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BEDRIJFSECONOMISCHE WETENSCHAPPEN

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(Interfacultaire opleiding)

Masterproef

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Promotor :
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Masterproef voorgedragen tot het bekomen van de graad van master in de verkeerskunde , afstudeerrichting verkeersveiligheid

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ROAD SAFETY DIFFERENCES BETWEEN PRIORITY INTERSECTIONS AND INTERSECTIONS WITH PRIORITY TO THE RIGHT: A BEHAVIOURAL ANALYSIS OF ROAD USER INTERACTIONS

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ABSTRACT

The objective of this study is to identify possible traffic safety differences between priority and priority to the right intersections by observing the road user behaviour at both intersections in vehicle-vehicle interactions. Priority and priority to the right intersections differ in priority rule. This might cause a difference in priority behaviour which result in traffic safety differences between these two intersection types. The road user behaviour is observed by means of a behavioural observation form that contains the following variables: gender, age, interaction type, the approach behaviour of the vehicles at the intersection plane, the drivers' observation making or looking behaviour, the priority behaviour, the performance of turning manoeuvres and the type of communication that takes place between the road users. The results indicate that the behaviour of other road users and the priority rules influence the road user behaviour. Furthermore, the type of priority control influences the non-compliance of this rule since more drivers violated the priority rule at the priority to the right intersection compared to the priority intersection. Informal traffic rules and psychological right-of-way played an important role in the violation of the priority to the right rule. The drivers' looking and approach behaviour also differed according to the priority rule. Possible explanations for the observed results are provided in the Results & Discussion section and in the Conclusion.

1. INTRODUCTION

Intersections are an important part of the road network with a complex nature. Intersections are locations where roads and vehicle streams from different directions converge. As a consequence, 32 potential conflict points emerge at four-arm junctions *(1)*. Therefore, intersections are considered as one of the most dangerous parts of the road network. As a result, traffic engineers try to design them as safe as possible. The design of intersections and the used control devices need to be in accordance with the surrounding road environment, the intended use of the intersection and the size of the vehicle streams to create a safe road environment. Therefore, the intersection design in rural areas differs from the design in built-up areas.

Intersections can be subdivided into two types, unsignalized and signalized intersections. Signalized intersections are characterised by traffic lights while unsignalized intersections consist of intersections with stop control, yield or priority control, no traffic control and roundabouts. In residential areas the most frequent type of intersections are unsignalized intersections with fixed priority rules or yield signs and the priority rule to the right.

However, priority rules and intersection designs that are adjusted to the road environment and the vehicle streams are not enough to guarantee traffic safety. All events at priority-controlled and priority to the right intersections are characterised by interactions between road users and between road users and the intersection environment. Furthermore, accidents at intersections are the result of three factors that interact with each other: the road environment, the vehicle and the road user. Road user behaviour has the highest contribution in nearly all accidents (94%), while the road environment and the vehicle only play a role in 18% and 8% of the accidents respectively *(2)*. Since road user behaviour is the most important factor, there is a need to manage or control their behaviour during interaction. Therefore, traffic rules, such as priority rules, are developed to guide road user interactions at intersections. At residential intersections, the fixed priority rule or the priority rule to the right guides road user interactions. Since, these two control measures differ significantly from each other, they lead to different road user behaviours and interactions. As a result the applied priority rules have an essential and different influence on traffic safety.

The objective of this research is to analyse and identify the traffic safety differences between these two intersection types. To guarantee a comparative analysis it is necessary that the investigated intersection types possess identical design characteristics. In this case it is possible to assign traffic safety differences to the variance in priority rules. The traffic safety performance of priority and priority to the right intersections is analysed by means of a behavioural study of road user interactions performed on two residential intersections in Belgium. The scope of the study is limited to vehicle-vehicle interactions.

2. BACKGROUND

2.1 Traffic Safety

The priority to the right rule or the right hand priority rule is the standard rule that applies to intersections where no specific type of traffic control is introduced. In Belgium this rule is sometimes

emphasized by a traffic sign indicating that each vehicle should give way to the right at the intersection. Priority controlled intersections are intersections where road users of minor roads are required to yield or give priority to road users of the main road. This priority situation is indicated by markings on the pavement and traffic signs at the approaches of the minor roads. These traffic control measures intend to create unambiguous right-of-way conditions, to improve the traffic flow and safety on intersections and to simplify road user decision-making *(3)*.

Accident records indicate that intersections are dangerous locations. In 2007, 49.793 accidents occurred in Belgium, of which 33.8% or 16836 accidents took place at intersections *(4)*. These intersections accidents can be further subdivided: 8258 accidents (49%) took place at priority intersections while 4824 accidents (28.65%) occurred on intersections with priority to the right *(4)*. 2,7% of the accidents on intersections with priority to the right were fatal, while this is 11% for priority intersections *(4)*. The accident number of the priority intersection is the sum of intersections governed by stop signs and by the fixed priority because no individual accident number was available. This should be kept in mind while interpreting these accident data since this study only focusses on priority controlled intersections.

Furthermore, several studies *(3)(5)(6)* investigated the effect of priority control and the right hand priority rule on accidents. Earlier studies mentioned that the absolute number of vehicle accidents at intersections increases with an increase in control levels, including the replacement of the right hand priority rule with priority control and that the most frequent crash types are rear-end and angle collisions *(5)*. More recent studies confirmed this statement. Norwegian research indicated that the introduction of priority control increases the number of injury and property-damage-only accidents while the introduction of the right hand priority rule reduced the number of these two accident types by 3% *(3)*. A Dutch research of intersections in built-up areas also concluded that the accident number is 50% higher on a priority controlled intersection compared to intersections with the right hand priority rule while the accident risk is 34% lower on intersections with the right hand priority rule *(6)*.

The Norwegian study indicated that the higher accident risk at priority intersections is due to higher speeds of the drivers on the priority road *(3)*. Drivers have the tendency to drive faster when they approach a priority controlled intersection from the main road. Whereas drivers that approach an intersection that is controlled by the priority rule to the right need to slow down from every branch to carefully observe the traffic situation. The violations that lead to accidents at intersections are failure to yield and neglecting a traffic sign and the contributing factors are driver distraction, inattention and sight obstructions *(7)(8)(9)*. Another study *(10)* mentioned six main causes of accidents at unsignalized intersections, disobeying the priority rule (26,37%), driving operational errors (11,69%) and speeding (15,49%), fail to keep a safe distance (8,92%), illegal turning operation (5,25%) and risk behaviours of vulnerable road users (11,45%). All these studies *(7)(8)(9)*(10) indicated that disobeying the priority rule or failure to yield or give priority are important causes of intersection accidents. Therefore, this research further investigates their contribution to traffic (un)safety.

2.2 Road User Behaviour

Road user behaviour is influenced by three variables in the traffic environment that are important to them when they enter an intersection: the design of the intersection, other road users' expected and actual behaviour and the priority rules at the intersection *(11)*. This implies that road users negotiate with the traffic environment to take the behaviours of other road users into account.

Formal traffic rules help individual road users to assess the traffic situation and to behave accordingly. These rules prescribe the proper way to behave in different situations and also indicate the intentions and behaviours that could be expected from other road users *(12)*. But for several reasons road users do not always comply to the traffic laws; a lack of knowledge about the formal traffic rules in a specific situation, traffic laws can be vague and are interpreted differently by individuals and finally, the traffic rules may not be in line with the road design *(11)(13)*. When behaviours, that are contrary to the formal traffic rules, become common in a specific situation such as an intersection, it is an indication that a norm or informal traffic rule has developed *(12)*. Informal traffic rules are developed through interaction between road users and are based on expectations of other road users' behaviour when formal traffic rules do not correspond with the road design *(11)*. Therefore, dangerous situations arise when the chosen rules are in conflict with each other: one driver follows the formal traffic rule while the other follows the informal traffic rule. Because of this, both drivers decide to take priority. These findings suggest that the future behaviour of individual road users is based on the appraisal of the current behaviour of other road users, the road design, the formal and informal traffic regulations.

Behaviour that is not in line with formal traffic regulations is dangerous behaviour *(14)*. Therefore, behaviour that is derived from informal traffic rules can be regarded as dangerous behaviour since this

behaviour might lead to accidents or conflicts in some situations. For example, neglecting the priority rules at an intersection when other road users have almost approached the intersection area is a dangerous situation which might lead to a collision. Behaviour that takes into account the behaviour of other road users and is in line with traffic regulations is ideal behaviour *(14)*. This behaviour is ideal for the road system or environment, but may not be ideal for the individual road user *(14)*. A characteristic of ideal behaviour is that it excludes conflicts by considering conflict-stimulating environmental cues with respect to the behaviour of other road users *(14)*. For example, a driver with ideal behaviour approaching the priority intersection from the minor road is aware that the drivers on the broader priority road drive at higher speeds. Therefore, the driver at the minor road will take those higher speeds into account without undertaking any action (e.g. neglecting the priority rule) that results in a dangerous situation.

A Finnish study indicated that drivers who look to the right before entering an intersection governed by the priority rule to the right do this with a lower speed than other drivers *(15)*. Drivers who do not look to the right at an intersection when another vehicle is coming from the right drive at higher speeds than the drivers who look to the right *(15)*. This aspect can be defined as a psychological right-of-way, meaning that drivers who do not look to the right are convinced that they have priority *(15)*. This study also mentioned that drivers who expect that a potential crossing driver will yield the right of way, drive faster and neglect to look to the left and right *(15)*.

Another study *(12)* indicated that road design plays an important role in the yielding behaviour at intersections governed by the priority rule to the right. Drivers yielded the right of way more often when the other driver came from an equally wide or wider road than when he or she came from a narrower road *(12)*. Drivers also tend to yield more often when the driver who has priority maintains his or her speed than when he or she decelerates *(12)*. These findings indicate that not only the road design but also the behaviour of other road users is an important indicator for the driver's priority behaviour. Several studies *(11)(13)(15)(16)* have shown that when it is obvious which traffic rule is in force at an intersection, for example priority controlled intersections indicated by markings and traffic signs, drivers exhibit no doubt about how they need to behave. Yet, priority controlled intersections do not entirely derive road user behaviour that complies with the traffic rules. Priority control can sometimes lead to a sequence of automatic manoeuvres (i.e. maintaining their speed or accelerating, neglecting to scan the intersection for other road users,…) by the driver on the main road which can increase the number of accidents and conflicts, especially when the driver on the minor road has no intention to give priority *(5)*. Communication at intersections is a behavioural aspect that is necessary to express the intention of an individual driver to other road users when they interact with each other. By giving signals such as hand gestures, using the directional lights and sounding the horn, the fluency and safety can be improved *(14)*. Erroneous or misunderstood communication or the absence of communication is related to traffic conflicts or accidents at intersections *(14)*. Therefore, communication is a behavioural aspect that influences the priority behaviour of road users at intersections.

2.2.1 Type of Road Users

For all age groups, most driver errors occur at unsignalized intersections *(17)*. But the nuances or characteristics of the driver errors differ according to the age group. Therefore, this section discusses the accident involvement of young, middle-aged and older drivers at priority and priority to the right intersections.

Young Drivers Several studies *(18)(19)(20)(21)* mentioned that young drivers are more involved in rear-end, right-of-way and left-turn accidents at unsignalized intersections. According to British and American research *(18)(20)*, young drivers (< 25 year) have a higher risk to be involved in 'passive' right-of-way accidents, e.g. the young driver had right-of-way and another driver violated the young drivers' priority. The researchers mention that their involvement is most likely due to a combination of speeding, slow hazard perception and a firmness to proclaim their right-of-way. Besides right-of-way accidents, young drivers also have an increased risk to be actively involved in rear-end collisions *(20)(21)*. Finally, young drivers are overrepresented in cross-flow or left-turn accidents. They are more than three times as likely to be involved in these accidents *(20)*. Rear-end crashes and cross-flow turns appear to decrease with age indicating that these crashes are primarily affected by the driving ability which increases when they gain experience *(20)(21)*.

