 |

Table D.169: Estimates

| (I) Gender | (J) Gender | Mean Difference (I-J) | Std. Error | df | Sig.c | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Man | Woman | .493 | 0.244 | 60.891 | 0.048 | 0.005 | 0.982 |
| Woman | Man | -.493 | 0.244 | 60.891 | 0.048 | -0.982 | -0.005 |

## Speed of the Vehicle, Presence of Parking and driver's license

DriversLicense=0: 0-2 years
DriversLicense=1: 2-5 years
DriversLicense=2: 5-10 years
DriversLicense=3: more than 10 years

Table D.170: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 6.228 | 0.231 | 107.487 | 26.974 | <.001 | 5.77 | 6.686 |
| [DrivenSpeed=30] | 1.217 | 0.201 | 121.138 | 6.055 | <.001 | 0.819 | 1.615 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | 1.169 | 0.218 | 140.144 | 5.36 | <.001 | 0.738 | 1.6 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| [DriversLicense=0] | 0.059 | 0.523 | 58.497 | 0.113 | 0.91 | -0.988 | 1.107 |
| [DriversLicense=1] | -0.05 | 0.377 | 58.844 | -0.132 | 0.896 | -0.805 | 0.706 |
| [DriversLicense=2] | -0.304 | 0.276 | 58.928 | -1.099 | 0.276 | -0.857 | 0.249 |
| [DriversLicense=3] | 0 | 0 | . | . | . | . | . |

## Speed of the Vehicle, Presence of Parking and Driving Frequency

DriversFrequency=0: (Almost) never
DriversFrequency=1: Monthly
DriversFrequency=2: Once every two weeks
DriversFrequency=3: Weekly
DriversFrequency=4: (Almost) daily

Table D.171: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 5.879 | 0.294 | 84.245 | 19.994 | <.001 | 5.294 | 6.463 |
| [DrivenSpeed=30] | 1.196 | 0.201 | 121.487 | 5.946 | <.001 | 0.798 | 1.594 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | 1.228 | 0.219 | 138.78 | 5.618 | <.001 | 0.796 | 1.66 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| [DriversFrequency=0] | -0.089 | 0.38 | 57.992 | -0.235 | 0.815 | -0.85 | 0.671 |
| [DriversFrequency=1] | 0.384 | 0.38 | 58.222 | 1.01 | 0.317 | -0.377 | 1.145 |
| [DriversFrequency=2] | 0.755 | 0.39 | 58.422 | 1.938 | 0.057 | -0.025 | 1.535 |
| [DriversFrequency=3] | 0.119 | 0.36 | 57.982 | 0.332 | 0.741 | -0.6 | 0.839 |
| [DriversFrequency=4] | 0 | 0 | . | . | . | . | . |

## Speed of the Vehicle, Presence of Parking and Level of Stress

Table D.172: Estimates of Fixed Effects

| | | | | | | 95% Confidence Interval | |
|---|---|---|---|---|---|---|---|
| Parameter | Estimate | Std. Error | df | t | Sig. | Lower Bound | Upper Bound |
| Intercept | 4.908 | 0.979 | 56.524 | 5.013 | <.001 | 2.948 | 6.869 |
| [DrivenSpeed=30] | 1.248 | 0.2 | 121.325 | 6.246 | <.001 | 0.853 | 1.644 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | 1.186 | 0.221 | 138.915 | 5.376 | <.001 | 0.75 | 1.622 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| [Stress=1] | 1.092 | 1.016 | 54.279 | 1.074 | 0.288 | -0.946 | 3.129 |
| [Stress=2] | 1.44 | 1.003 | 54.282 | 1.435 | 0.157 | -0.571 | 3.451 |
| [Stress=3] | 1.267 | 0.995 | 54.353 | 1.273 | 0.208 | -0.727 | 3.261 |
| [Stress=4] | 0.918 | 1.021 | 54.241 | 0.899 | 0.373 | -1.13 | 2.966 |
| [Stress=5] | 1.202 | 1.083 | 54.261 | 1.11 | 0.272 | -0.97 | 3.374 |
| [Stress=6] | 0.486 | 1.12 | 54.46 | 0.434 | 0.666 | -1.758 | 2.731 |
| [Stress=7] | 1.968 | 1.119 | 54.18 | 1.759 | 0.084 | -0.274 | 4.211 |
| [Stress=8] | 0 | 0 | . | . | . | . | . |