Middle-Aged Drivers It is well known that middle-aged drivers have a lower risk of crash involvement than younger and older drivers. The proportion of middle-aged drivers (35-54 year) that was involved in fatal multiple-vehicle intersection accidents in 2005 was lower (23%) compared to older drivers (40%) *(22)*. The driver actions that leaded to these accidents were neglecting fixed priority rules (8%), rear-end

(45%), failure to yield right-of-way (26 %) and ran off road (18%) *(22).* Another study also confirmed that failure to yield right-of way and rear-end are the most frequently occurring accident causes *(23)*. These causes are also mainly responsible for intersection crashes involving young and older drivers. But adult drivers are less likely to be at-fault in failure to yield right-of-way crashes compared to the other age groups *(24)*. Furthermore, approximately 7% of the intersection crashes with middle-aged drivers pertained to left turns *(25).* As with young and older drivers, search and detection (45%) and evaluation (22%) errors contributed to intersection accidents with middle-aged drivers *(22)*. As opposed to young and older drivers, these errors were more often due to distraction than to inexperience and the age-declining ability to scan intersections *(22)*.

Older Drivers Compared with younger drivers, older drivers are overrepresented in most types of intersection crashes *(23)(24)(25)(26)(27)(28)(29)*. Drivers aged 85 years and older are 10.6 times more at risk of being involved in multiple vehicle crashes at intersections than middle-aged drivers between 40 and 49 years *(25)*. For older drivers; intersections in rural areas are more risky than those in urban areas, unsignalized intersections are riskier than signalized ones and the crash risk is higher at unsignalized priority controlled intersections than at intersections governed by the priority to the right rule *(25)(30)(31)*. At unsignalized intersections governed by yield signs or by the priority rule to the right, the main crash types are failing to give way when they cross a main road where other drivers have priority or making left turns *(22)(32)(29)*. Left-turning manoeuvres at unsignalized intersections are a major performance error of older drivers. Seniors are two to three times more likely than younger drivers to be involved in turning crashes because they failed to yield the right-of-way, disregarded traffic signs or made an improper turn *(23)(24)(25)*. Another contributing factor to intersection accidents is that older drivers have the tendency to overestimate the speed of vehicles travelling at low speeds whilst underestimating the speed of those travelling much faster *(33)*. Therefore, older drivers drive and accelerate slowly and this behaviour leads to unsafe traffic situations at intersections since other drivers might interpret the slow speeds of the older drivers as an intention to stop and give priority while this is not the case *(26)*. The over-involvement of older drivers in these types of intersection accidents is mainly due to the complex driving task which conflicts with their age- and driving-related impairments such as a declining vision, perception, cognitive functioning and physical abilities *(32)(27)(34)*.

Gender Differences in driving behaviour between males and females have been extensively investigated. Therefore, the gender of a driver may also play a role in intersection interactions. Males observe traffic situations at intersections more frequently without looking to the left and right while females take less risks by entering the intersection at lower speeds, stopping more frequently, committing fewer traffic violations and by looking to both sides *(15)*. Another study *(35)*, analysed the occurrence of different driver faults by gender. Priority violations and yield sign observations at unsignalized intersections were investigated and a high male accident rate (i.e. number of accidents per 1000 drivers) was observed (8,71) compared to the female accident rate (2,56) *(35)*. The male-to-female-accident-ratio of 3,40 indicates that male drivers are more involved in intersection accidents caused by priority violations *(35)*. Among teenage drivers, females were more likely than male drivers to be involved in violated right-of-way accidents because they failed to detect other vehicles or to comply with the priority rules *(36)*. In rear-end crashes at intersections, young male drivers (16-18 years old) are more actively involved compared to young female drivers who are mostly passively involved *(20)(21)*. To summarize, gender also plays a role in the driver's observation making and accident involvement at priority and priority to the right intersections.

To conclude, the literature review revealed safety differences between intersections governed by priority and by the priority to the right rule. These differences emerge from the type of priority control. The crash risk differs per age group and gender and results in an overrepresentation of young and older drivers in intersections crashes. Furthermore, the type of priority control also influences the road users' behaviour.

3. METHOD

3.1 Selection of Intersection Types

The scope of the study covers a total of two intersections in residential areas: one priority and one priority to the right intersection situated in the Belgian province of Limburg (appendix 1). The number of arms and the speed limit has an influence on the priority behaviour. These criteria were taken into account in selecting the intersections. The two intersections are four-arm intersections with a speed limit of 50 km/h. These two intersections can be regarded as basis intersections. They share the same infrastructural characteristics (no cycle tracks, speed slowing measures, …) road geometry (2x1 equally broad lanes) and vehicle intensities (appendix 2). As a result, the only difference between these two intersections is the type of priority control. This basis scenario is created to limit the number of confounding factors since the specific characteristics of these intersections are kept to a minimum. In this case it is possible to assign traffic safety differences to the variance in priority rules. Behavioural observations, speed and intensity measurements were performed at both intersections.

3.2 Observation of Road User Behaviour

The goal of these observations is to investigate the priority behaviour and the road user behaviour which precedes this behaviour when two vehicles arrive simultaneously at the intersection. A conflict distance needs to be defined to determine if both vehicles arrive simultaneously. For vehicle-vehicle interactions the conflict area at intersections is situated at the junction plane. The conflict distance is the distance in which an interaction between vehicles may result in a potential conflict. To determine this distance a reference point, based on the safe stopping distance, is determined for each direction. At both intersections, the speed limit is 50km/h which corresponds to a safe stopping distance of 25-30 metres. Speed measurements showed that the vehicle speeds where higher at the main road for the priority-controlled intersection while one road functions as an implicit main road at the intersection with priority to the right leading to higher vehicle speeds. The speed measurements with the speed gun also revealed that the vehicles of the minor roads have vehicle speeds below 50km/h (appendix 3). Due to these speed differences, it is necessary to define a smaller interaction zone for the minor roads and a larger interaction zone for the main roads. Therefore, it is opted to use a variable distance for both roads to define vehicle-vehicle interactions namely, 50 metres for the main road and 25 metres for the minor road. To summarize, an interaction is defined as the situation when a vehicle on the minor road is located at or within 25 metres of the junction plane while the vehicle on the main road is located at or within the reference distance of 50 metres (appendix 4).

The road user behaviour under both priority rules is observed by making use of a behavioural observation form (appendix 5). This observation form contains different aspects of road user behaviour and characteristics that are discussed in the literature review. The observation form contains the following variables: gender, age, interaction type, sequence of arrival at the intersection, approach behaviour, observation making, priority behaviour, turning movements and communication.

For the basis scenario, the road user behaviour is observed for 30 hours within the same two-week period. Observations also took place during weekends since it is expected that those traffic patterns can differ from weekdays. All observations took place in dry weather conditions and in some circumstances the road surface was wet. The observations are performed by one observer and the four intersection arms were observed simultaneously. All interactions are registered by video camera to minimize subjective influences (appendix 7). Afterwards, every noted interaction was verified by these images. Therefore, the interaction data that is objectively detected such as the interaction type, sequence of arrival at the intersection, approach behaviour, priority behaviour and turning movements are correct because these could be verified by the video images.

3.4 Data-Analysis

The data-analysis is only performed on complete records. The records that contained missing values were omitted from the analysis.

3.4.1 Intercoder Reliability

The reliability of the road user behaviour observations is measured using intercoder reliability. Intercoder reliability is the extent to which independent coders or observers evaluate a situation by using the same method to reach the same conclusion *(37)*. It is a scientific evaluation of the extent in which the measurements or observations are reliable executed. Two coders registered 129 observations of the total 472 observations at both intersections. Therefore, 27% of the registered observations is used to calculate the intercoder reliability. Before calculating the intercoder reliability, an acceptable level of reliability needs to be determined. The criterion that the literature suggests for exploratory research is 0.70 *(37)*. Since this study is exploratory research, the reliability of every variable needs to be higher than 0.70 to indicate a good reliability. The observations of coder 1 were used as the reference category to determine the reliability, since this coder carried out all observations of this study. Furthermore, the reliability is based on observations that took place at the beginning of the observation period which implies a 'worse estimate' because a learning effect is likely to be present. As the observation period proceeds, the reliability of the observations should improve.

Three intercoder reliability measures are used to calculate the reliability of the road user observation data: percent agreement, Cohen's kappa and Krippendorff's alpha. The percent agreement measure is the most simple measure and is calculated by counting the number of observations for which there is agreement between the two coders and dividing the result by the total number of observations that are taken into consideration. Since this measure does not take the possibility of agreement that is due to chance into account, it is recommended to use other measures to calculate the reliability*(37)*.

Cohen's kappa takes agreement by chance into account. The agreement is calculated by multiplicative marginals, which accounts for differences in the distribution of values across categories for different coders *(37)*.

Krippendorff's alpha is a measure that takes agreement by chance and proclivity by the observer into account. Proclivity is the tendency of the coders to choose certain codes systematically more often than others *(38)*. Therefore, this measure also accounts for the preference that coders have developed for certain codes, since coders have the tendency to keep using codes they have already used before. Cohen's kappa is calculated using the software package SPSS while Krippendorff's alpha is calculated with the software package "R".

3.4.2 Road user behaviour

Logistic regression is used to model the road user behaviour at the priority and the priority to the right intersection. These models are used to predict the probability of a certain event when the dependent variable is binary, for example the probability that someone violates the priority rule at an intersection is expressed as 'yes' or 'no'. This regression technique applies a logistic transformation on the dependent variable. The goal of logistic regression is to identify independent variables that influence the probability of the event (e.g. the dependent variable). The logit is the natural logarithm of the odds *(39)*:

$$\text{logit} = \ln\left(\frac{P}{1-P}\right) \quad (1)$$

The regression has the following form *(39)*:

$$\text{logit} = B_0 + B_1 * X_1 + B_2 * X_2 + \cdots + B_n * X_n \quad (2)$$

Where logit is the predicted natural logarithm of the odds ratio: ln (P/1-P)
B_0 is the intercept (constant)
B_n are the partial logistic regression coefficients. B_1 expresses the influence of X_1 on the logit.
Every X_n (independent variable) has its own partial logistic regression coefficient B_n.

Preliminary analyses indicated quasi-complete separation of the data points. In the case of quasi-complete separation, a vector b exists such that $bx_i \geq 0$ whenever $y_i = 1$ and $bx_i \leq 0$ whenever $y_i = 0$ *(40)*. This is the case when a single variable, or linear combination of predictor variables almost perfectly separates the space

between success and failure *(41)*. Therefore, the maximum likelihood estimate for B does not exist and the log-likelihood approaches zero and the dispersion matrix becomes unbound when the iterations proceed *(42)*. These aspects are in contradiction with the assumptions of the model and result in a not satisfied convergence status combined with a questionable validity. Firth's procedure or the penalized maximum likelihood method for binary logistic regression is therefore applied on the variables because it solves the problem of quasi-complete separation *(42) (43)*. This procedure removes the first-order term of the asymptotic bias of maximum likelihood estimates in generalized linear models by modifying the score function *(42)*:

$$U(\beta_j)^* = U(\beta_j) + 0.5 \times \text{trace}\ \{I(\beta)^{-1}[\partial I(\beta)/\partial \beta_j]\} = 0,\ j = 1 \ldots p \quad (3)$$

where $U(\beta_j)$ is the original score function
$I(\beta)^{-1}$ is the inverse Fisher's information matrix evaluated at β
Trace is the i^{th} element of the information matrix evaluated at β

The modified score function for logistic regression divides each original observation in a response and a non-response part when Firth's procedure is applied to logistic regression *(43)*. This ensures finite estimates. The quasi-complete separation problem is now solved and the result is a valid logistic regression model with a satisfied convergence status. Because Firth's procedure does not yet function with the forward selection, backward elimination and stepwise selection modelling procedures, the models are built with the full model fitted (no selection) procedure. The Akaike Information Criterion (AIC) is used to find the optimal model. This measure indicates the relative goodness-of-fit of the model *(44)*. The lower the AIC-value, the better the model.

The models are only built for the 90° interactions (e.g. between a vehicle on the main and minor road) that took place at both intersections because the sample of the interactions between two vehicles on the main road, and two vehicles approaching the intersection from the minor road are too small to build a valid model. Therefore, the variables of these interactions types will be analysed with another method. Pearson's chi-square test is used to compare the variables of the 90° interactions with the variables of both interaction types (appendix 9). This test is most suited to perform this analysis since it investigates whether two categorical variables are significantly related to each other *(39)*. For example, the number of violations of the fixed priority rule in 90° interactions can be compared with the violation of the fixed priority rule in interactions between two vehicles approaching the intersection from the main road. As a result, it is possible to determine whether the violation of the priority rule is dependent of the interaction type.

4. RESULTS AND DISCUSSION

First, a few descriptive statistics of the data will be presented to get acquainted with datasets. Subsequently, the results of the intercoder reliability will be discussed. Finally, the results of the logistic regression models for the both intersections are discussed.

4.1 Descriptive statistics

The descriptive statistics with the explanation of the variables for the priority and priority to the right intersection is provided in table 1 and 2.

	Priority intersection (N = 182, no missing data)	Priority to right intersection (N = 201, no missing data) Model A
Variable	Descriptive statistics	Descriptive statistics
Demographic data		
Gender main – gender of driver on main road M = male F = female	M: 125 ; F: 57	M:138 ; F: 63
Gender minor – gender of driver on minor road M = male F = female	M: 104 ; F: 78	M:108 ; F: 93

Age main – age of driver on main road Y = young driver A = middle-aged driver S = older driver	Y: 5 ; A:159; S:18	Y:5 ; A:186; S:10
Age minor – age of driver on minor road Y = young driver A = middle-aged driver S = older driver	Y: 3 ; A:150; S:29	Y:6 ; A:166; S:29
Type of interaction		
Interaction 90° - interaction between vehicle of main and minor road	Yes: 182 ; No:0	Yes:201 ; No:0
Approach behaviour data		
Intersectionfirst main – vehicle of main road reaches junction plane first	Yes:15 ; No:167	Yes:58 ; No:143
Intersectionfirst minor – vehicle of minor road reaches junction plane first	Yes:112 ; No:70	Yes:90; No:111
Intersectionequal – vehicle of main and minor road reach junction plane at the same time	Yes:55 ; No:127	Yes:53 ; No:148
Intersection main – approach behaviour of vehicle of main road at junction plane Stps = stops Dec. = decelerates MntnSpeed= maintains vehicle speed Acc. = accelerates	Stps: 1 ; Dec.: 24 ; MntnSpeed: 157 ; Acc.: 0	Stps:40 ; Dec.:53 ; MntnSpeed:106 ; Acc.:2
Intersection minor – approach behaviour of vehicle of minor road at junction plane Stps = stops Dec. = decelerates MntnSpeed= maintains vehicle speed Acc. = accelerates	Stps:179 ; Dec.:1 ; MntnSpeed:2 ; Acc.:0	Stps:110 ; Dec.:69 ; MntnSpeed:22 ; Acc.:0
Driver's observation making data		
LookLeft main – vehicle of main road looks to the left	Yes:21 ; No:161	Yes:22 ; No:179
LookRight main – vehicle of main road looks to the right	Yes:10 ; No:172	Yes:90 ; No:111
DontLook main – vehicle of main road does not look to the right or left	Yes:155 ; No:27	Yes:107 ; No:94
LookLeft minor – vehicle of minor road looks to the left	Yes:182 ; No:0	Yes:198 ; No:3
LookRight minor – vehicle of minor road looks to the right	Yes:181 ; No:1	Yes:198 ; No:3
DontLook minor – vehicle of minor road does not look to the right or left	Yes:0 ; No:182	Yes:0 ; No:201
Priority data		
HasPriority main– vehicle of main road has priority	Yes:182 ; No:0	Yes:86 ; No:115
HasPriority minor – vehicle of minor road has priority	Yes:0 ; No:182	Yes:115 ; No:86
GetPriority main – vehicle of main road gets priority	Yes:167 ; No:15	Yes:124 ; No:77
GetPriority minor – vehicle of minor road gets priority	Yes:15 ; No:167	Yes:77 ; No:124
ViolationPriority – priority rule is violated	Yes:15 ; No:167	Yes:54 ; No:147

Turning manoeuvre data		
TurnLeft main – vehicle of main road turns left	Yes:14 ; No:168	Yes:9 ; No:192
TurnRight main – vehicle of main road turns right	Yes:0 ; No:182	Yes:2 ; No:199
DontTurn main– vehicle of main road does not turn	Yes:168 ; No:14	Yes:190 ; No:11
TurnLeft minor – vehicle of minor road turns left	Yes:83 ; No:99	Yes:144 ; No:57
TurnRight minor – vehicle of minor road turns right	Yes:58 ; No:124	Yes:29 ; No:172
DontTurn minor – vehicle of minor road does not turn	Yes:41 ; No:141	Yes:28 ; No:173
Communication data		
Direction main – vehicle of main road uses directional lights	Yes:168 ; No:14	Yes:11 ; No:190
Direction minor – vehicle of minor road uses directional lights	Yes:116 ; No:66	Yes:153 ; No:48
Gesture main – vehicle of main road uses horn, hand gesture or lights to communicate	Yes:1 ; No:181	Yes:1 ; No:200
Gesture minor – vehicle of minor road uses horn, hand gesture or lights to communicate	Yes:0 ; No:182	Yes:8 ; No:193
Conflict data		
Conflicts – number of interactions which result in a serious conflict	Yes:1 ; No:181	Yes:3 ; No:198

TABLE 1 Descriptive Statistics of Intersection Data

	Priority to the right rule intersection (N = 201, no missing data) Model B
Variable	Descriptive statistics
Demographic data	
GenderVP – gender of driver in priority M = male F = female	M:121 ; F: 80
GenderVNP – gender of driver no priority M = male F = female	M:125 ; F: 76
AgeVP – age of driver in priority Y = young driver A = middle-aged driver S = older driver	Y:4 ; A:174 ; S:23
AgeVNP – age of driver no priority Y = young driver A = middle-aged driver S = older driver	Y:7 ; A:178 ; S:16
Type of interaction	
Interaction 90° - interaction between vehicle of main and minor road	Yes:0 ; No:201
Approach behaviour data	
IntersectionfirstVP – vehicle in priority reaches junction plane first	Yes:77 ; No:124
IntersectionfirstVNP – vehicle no priority reaches junction plane first	Yes:71 ; No:130
Intersectionequal – vehicle in priority and no priority reach junction plane at the same time	Yes:53 ; No:148

IntersectionVP – approach behaviour of vehicle in priorty at junction plane Stps = stops Dec. = decelerates MntnSpeed= maintains vehicle speed Acc. = accelerates	Stps:52 ; Dec.:64 ; MntnSpeed:84 ; Acc.:1
IntersectionVNP – approach behaviour of vehicle no priority at junction plane Stps = stops Dec. = decelerates MntnSpeed= maintains vehicle speed Acc. = accelerates	Stps:98 ; Dec.:58 ; MntnSpeed:44 ; Acc.:1
Driver's observation making data	
LookLeftVP – vehicle in priority looks to the left	Yes:123 ; No:78
LookRightVP – vehicle in priority looks to the right	Yes:128 ; No:73
DontLookVP – vehicle in priority does not look to the right or left	Yes:160 ; No:41
LookLeftVNP – vehicle no priority looks to the left	Yes:97 ; No:104
LookRightVNP – vehicle no priority looks to the right	Yes:66 ; No:135
DontLookVNP – vehicle no priority does not look to the right or left	Yes:41 ; No:160
Priority data	
HasPriorityVP – vehicle in priority has priority	Yes:201 ; No:0
HasPriorityVNP – vehicle no priority has priority	Yes:0 ; No:201
GetPriorityVP – vehicle in priority gets priority	Yes:147 ; No:54
GetPriorityVNP – vehicle no priority gets priority	Yes:54 ; No:147
ViolationPriority – priority rule is violated	Yes:54 ; No:147
Turning manoeuvre data	
TurnLeftVP – vehicle in priority turns left	Yes:85 ; No:116
TurnRightVP – vehicle in priority turns right	Yes:28 ; No:173
DontTurnVP – vehicle in priority does not turn	Yes:88 ; No:113
TurnLeftVNP – vehicle no priority turns left	Yes:68 ; No:133
TurnRightVNP – vehicle no priority turns right	Yes:3 ; No:198
DontTurnVNP – vehicle no priority does not turn	Yes:130 ; No:71
Communication data	
DirectionVP – vehicle in priority uses directional lights	Yes:99 ; No:102
DirectionVNP – vehicle no priority uses directional lights	Yes:65 ; No:136
GestureVP – vehicle in priority uses horn, hand gesture or lights to communicate	Yes:8 ; No:193
GestureVNP – vehicle no priority uses horn, hand gesture or lights to communicate	Yes:1 ; No:200
Conflict data	
Conflicts – number of interactions which result in a serious conflict	Yes:3 ; No:198

TABLE 2 Descriptive Statistics of Priority to the Right Intersection Data Model B

4.2 Intercoder Reliability

The results of the intercoder reliability are provided in table 1 of appendix 8. For all variables, the percent agreement is higher than 0.80 which indicates a high agreement between the two coders. Due to the correction for agreement by chance, the results of Cohen's kappa are for most variables slightly lower than the percent agreement. But these results still meet the postulated criterion of 0.70. For the variables age and looking behaviour the kappa values are very low although the percent agreement is quite high. Such a situation is called a kappa paradox *(45)*. Cohen's kappa only produces reasonable values when the occurrence of the investigated trait for the binary variables is 0.5 *(46)*. When the trait prevalence value is close to 0 or 1, the ability of the kappa measure to indicate agreement between the coders is reduced significantly *(46)*. This is the case for some

variables of this study. Due to the unequal distribution of the values over the different codes of these variables, a low kappa value is generated that indicates a low agreement between the coders while this is not the case.

In general, the intercoder reliability can be considered as a good reliability, even for the variables with a low kappa. The reliability for these variables is good since the percent agreement of these variables is quite high, i.e. this agreement is comparable to the other variables with an equal number of codes but with a more evenly distribution of the values over the code categories. This more evenly distribution results in an acceptable kappa value that meets the criterion of 0.70.

4.3 Road User Behaviour

This section discusses the results of the logistic regression models for the following dependent variables: the violation of the priority rule, the looking behaviour of the driver and the approach behaviour of the vehicles at the junction plane. For the priority intersection the vehicles are subdivided in main and minor to indicate the road from which they approach the intersection. The in-priority vehicle is always the vehicle that approaches the intersection from the main road. Model A of the priority to the right intersection also categorises the vehicles in main and minor but the difference with the priority intersection is that the vehicle that comes from the right has priority. As a result, both vehicles can have priority irrespectively of the road from which they approach the intersection. Therefore a second model, Model B, is created for the priority to the right intersection which subdivides the vehicles in two categories: in-priority vehicles and no-priority vehicles.