## Speed of the Vehicle, Presence of Parking and Level of Tiredness

Table D.173: Estimates of Fixed Effects

| | | | | | | 95% Confidence Interval | |
|---|---|---|---|---|---|---|---|
| Parameter | Estimate | Std. Error | df | t | Sig. | Lower Bound | Upper Bound |
| Intercept | 5.505 | 0.996 | 56.501 | 5.526 | <.001 | 3.51 | 7.5 |
| [DrivenSpeed=30] | 1.21 | 0.201 | 120.673 | 6.016 | <.001 | 0.812 | 1.609 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | 1.198 | 0.219 | 139.297 | 5.478 | <.001 | 0.766 | 1.631 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| [Tiredness=1] | 0.503 | 1.082 | 54.688 | 0.465 | 0.644 | -1.666 | 2.673 |
| [Tiredness=2] | 0.602 | 1.021 | 54.735 | 0.59 | 0.558 | -1.444 | 2.647 |
| [Tiredness=3] | 0.571 | 1.032 | 54.674 | 0.554 | 0.582 | -1.497 | 2.64 |
| [Tiredness=4] | 0.552 | 1.048 | 54.641 | 0.527 | 0.6 | -1.548 | 2.652 |
| [Tiredness=5] | 1.208 | 1.057 | 54.748 | 1.143 | 0.258 | -0.91 | 3.326 |
| [Tiredness=6] | 0.348 | 1.048 | 54.727 | 0.332 | 0.741 | -1.753 | 2.449 |
| [Tiredness=7] | 0.412 | 1.048 | 54.644 | 0.394 | 0.695 | -1.688 | 2.512 |
| [Tiredness=9] | 0 | 0 | . | . | . | . | . |

## Speed of the Vehicle, Presence of Parking and Familiarity

Familiarity=0: No
Familiarity=1: Yes
Familiarity=0=2: Not sure

Table D.174: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 6.035 | 0.62 | 166.844 | 9.729 | <.001 | 4.81 | 7.259 |
| [DrivenSpeed=30] | 1.218 | 0.201 | 118.932 | 6.061 | <.001 | 0.82 | 1.616 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | 1.211 | 0.219 | 141.859 | 5.525 | <.001 | 0.778 | 1.644 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| [Familiarity=0] | 0.031 | 0.609 | 167.478 | 0.051 | 0.959 | -1.172 | 1.234 |
| [Familiarity=1] | 0.263 | 0.684 | 187.936 | 0.384 | 0.701 | -1.086 | 1.611 |
| [Familiarity=2] | 0 | 0 | . | . | . | . | . |

## Speed of the Vehicle, Presence of Parking and Estimated Driven Speed

Table D.175: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 9.167 | 0.631 | 198.078 | 14.534 | <.001 | 7.924 | 10.411 |
| [DrivenSpeed=30] | 0.449 | 0.255 | 183.152 | 1.761 | 0.08 | -0.054 | 0.951 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| [Parking=0] | 1.318 | 0.212 | 142.247 | 6.221 | <.001 | 0.899 | 1.737 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| EstimatedDrivenSpeed | -0.062 | 0.012 | 195.005 | -5.013 | <.001 | -0.086 | -0.037 |

## Presence of Parking and Estimated Driven Speed

Table D.176: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 9.982 | 0.423 | 173.349 | 23.598 | <.001 | 9.147 | 10.817 |
| [Parking=0] | 1.348 | 0.211 | 141.564 | 6.391 | <.001 | 0.931 | 1.764 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| EstimatedDrivenSpeed | -0.075 | 0.009 | 195.646 | -7.95 | <.001 | -0.094 | -0.057 |

## Speed of the Vehicle, Presence of Parking and Estimated Speed Limit

Table D.177: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 5.229 | 0.597 | 210.42 | 8.765 | <.001 | 4.053 | 6.405 |
| [Parking=0] | 1.097 | 0.234 | 146.712 | 4.693 | <.001 | 0.635 | 1.559 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| [DrivenSpeed=30] | 1.236 | 0.201 | 122.052 | 6.155 | <.001 | 0.838 | 1.633 |
| [DrivenSpeed=50] | 0 | 0 | . | . | . | . | . |
| EstimatedSpeedLimit | 0.019 | 0.013 | 213.569 | 1.5 | 0.135 | -0.006 | 0.044 |

## Presence of Parking and Estimated Speed Limit

Table D.178: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 6.087 | 0.602 | 207.088 | 10.118 | <.001 | 4.901 | 7.274 |
| [Parking=0] | 1.208 | 0.245 | 141.939 | 4.919 | <.001 | 0.722 | 1.693 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| EstimatedSpeedLimit | 0.011 | 0.013 | 212.661 | 0.866 | 0.388 | -0.015 | 0.037 |

## Presence of Parking, Estimated Driven Speed and Overview on the Road

Table D.179: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 4.528 | 0.57 | 97.78 | 7.937 | <.001 | 3.396 | 5.66 |
| [Parking=0] | 0.089 | 0.196 | 166.436 | 0.456 | 0.649 | -0.297 | 0.475 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| EstimatedDrivenSpeed | -0.041 | 0.008 | 116.478 | -5.123 | <.001 | -0.056 | -0.025 |
| OverviewRoad | 0.591 | 0.052 | 104.153 | 11.33 | <.001 | 0.488 | 0.695 |