4.3.1 Model 1: Priority violation

The main goal of this study is to investigate the difference in priority behaviour between a priority intersection and a priority to the right intersection. This information is given by the variable 'Violationpriority'. This variable is modelled with probability = 1, e.g. the probability that the priority rule is violated. The variable 'Violationpriority' is therefore selected as the dependent variable. Before discussing the model output, it is important to mention that more drivers violated the priority rule at the priority to the right intersection than at the priority intersection. This is an indication that the type of priority control influences the non-compliance of this rule. Research *(11)(13)(15)(16)* concluded that when it is obvious which traffic rule is in force at an intersection, such as the fixed priority rule indicated by markings and signs, drivers exhibit no doubt about how they need to behave. This is the main reason why the number of violations is smaller at the priority intersection, but it does not guarantee that every driver complies with the priority rule.

For the priority intersection, the variable 'LookRight main' has a p-value of 0.0092 at a significance level of 0.05 and has the highest significance of the variables. The fixed priority rule is more likely violated when the driver on the main road looks to the right than when he/she does not. This result implies that the priority rule is violated when the driver of minor road notices that the approaching vehicle has seen him. Literature *(15)*, confirms that that a driver who looks to the right or left does this at lower speeds. The in-priority driver may just exert a cautious driving style by looking but the no-priority driver might misinterpret this behaviour as an indication that the driver does not want to compel his priority which leads to a violation of the priority rule. This looking behaviour can also be regarded as a form of misunderstood communication since the other road user interprets that he is granted priority and may proceed its route while this is not the case *(14)*. As a result, the priority rule is violated. The parameter estimate for 'Intersection minor' is negative when stopping is compared with decelerating. This indicates a strong negative relationship between the violation of the priority rule and this approach behaviour and therefore it is not very likely that the priority rule is violated when the vehicle stops compared to the situation when it slows down. The last variable 'Intersectionfirst minor' indicates that the fixed priority rule is more likely to be violated when the vehicle of the minor road reaches the intersection first which might suggest that the road user who reaches the intersection first has a higher tendency to proceed his route.

Variables[1]	Priority controlled intersection	Priority to the right rule intersection (model A)[2]	Priority to the right rule intersection (model B)[3]
Intercept	0.0268 *(p = 0.9802)*°	-1.3227 *(p < 0.0001)****	-0.7651 *(p = 0.3645)*°
LookRight main	1.0981 *(p = 0.0092)****		
DontLook main		0.7832 *(p = 0.0002)****	
HasPriority minor		1.1983 *(p<0.0001)****	
Intersectionfirst minor	1.5265 *(p = 0.0344)***	-0.4364 *(p = 0.0232)***	
Intersection minor	MntnSpeed: 1.1542 (p =0.4611)° Stps: -2.6527 (p = 0.0172)** Dec.: 0 *(p = 0.0449)***		
TurnRight minor		0.3555 *(p = 0.1378)* °	
Intersectionfirst VNP			1.1975 *(p <0.0001)****
Intersection VP			MntnSpeed: -1.0085 (p =0.1496)° Stps: 2.1525 (p = 0.0042)*** Acc.: -1.1340 (p =0.5256)° Dec.: 0 *(p =0.0002)****
Intersection VNP			MntnSpeed: 1.5437 (p =0.0230)** Stps: -1.8228 (p = 0.0066)*** Acc.:0.6767 (p =0.7017)° Dec.: 0 *(p < 0.0001)****

Note
[1]Values present the parameter estimates of the logistic regression model. For categorical variables with more than 2 categories, the category is indicated. P-values of individual categories between (). *P-values of the variables in total are in italics between ()*.
[2] Model where variables are subdivided according to vehicle main and minor road
[3] Model where variables are subdivided according to which vehicle has priority (VP) and has no priority (VNP)
*** P≤0,01 (significant at 99% CI)
** P≤0,05 (significant at 95% CI)
* P≤0,10 (significant at 90% CI)
° P>0,10 (not significant at 90% CI)

TABLE 3 Output Priority Violation Model

For the priority to the right intersection (model A), the most significant variable 'Haspriority minor' has a p-value of <0.0001. The priority to the right rule is more likely to be violated when the vehicle of the minor road has priority. Probably, the drivers of the 'main' road perceive this road as an informal main road and suspect that the driver on the minor road will not be quite determined to enforce his priority. As a result, the drivers are convinced that they have priority while this is not the case. This situation is defined in literature as a psychological right-of-way *(15)*. Furthermore, the literature also confirms that recurring behaviours which

conflict with the formal traffic rules result in the development of an informal traffic rule which is the outcome of interactions between road users and the expectations concerning the behaviour of other road users when the formal traffic rules do not correspond with the road design *(11)(12*). Because of this, the recurrent violation of the priority to the right rule resulted in an informal priority rule which is in conflict with the priority to the right rule. The variable 'Intersectionfirst minor' indicates that the relationship between the violation of the priority rule and the situation when the vehicle of the minor road arrived first is negative. Therefore, it is not very likely that priority to the right rule is violated when this vehicle arrives first. This behaviour is very likely related with the existence of an informal priority rule as mentioned earlier. 'DontLook main' indicates a stronger relationship with violating the priority to the right when the driver of the 'main' road looks straight ahead instead of to his right or left. Drivers who do not look to the right or left do this at higher speeds *(15)*. This behaviour is related with the psychological right-of-way *(15)*. The last variable 'TurnRight minor' indicates a higher number of violations in case the driver on the minor road turns right but this result is not significant at the 90% CI. Probably, it is easier for the driver to precede its route because he can turn right without having to give priority. This is not the case when he drives straight through or turns left since he then needs to yield to the other vehicles streams he might encounter.

For model B of the priority to the right intersection, the variables 'Intersectionfirst VNP' and 'Intersection VNP' are the most significant variables since their $p < 0.0001$. 'Intersectionfirst VNP' indicates that it is more likely that the priority to the right is violated when the no-priority vehicle arrives first at the intersection plane. This result is in line with the priority intersection model which also suggest that the road user who reaches the intersection plane first has a higher inclination to proceed its route. The parameter estimate for 'Intersection VP' is negative but not significant when this vehicle maintains its speed. This value gives a first indication that a negative relation exists between the approach behaviour of the in-priority vehicle and the violation of the priority rule. The second category of the variable 'Intersection VP', Stps is significant at 0.05 and indicates a positive relation between this approach behaviour and the violation of the priority rule. As a result, it is more likely that the priority rule is violated when the in-priority vehicle stops at the junction plane compared to the situation when it slows down. Literature confirms that that drivers yield to the right more often when the in-priority driver maintains its speed than when he decelerates or stops *(12*). When the in-priority driver maintains his speed, this can be regarded as a way to compel their priority while stopping or slowing down is interpreted by the other road users as an indication to not compel his priority. This last interpretation can be regarded as a form of misunderstood communication which leads to a violation of the priority rule *(14)*. The variable 'Intersection VNP' when the VNP maintains its speed indicates that the priority to the right rule is more likely to be violated when the no-priority vehicle maintains its speed at the intersection and forces the VP to relinquish its priority *(12*). The second category of this variable, Stps, has a negative parameter estimate which indicates a negative relationship with the violation of the priority rule. As a result, it is very unlikely that the priority rule is violated when the no-priority vehicle stops at the junction plane compared to the situation when it slows down since this action indicates that the VNP wants to give priority to the vehicle that approaches the intersection from the right *(12*).

A resemblance between both intersections is that the priority rule is most likely violated when the no-priority vehicle arrives first. This finding suggests that the road user who reaches the intersection plane first has a higher tendency to proceed his route despite the in-force priority rule.

4.3.2 Model 2: Looking behaviour

The looking behaviour or the drivers' observation making for the two intersections is the next variable that is examined. Only the looking behaviour for the drivers on the main road or assumed main road could be modelled for the priority intersection and model A of the priority to the right intersection because the looking behaviour of the drivers on the minor road is a constant which means that all these drivers looked to the left, the right or both when they arrived at the intersection. For priority to the right model B, the looking behaviour is modeled for the in-priority and no-priority driver since the looking behaviour of the no-priority driver was no longer constant after re-categorizing. The variable 'Look main/VP/VNP' is modelled with probability = 1, e.g. the probability that the driver looked to the left, the right or both when he arrived at the intersection.

For the priority intersection, the most significant variable is 'Turn main' with a p-value of < 0.0001 which indicates it is more probable that the vehicle of the main road looks to the right and/or left is when this vehicle performs a turning manoeuvre. This result was expected since the driver needs to check for other vehicles that may be present on the road before performing the manoeuvre. The variable 'Intersectionfirst main' shows that it is more likely that the driver of the main road looks to the left or right when this vehicle arrives first at the intersection but this result is not significant at the 90% CI. Therefore this finding should be regarded

as a first indication. This model explains very little about the looking behaviour of the driver on the main road since the only significant variable is a turning manoeuvre.

Variables[1]	Priority controlled intersection	Priority to the right rule intersection (model A)[2]	Priority to the right rule intersection (model B)[3]	Priority to the right rule intersection (model B)[4]
Intercept	0.0292 *(p = 0.9506)*°	1.3678 *(p = 0.0284)***	2.2604 *(p < 0.0001)****	1.5704 *(p = 0.0126)***
Intersectionfirst main	0.5017 *(p = 0.1705)*°			
Intersection main		MntnSpeed: -2.2181 (p <0.0001)*** Stps: 2.0562 (p = 0.0062)*** Acc.: -0.1997 (p = 0.8560)° Dec.: 0 *(p < 0.0001)****		
Turn main	1.9041 (p < 0.0001)***	0.6550 *(p = 0.1847)*°		
GetsPriority minor		0.5124 *(p = 0.0356)***		
Gender VP			M: -0.2870 *(p = 0.1009)*° F: 0	
Age VP			Y:-0.5288 (p = 0.5279)° S:1.2481 (p = 0.0806)* A: 0 *(p = 0.0950)**	
Intersectionfirst VP			0.4649 *(p = 0.0077)****	
GetsPriority VNP			1.2622 *(p < 0.0001)****	
Intersection VNP				MntnSpeed: -2.4720 (p = 0.0003)*** Stps: 2.1727 (p = 0.0134)** Acc.: 0.0898 (p = 0.9595)° Dec.: 0 *(p < 0.0001)****
GetsPriority VP				0.5608 *(p = 0.0520)**

Note
[1]values present the parameter estimates of the logistic regression model. For categorical variables with more than 2 categories, the category is indicated. P-values of individual categories between (). *P-values of the variables in total are in italics between ()*.
[2] Model where variables are subdivided according to vehicle main and minor road
[3] Looking behaviour model vehicle VP: looking behaviour of in-priority driver is the dependent variable
[4] Looking behaviour model vehicle VNP: looking behaviour of no-priority driver is the dependent variable
*** P≤0,01 (significant at 99% CI)
** P≤0,05 (significant at 95% CI)
* P≤0,10 (significant at 90% CI)
° P>0,10 (not significant at 90% CI)

TABLE 4 Output Looking Behaviour Model

For model A of the intersection with the priority to the right , 'Intersection main' is the most significant variable with $p < 0.0001$. The parameter estimate is negative for the category MntnSpeed and positive for the category Stps. This finding indicates that drivers look to the right at lower speeds while drivers do not look to the right when driving at higher speeds *(15)*. The third variable 'GetsPriority minor' indicates that it is more probable that the driver of the main road looks when the vehicle of the minor or side road gets priority since the driver of the main road needs to look to the right to give priority to the vehicle that comes from the right. The last variable 'Turn main' is not significant at the 90% CI but gives a first indication that it is more likely that the driver of the main road looks when the vehicle performs a turning manoeuvre.

The most significant variable for the looking behaviour of the in-priority vehicle at the priority to the right intersection is 'GetsPriority VNP' with a p-value of < 0.0001. It is more likely that the driver of the in-priority vehicle looks to the right and/or left when the no-priority vehicle gets priority. This situation may be the result of two aspects: vehicle VNP might interpret this looking behaviour of vehicle VP as an indication that the driver might relinquish his priority while this driver just adopts a careful driving style or the driver of vehicle VP looks to the right and/or left because he wants to give priority to vehicle VNP. The odds ratio of 'Gender VNP' indicates that a negative relation exists between the dependent and explanatory variable when the gender of the driver is male but this variable is not significant at the 90% CI. As a result, it is very unlikely that a male driver looks when he is in-priority compared to the situation with a female driver since literature confirms that females, compared to males, take less risks by looking at both sides when they approach the intersection *(15)*. The only category that is significant in the variable 'Age VP' is 'Senior' and specifies that it is more presumable that a senior in-priority driver looks to the right and/or left than a middle-aged driver. This finding can be explained by the fact that senior drivers have a more cautious driving style to cope with their age-declining driver abilities even when they are in priority (47). The last variable 'Intersectionfirst VP' indicates that it is more likely that the in-priority vehicle looks when it arrives first.

The looking behaviour of the no-priority vehicle at the priority to the right intersection is influenced by the approach and priority behaviour of this vehicle. 'GetsPriority VP' indicates that it is more likely that the no-priority driver looks when the in-priority vehicle is granted priority since the driver needs to look to the right in order to give priority. 'Intersection VNP' is the most significant variable with $p < 0.0001$ for this model. The parameter estimate is negative for the category MntnSpeed and positive for the category Stps. This finding indicates that drivers look to the right at lower speeds while drivers do not look to the right when driving at higher speeds *(15)*.

4.3.3 Model 3: Approach behaviour in-priority vehicle

Model 3 examines the approach behaviour for the vehicles on the main road and the in-priority vehicles. The variable 'Intersection main/VP' is modelled with probability = 0 e.g. the expected behaviour of the road users. For the priority intersection, this means that the vehicles maintain their speed because they have priority. This implies, for the intersection with priority to the right (model A) that these vehicles stop or slow down because they need to give priority to the right while for model B the vehicles accelerate or maintain their speed since they have priority.

For the priority intersection, the variable 'DontTurn main' is the most significant variable. The odds ratio of this variable indicates that it is more probable that the vehicle maintains his speeds at the intersection when the vehicle does not make a turn.'Intersectionfirst main' is not significant at the 90% CI . Therefore, this result gives a first indication that it is more likely that the vehicle on the main road maintains it speed when this vehicle arrives first at the junction plane since the vehicles on the main road have priority and most drivers do not adopt a cautious driving style when they arrive first. The next variable is 'Intersection minor'. The parameter estimate is positive for the category Stps which indicates that it is very probable that the vehicle of the main road maintains its speed when the vehicle of the minor road stops at the intersection. This finding explains that the vehicles on the main road have priority and therefore maintain their speed while the vehicles of the minor road stop to give priority *(12)*. The last variable 'DontLook main' indicates that it is more likely that the vehicle on the main road maintains its speed when the driver does not look to the left and/or right when he arrives at the intersection *(15)*. This is the same relation as in the looking behaviour model.

Variables[1]	Priority controlled intersection	Priority to the right rule intersection (model A)[2]	Priority to the right rule intersection (model B)[3]
Intercept	-0.7859 *(p = 0.4174)*°	1.7171 *(p = 0.0118)***	0.0635 *(p= 0.8372)*°
Intersectionfirst main	0.7666 *(p = 0.1834)*°		
Intersectionequal		0.4317 *(p = 0.1002)*°	
Intersection minor	MntnSpeed: -0.7371 (p = 0.5651)° Stps: 1.9095 (p = 0.0574)* Dec.: 0 *(p = 0.0999)**		
LookRight main		1.4720 (p < 0.0001)***	
DontLook main	0.9371 *(p = 0.0029)****		
GetsPriority minor		1.0994 (< 0.0001)***	
DontTurn main	1.3524 *(p = 0.0015)****	-1.3496 (p = 0.0340)**	
DontLook VP			1.3412 *(p < 0.0001)****
DontTurn VP			0.6779 *(p = 0.0070)****
GetsPriority VP			0.4096 *(p = 0.1017)**

Note
[1]values present the parameter estimates of the logistic regression model. For categorical variables with more than 2 categories, the category is indicated. P-values of individual categories between (). *P-values of the variables in total are in italics between ()*.
[2] Model where variables are subdivided according to vehicle main and minor road
[3] Model where variables are subdivided according to which vehicle has priority (VP) and has no priority (VNP)
*** P≤0,01 (significant at 99% CI)
** P≤0,05 (significant at 95% CI)
* P≤0,10 (significant at 90% CI)
° P>0,10 (not significant at 90% CI)

TABLE 5 Output Approach Behaviour Model for In-Priority Vehicle

The variables 'LookRight main' and 'GetsPriority minor' are the most significant variables for the priority to the right intersection. The variable 'LookRight main' shows that it is more likely that the vehicle of the main road stops at the junction plane when the driver looks to the right *(15).* 'GetsPriority minor' indicates that it is more probable that the vehicle of the main road stops at the intersection when the vehicle gives priority to the vehicle on side road that comes from the right. The variable 'Intersectionequal' indicates that it is more likely that the vehicle of the main road stops at the intersection when the vehicles of the main and side roads arrive simultaneously. 'DontTurn main' indicates a negative relation between the approach behaviour of the driver on the main road and a turning manoeuvre. This finding confirms the hypothesis that vehicles are less likely to stop at the intersection when they drive straight through.

'DontLook VP' is the most significant variable for model B of the priority to the right intersection. As a result, it is more likely that the in-priority vehicle maintains its speed when the driver does not look to the right and/or left *(15).*The variable 'DontTurn VP' shows that it is more likely that the in-priority vehicle maintains its speed or accelerates when it does not turn. The odds ratio of the last variable 'Getspriority VP' shows it is very presumable that vehicle VP maintains its speed or accelerates when it has priority. This finding is quite logical since an in-priority vehicle is more or less determined to force his priority by not slowing down or stopping at the junction plane.

4.3.4 Model 4: Approach behaviour no-priority vehicle

Model 4 examines the approach behaviour for the vehicles on the minor road for both intersections. The variable 'Intersection minor/VNP' is modelled with probability = 0 e.g. the expected behaviour of the road users. For the priority and priority to the right (model A and B) intersection, this means that the vehicles stop or slow down because they need to give priority.

For the priority intersection, the variable 'GetsPriority main' has a p-value of 0.0104 and is the most significant variable. Therefore, it is very likely that the vehicle of the minor road stops or slows down at the

junction plane when the vehicle on the main road gets priority since the vehicles on the minor road need to give priority to the vehicles that approach the intersection from the main road. The next variable is 'Intersection main'. The parameter estimate is positive for the category MntnSpeed and negative for the category Stps which means that it is more likely that the vehicle of the minor road stops when the vehicle on the main road maintains its speed *(12*). Because N=1 for the category Stps, it is impossible to draw conclusions.

Variables[1]	Priority controlled intersection	Priority to the right rule intersection (model A)[2]	Priority to the right rule intersection (model B)[3]
Intercept	2.0087 *(p = 0.0220)***	0.9376 *(p = 0.1102)*°	0.4142 *(p =0.1482)*°
Intersection main	MntnSpeed: 1.8393 (p = 0.0736)* Stps: -2.8570 (p = 0.1101)° Slwsdown: 0 *(p = 0.1928)*°		
GetsPriority main	1.9466 *(p = 0.0104)****	0.7088 *(p = 0.0044)****	
LookRight minor		0.9700 *(p = 0.0733)**	
TurnRight minor		-0.4158 *(p = 0.1279)*°	
GetsPriority VP			1.2946 *(p < 0.0001)****
LookRight VP			1.6863 *(p < 0.0001)****
Note [1]values present the parameter estimates of the logistic regression model. For categorical variables with more than 2 categories, the category is indicated. P-values of individual categories between (). *P-values of the variables in total are in italics between ()*. [2] Model where variables are subdivided according to vehicle main and minor road [3] Model where variables are subdivided according to which vehicle has priority (VP) and has no priority (VNP) *** P≤0,01 (significant at 99% CI) ** P≤0,05 (significant at 95% CI) * P≤0,10 (significant at 90% CI) ° P>0,10 (not significant at 90% CI)			

TABLE 6 Output Approach Behaviour Model for No-Priority Vehicle

The variable 'GetsPriority main' is the most significant variable for the priority to the right intersection (model A) and shows that it becomes very likely that the vehicle of the minor or side road stops or slows down at the junction when the vehicle gives priority to the vehicle of the main road that comes from the right.'LookRight minor' indicates a positive relation. As a result, it becomes very likely that the vehicle of the minor road stops or slows down when the driver looks to the right *(15)*. The last variable 'TurnRight minor' indicates that it is less likely that the vehicle of the minor road stops or slows down when the vehicle turns right. The drivers do not slow down or stop to make a right turn because they do not need to yield to the other vehicle streams they might encounter.

Model B of the priority to the right intersection is explained by two variables, that are both very significant. 'Getspriority VP' indicates that the no-priority vehicle stops or slows down to give priority to the in-priority vehicle to comply with the priority rule. The ratio of the variable LookRight VP also indicates a strong positive relation. As a result, it becomes very likely that the vehicle with no priority stops or slows down at the intersection to look to right in order to search for approaching in-priority vehicles *(15)*

5. CONCLUSIONS

The main goal of this study was to identify possible traffic safety differences between priority and priority to the right intersections by comparing the road user and priority behaviour by means of road user behavioural observations. The road user behaviour was observed at intersections with the same road geometry, traffic flows and speed limits while the infrastructural characteristics are kept to a minimum to limit the number of confounding factors. As a result, the only difference between the intersections is the type of priority control

which makes it possible to assign traffic safety differences to the variance in priority rules. A first exploratory analysis of such traffic safety and road user behaviour differences has been presented here.

Overall, more drivers violated the priority to the right rule compared to the fixed priority rule. This is an indication that the type of priority control influences the non-compliance of this rule. The fixed priority rule is mostly violated when the vehicle of the minor road arrives first at the intersection and the in-priority driver looks to the right. This is not the case for the priority to the right intersection. The results of the two models indicate that the priority is mostly violated when the vehicle of the side road has priority, the in-priority vehicle stops or slows down at the intersection plane and the no-priority vehicle arrives first and maintains its speed. These findings confirm that the behaviour of other road users and the priority rules influence the road user behaviour. The higher priority violation number at the priority to the right intersection is related with the existence of an informal traffic rule which convinces drivers that one road functions as an informal in-priority main road. As a result, the drivers are convinced that they have priority while this is not the case. This situation can be defined as a psychological right-of-way. A resemblance between both intersections is that the priority rule is most likely violated when the no-priority vehicle arrives first which suggests that the road user who reaches the intersection plane first has a higher tendency to proceed his route despite the in-force priority rule.

The looking behaviour also differs according to the type of priority rule. At the priority intersection, the in-priority drivers only look when they need to make a turning manoeuvre. At the priority to the right intersection, the in-priority drivers looked to the right and/or left when this vehicle arrives first, stops at the intersection and gives priority to the other road user while to no-priority driver looked when he stopped and gave priority to the right.