## Presence of Parking, Estimated Driven Speed and Overview at Crossings

Table D.180: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 6.009 | 0.52 | 184.445 | 11.56 | <.001 | 4.984 | 7.035 |
| [Parking=0] | 0.376 | 0.193 | 224.643 | 1.948 | 0.053 | -0.004 | 0.756 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| EstimatedDrivenSpeed | -0.056 | 0.008 | 203.848 | -6.862 | <.001 | -0.073 | -0.04 |
| OverviewCrossings | 0.488 | 0.046 | 203.611 | 10.606 | <.001 | 0.397 | 0.579 |

## Presence of Parking, Estimated Driven Speed and Room to Swerve

Table D.181: Estimates of Fixed Effects

| Parameter | Estimate | Std. Error | df | t | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|---|
| Intercept | 8.088 | 0.456 | 230.016 | 17.731 | <.001 | 7.19 | 8.987 |
| [Parking=0] | 0.85 | 0.195 | 137.983 | 4.354 | <.001 | 0.464 | 1.236 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| EstimatedDrivenSpeed | -0.064 | 0.009 | 207.416 | -7.374 | <.001 | -0.082 | -0.047 |
| RoomToSwerve | 0.315 | 0.04 | 203.669 | 7.954 | <.001 | 0.237 | 0.393 |

## Presence of Parking, Estimated Driven Speed and Level of Attention Required

Table D.182: Estimates of Fixed Effects

| | | | | | | 95% Confidence Interval | |
|---|---|---|---|---|---|---|---|
| Parameter | Estimate | Std. Error | df | t | Sig. | Lower Bound | Upper Bound |
| Intercept | 11.17 | 0.417 | 149.491 | 26.765 | <.001 | 10.346 | 11.995 |
| [Parking=0] | 0.626 | 0.22 | 163.743 | 2.844 | 0.005 | 0.191 | 1.06 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| EstimatedDrivenSpeed | -0.048 | 0.009 | 200.42 | -5.116 | <.001 | -0.066 | -0.029 |
| AttentionRequired | -0.438 | 0.061 | 191.935 | -7.151 | <.001 | -0.559 | -0.317 |

## Presence of Parking, Estimated Driven Speed and Self-Reported Workload

Table D.183: Estimates of Fixed Effects

| | | | | | | 95% Confidence Interval | |
|---|---|---|---|---|---|---|---|
| Parameter | Estimate | Std. Error | df | t | Sig. | Lower Bound | Upper Bound |
| Intercept | 11.034 | 0.4 | 157.281 | 27.616 | <.001 | 10.245 | 11.823 |
| [Parking=0] | 0.475 | 0.226 | 176.749 | 2.1 | 0.037 | 0.029 | 0.922 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| EstimatedDrivenSpeed | -0.045 | 0.009 | 217.243 | -4.918 | <.001 | -0.063 | -0.027 |
| SelfReportedWorkload | -0.488 | 0.059 | 231.759 | -8.313 | <.001 | -0.604 | -0.372 |

## All Situational Workload Variables

Table D.184: Estimates of Fixed Effects

| | | | | | | 95% Confidence Interval | |
|---|---|---|---|---|---|---|---|
| Parameter | Estimate | Std. Error | df | t | Sig. | Lower Bound | Upper Bound |
| Intercept | 7.52 | 0.656 | 119.297 | 11.457 | <.001 | 6.22 | 8.819 |
| [Parking=0] | -0.016 | 0.188 | 216.314 | -0.084 | 0.933 | -0.386 | 0.354 |
| [Parking=1] | 0 | 0 | . | . | . | . | . |
| EstimatedDrivenSpeed | -0.044 | 0.008 | 182.2 | -5.557 | <.001 | -0.06 | -0.029 |
| SelfReportedWorkload | -0.211 | 0.067 | 185.4 | -3.162 | 0.002 | -0.342 | -0.079 |
| OverviewCrossings | 0.27 | 0.052 | 160.564 | 5.209 | <.001 | 0.167 | 0.372 |
| RoomToSwerve | 0.19 | 0.036 | 128.248 | 5.287 | <.001 | 0.119 | 0.261 |
| AttentionRequired | -0.077 | 0.071 | 118.908 | -1.086 | 0.279 | -0.218 | 0.064 |

Table D.185: Estimates of Fixed Effects

| | | | | | | 95% Confidence Interval | |
|---|---|---|---|---|---|---|---|
| Parameter | Estimate | Std. Error | df | t | Sig. | Lower Bound | Upper Bound |
| Intercept | 6.76 | 0.637 | 192.276 | 10.607 | <.001 | 5.503 | 8.017 |
| EstimatedDrivenSpeed | -0.04 | 0.008 | 194.837 | -4.928 | <.001 | -0.056 | -0.024 |
| SelfReportedWorkload | -0.232 | 0.058 | 205.695 | -3.993 | <.001 | -0.347 | -0.117 |
| OverviewCrossings | 0.303 | 0.052 | 193.745 | 5.818 | <.001 | 0.201 | 0.406 |
| RoomToSwerve | 0.195 | 0.037 | 177.556 | 5.318 | <.001 | 0.122 | 0.267 |