The approach behaviour of the drivers is at both intersections conform with the priority rule. At the priority intersection, the in-priority vehicles maintain their speed while the no-priority vehicles generally stop or slow down to give priority. At the priority to the right intersection, the in-priority vehicle maintains its speed when it does not look and gets priority while the no-priority vehicles stop and look to give priority to the right.

To conclude, the results of the present study suggest that the road user behaviour at intersections is influenced by the type of priority control. There are differences in the way the drivers interact with each other and their environment that are independent of the infrastructural characteristics. Therefore, this study provides a first indication that traffic safety differences exist between these two intersection types and that they are the direct result of the difference in priority control.

6. LIMITATIONS AND FUTURE RESEARCH

Due to time constraints and practical reasons it was impossible to take every interaction kind into account. This study only discusses the road user behaviour in interactions between two vehicles. Further research which also takes into account interactions between more than two vehicles may further elucidate the traffic safety differences between these types of priority control since it is expected that road users behave differently compared to interactions with only two road users. Complex interactions, e.g. turning movements at the junction plane, are also excluded from this study since it is quite difficult to correctly observe these interactions due to their complexity. Further research with automated video analysis of the road user behaviour can provide useful insights concerning the road user and priority behaviour in both interaction types.

The analysed interactions are limited to 90° interactions. Because the sample of the other interaction types (main road vs. main road and minor road vs. minor road) were too small to build a valid model. Therefore, chi-square tests were performed on these interaction types by comparing the road user behaviour of the 90° interactions with the behaviour in these interaction types (appendix 9). The first results indicated that the road user behaviour differs according to the interaction type at the priority to the right and priority intersection. Nevertheless more research is necessary to confirm these findings since the number of interactions on the side roads and main road are quite limited, compared to the 90° interactions, to produce valid results and conclusions.

The final remark, is that this research is an exploratory study that provides first insights. Further research at more locations is necessary to confirm whether the results of this study can be generalised to other locations.

7. ACKNOWLEDGEMENTS

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APPENDICES: CONTENTS

APPENDIX 1: INTERSECTIONS

1.1 Intersection Halen (Zelem)

Characteristics:

- Residential area
- Fixed priority rule
- Priority road: Stationstraat
- Four arms
- No cycle path
- Footpath

Street name	*Speed (km/h)*	*Number of lanes*	*Lane width (in m)*
Stationstraat (to Halen)	50	2	5
Weyerstraat (to Zelem centre)	50	2	10
Stationstraat (to Meldert)	50	2	5
Weyerstraat (to Halen)	50	2	10

Stationstraat (to Meldert)

Weyerstraat (to Zelem centre)

Stationstraat (to Halen)

Weyerstraat (to Halen)

1.2 Intersection Hasselt (Banneuxwijk)

Characteristics:

- Residential area
- Priority to the right rule
- Four arms
- No cycle path
- Footpath

Street name	*Speed (km/h)*	*Number of lanes*	*Lane width (in m)*
Banneuxstraat (to Genk)	50	2	5
Lod Lavkistraat (to school)	50	2	10
Banneuxstraat (to Hasselt)	50	2	5
Lod Lavkistraat	50	2	10

Banneuxstraat (to Genk)

Lod Lavkistraat (to school)

Banneuxstraat (to Hasselt)

Lod Lavkistraat

1.3 Intersection Bilzen

Characteristics:

- Residential area
- Fixed priority rule
- Four arms
- Adjacent cycle path

Street name	*Speed (km/h)*	*Number of lanes*	*Lane width (in m)*
N730 Pijpenpoort	50	2	5,70
Tabaartstraat	50	2	6,20
N730 Meershoven	50	2	5,70
Brabantsestraat	50	2	6

N730 Pijpenpoort

Tabaartstraat

Brabantsestraat

N730 Meershoven

Cycle path:

Adjacent cycle path	
Width cycle path (in m)	1,3

1.4 Intersection Hasselt (Kuringen)

Characteristics:

- Residential area
- Priority to the right rule
- Four arms
- Adjacent cycle path

Street name	*Speed (km/h)*	*Number of lanes*	*Lane width (in m)*
Overdemerstraat (to Heide)	50	2	6,1
Jessenhofstraat (to Hasselt)	50	2	5
Overdemerstraat (to Kuringen)	50	2	6,1
Jessenhofstraat (to Stokrooie)	50	2	5

Overdemerstraat (to Heide)

Jessenhofstraat (to Hasselt)

Overdemerstraat (to Kuringen)

Jessenhofstraat (to Stokrooie)

Cycle path:

Adjacent cycle path	
Width cycle path (in m)	1,3

1.5 Intersection Bilzen (Munsterbilzen)

Characteristics:

- Residential area
- Fixed priority rule
- Four arms
- Elevated junction plane
- Cycle path

Street name	*Speed (km/h)*	*Number of lanes*	*Lane width (in m)*
Oude Siemerstraat (to centre)	50	2	6,4
Oude Tramweg (to Munsterbilzen)	50	2	5,2
Oude Siemerstraat (to Eik)	50	2	6,4
Oude Tramweg (to Eik)	50	2	5,2

Oude Siemerstraat (to centre)

Oude Tramweg (to Munsterbilzen)

Oude Siemerstraat (to Eik)

Oude Tramweg (to Eik)

Cycle path:

Adjoining cycle path	
Width cycle path (in m)	1,2

1.6 Intersection Genk (Boxbergheide)

Characteristics:

- Residential area
- Priority rule to the right
- Four arms
- Elevated junction plane
- Cycle path

Street name	*Speed (km/h)*	*Number of lanes*	*Lane width (in m)*
Boxbergstraat (to Winterslag)	50	2	5,4
De Heuvel (to Zonhoven)	50	2	5,4
Boxbergstraat (to Bokrijk)	50	2	5,4
De Heuvel (to Genk)	50	2	5,4

Boxbergstraat (to Winterslag)

De Heuvel (to Zonhoven)

Boxbergstraat (to Bokrijk)

De Heuvel (to Genk)

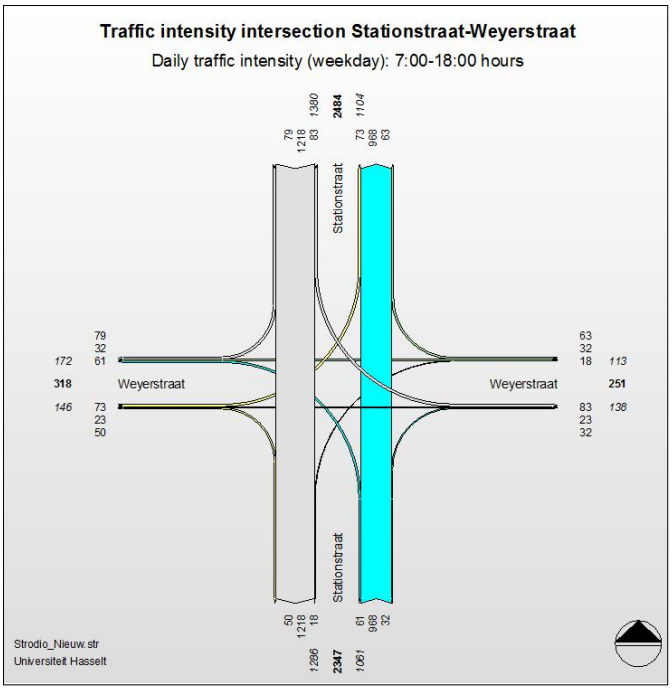
Cycle path:

Adjoining cycle path	
Width cycle path (in m)	1,5

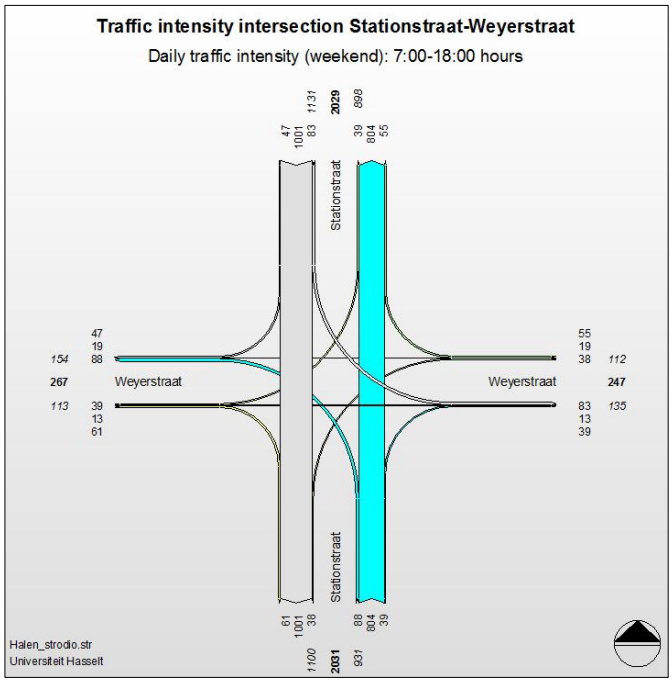
APPENDIX 2: TRAFFIC VOLUMES

2.1 Intersection Halen (Zelem): priority controlled intersection

Weekday

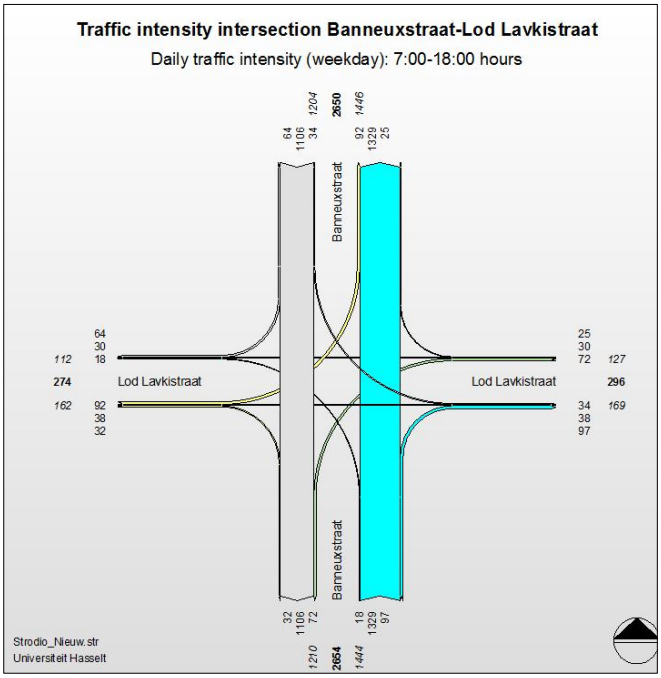


Weekend

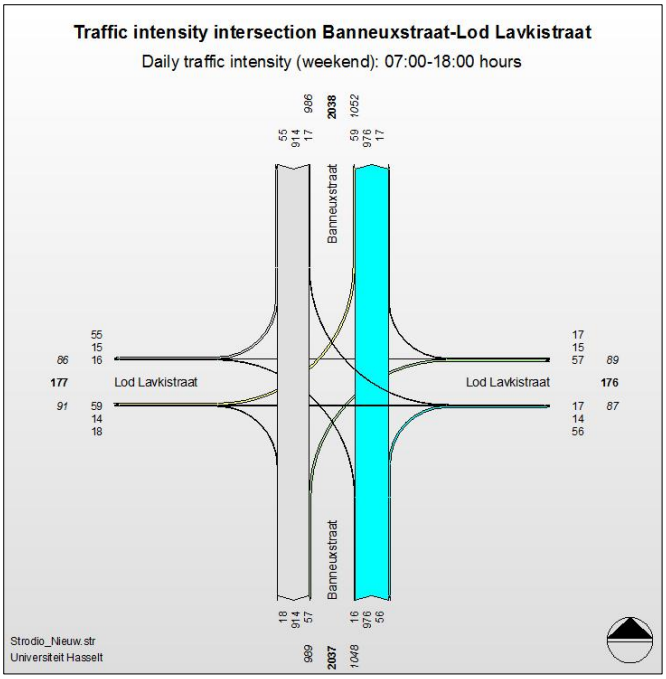


2.2 Intersection Hasselt (Banneuxwijk): priority to the right rule intersection

Weekday



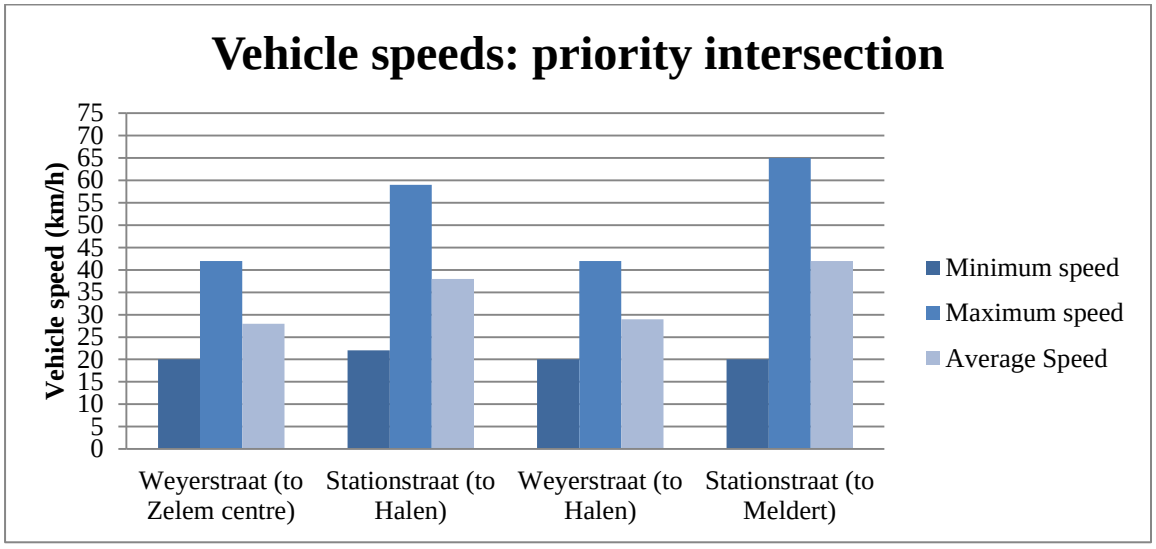
Weekend



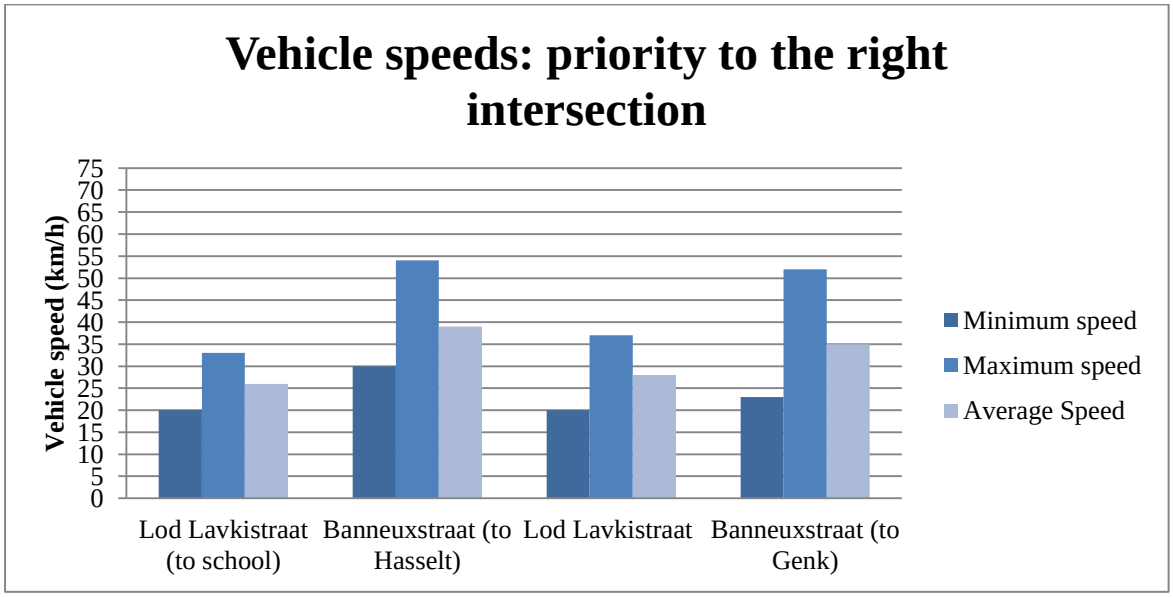
APPENDIX 3: VEHICLE SPEEDS

For all intersections, the legal speed limit is set a 50 km/h. The following graphs indicate that at each intersection this speed is exceed at the (psychological) main road of the intersection. The vehicles driving at the side or minor roads drive slower than this speed limit or drive at the speed of 50 km/h.

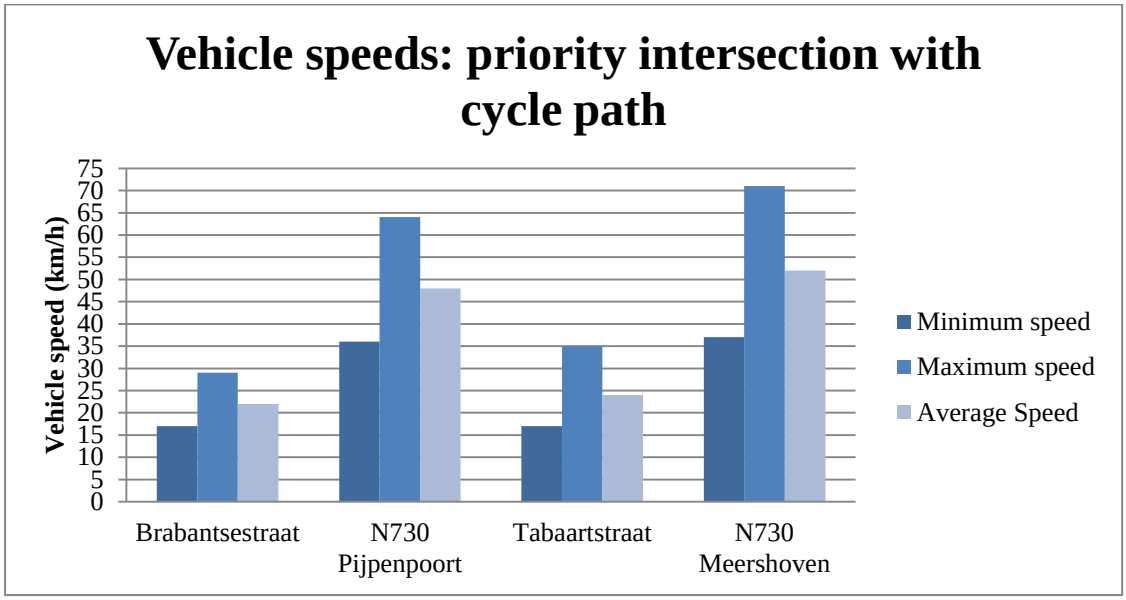
3.1 Intersection Halen



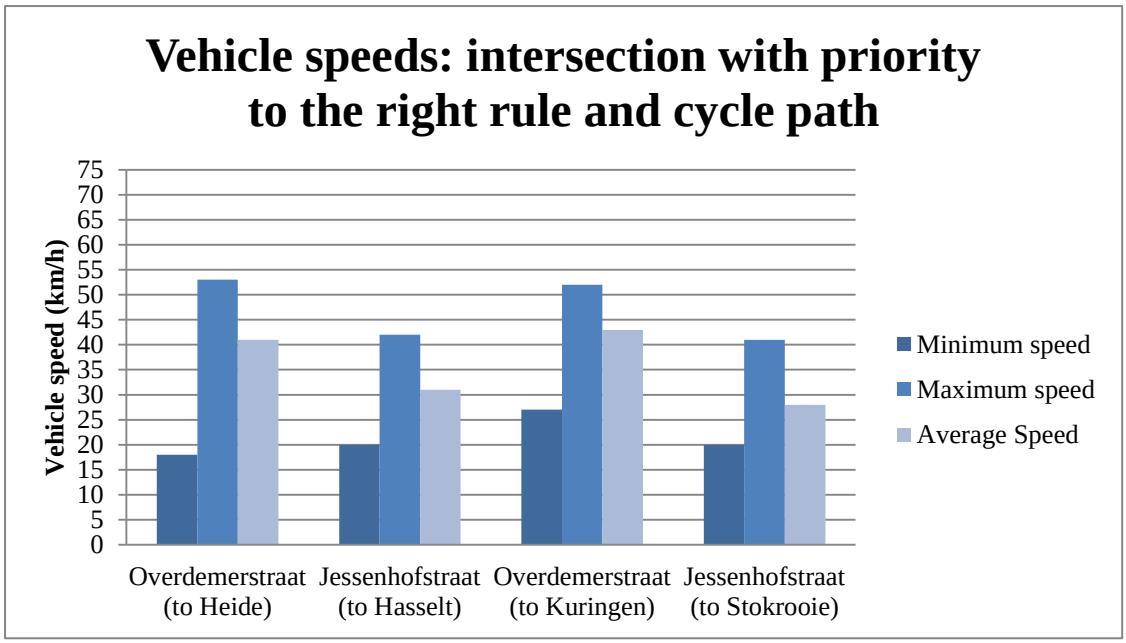
3.2 Intersection Hasselt



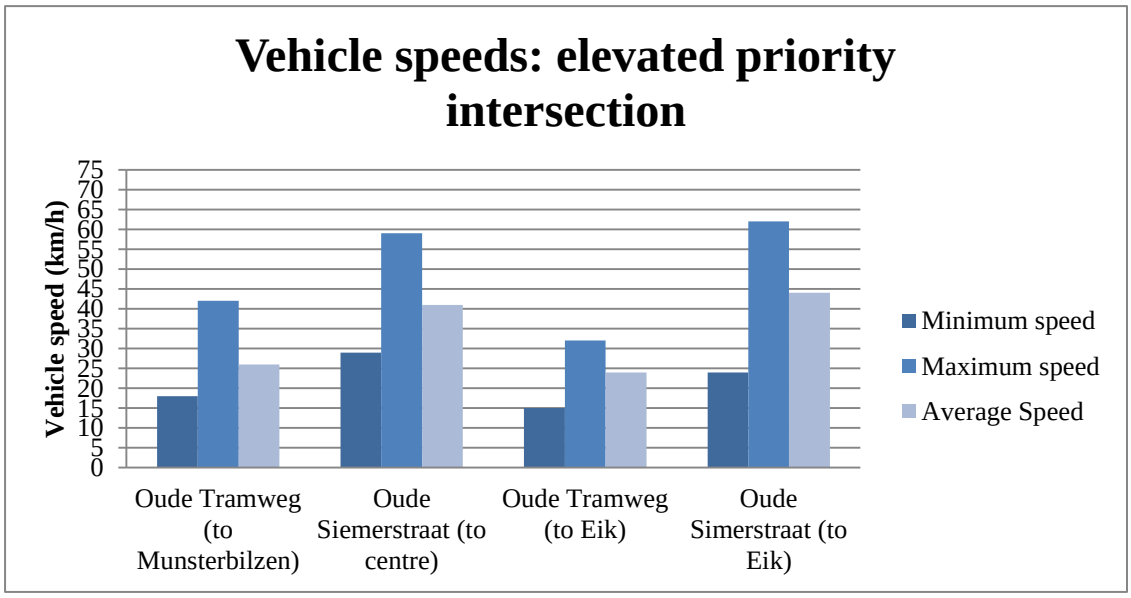
3.3 Intersection Bilzen



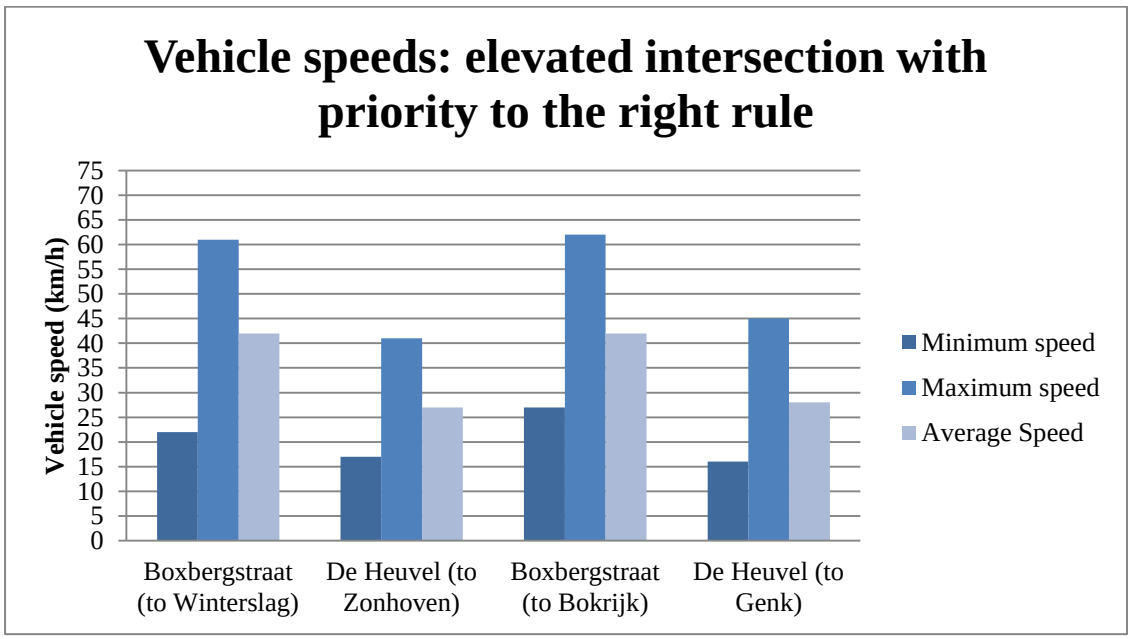
3.4 Intersection Hasselt (Kuringen)



3.5 Intersection Bilzen (Munsterbilzen)



3.6 Intersection Genk (Boxbergheide)



APPENDIX 4: REFERENCE POINTS

4.1 Intersection Halen (Zelem)

Stationstraat (to Meldert)

Weyerstraat (to Zelem centre)

Stationstraat (to Halen)

Weyerstraat (to Halen)

Street name	*Distance reference point (m)*	*Reference point*
Stationstraat (to Halen)	50	House
Weyerstraat (to Zelem centre)	25	Mailbox
Stationstraat (to Meldert)	50	Between the two trees on the left
Weyerstraat (to Halen)	25	Driveway

4.2 Intersection Hasselt (Banneuxwijk)

Banneuxstraat (to Genk)

Lod Lavkistraat (to school)

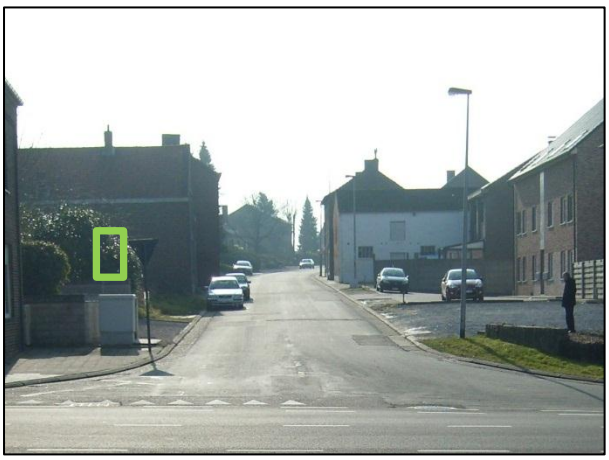
Banneuxstraat (to Hasselt)

Lod Lavkistraat

Street name	*Distance reference point (m)*	*Reference point*
Banneuxstraat (to Genk)	50	Lighting pole
Lod Lavkistraat (to school)	25	Third tree on the right
Banneuxstraat (to Hasselt)	50	Between fourth and fifth tree on the right
Lod Lavkistraat	25	Driveway on the right

4.3 Intersection Bilzen

N730 Pijpenpoort



Tabaartstraat

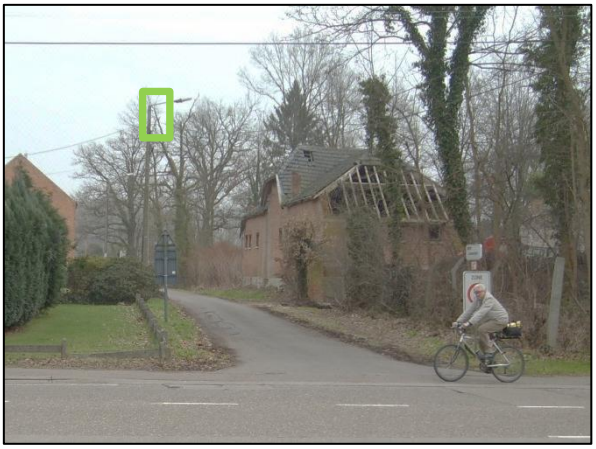
Brabantsestraat

N730 Meershoven

Street name	*Distance reference point (m)*	*Reference point*
N730 Pijpenpoort	50	Third house on the right
Tabaartstraat	25	End of first house on the left
N730 Meershoven	50	Second lighting pole
Brabantsestraat	25	Traffic sign

4.4 Intersection Hasselt (Kuringen)

Overdemerstraat (to Heide)



Jessenhofstraat (to Hasselt)

Overdemerstraat (to Kuringen)

Jessenhofstraat (to Stokrooie)

Street name	*Distance reference point (m)*	*Reference point*
Overdemerstraat (to Heide)	50	Beginning of drive way (third house on the right)
Jessenhofstraat (to Hasselt)	25	Lighting pole
Overdemerstraat (to Kuringen)	50	Lighting pole
Jessenhofstraat (to Stokrooie)	25	Lighting pole

4.5 Intersection Bilzen (Munsterbilzen)

Oude Siemerstraat (to centre)

Oude Tramweg (to Munsterbilzen)

Oude Siemerstraat (to Eik)

Oude Tramweg (to Eik)

Street name	*Distance reference point (m)*	*Reference point*
Oude Siemerstraat (to centre)	50	Second lighting pole on the right
Oude Tramweg (to Munsterbilzen)	25	Hedge
Oude Siemerstraat (to Eik)	50	Second lighting pole on the left
Oude Tramweg (to Eik)	25	First lighting pole on the left

4.6 Intersection Genk (Boxbergheide)

Boxbergstraat (to Winterslag)

De Heuvel (to Zonhoven)

Boxbergstraat (to Bokrijk)

De Heuvel (to Genk)

Street name	*Distance reference point (m)*	*Reference point*
Boxbergstraat (to Winterslag)	50	Large pineapple tree
De Heuvel (to Zonhoven)	25	Mailbox
Boxbergstraat (to Bokrijk)	50	Large pineapple tree
De Heuvel (to Genk)	25	First lighting pole on the left

APPENDIX 5: BEHAVIOURAL OBSERVATION FORM

The behavioural observation form contains the following variables:

- Gender: this personal characteristic is included in the form in order to investigate to what extent this characteristic influences the behaviour of road users. A distinction is made between male (M) and female (F) drivers. The second distinction that is made, is whether the driver approaches the intersection from the main road (VH) or from the minor road (VO). This factor makes it possible to determine whether the priority behaviour differs according to the gender of the driver.

- Age: the driver age is subdivided in three categories: young driver (Y), middle-aged driver (A) and senior driver (S). The second distinction that is made, is whether the driver approaches the intersection from the main road (VH) or from the minor road (VO). This factor makes it possible to determine whether the priority behaviour differs according to the age of the driver.

- Interaction: the interaction type or the way the interaction proceeds (i.e. who comes from where) may also influence the driver behaviour. It is assumed that interactions with two vehicles from the opposite direction (main or minor road) differ from interactions where vehicles approach each other in a corner of 90°, i.e. one vehicle comes from the main road and one from the minor road. Therefore, the priority behaviour may also differ according to the type of interaction.

- Approach behaviour at intersection: the first block of this variable distinguishes which vehicle reaches the intersection plane first and/or the vehicles arrive simultaneously. This distinction is made to investigate whether the arrival situation influences the priority behaviour. The second block makes a distinction in the approaching behaviour of the vehicles of the main (VH) and minor (VO) road. Four possible situations are defined that are mutually exclusive: the vehicle stops, slows down, accelerates or maintains its speed at the intersection. This factor plays an important role in giving priority. When a driver does not have the intention to adjust his speed when he/she approaches the intersection, it is very likely that the other driver will give him/her priority even when the priority rules indicate otherwise.

- Drivers' observation making: this factor poses the question whether the driver VH/VO looks to his/her right or left when he/she has reached the intersection. The looking behaviour is only noted when drivers search for other vehicles in their vicinity. This implies that it is not noted when drivers look at which direction they need to drive. When drivers do not look to the right or left, they look straight ahead ("N" = no). This factor plays an important role in giving priority. When the driver does not look to his/her left or right at the intersection, it becomes very likely that the other vehicle is noticed too late or not at all and the driver does not give priority. Such a situation increases the likelihood of a potential conflict. This factor may also be related to a psychological conviction that the driver who does not look for other road users, is convinced that he/she has priority while this is not the case.

- Priority behaviour: the priority behaviour is investigated by observing which vehicle has priority and which vehicle takes or gets priority. Because the difference between "taking" priority and "getting" priority is not always clear, it is opted to mark which vehicle has priority and which vehicle gets priority, i.e. which vehicle goes first. Therefore, it becomes possible to analyse violations of the priority rules.

- Turning movements: this factor is included to establish if…then-behaviour. Does the driver use the directional lights when he/she turns left or right. This factor makes it possible to determine for which turning movement the directional lights are frequently used or not.

- Communication: communication plays an important role in road user interactions. The first factor investigates whether the vehicles VH or VO use their directional lights when making turning movements. When drivers do not use their directional lights when making a turn, it becomes very difficult for the other drivers to infer the driving direction of this vehicle which might lead to a potential conflict. The second factor "gesture/light/horn" is included to investigate whether the drivers make hand gestures, flash their lights or sound the horn when they voluntarily yield their priority to the

vehicle that has no priority. This is important to make a distinction in priority violations that occurred because the driver in priority voluntarily yielded their priority to other drivers and the situation in which a vehicle without priority actively violated the priority of other vehicles.

Date:
Time: **Pavement:**
Weather: **Intersection:**

	Time	Gender				Age						Interaction			Intersection: approach behaviour									
		VH		VO		VH			VO			Opposite direction		90°	First		Equal	Stops		Slows down		Acceler-ates		Main. speed	
		M	F	M	F	Y	A	S	Y	A	S	Main road	Minor road		VH	VO		VH	VO	V H	V O	V H	V O	V H	V O
1																									
2																									
3																									
4																									
5																									
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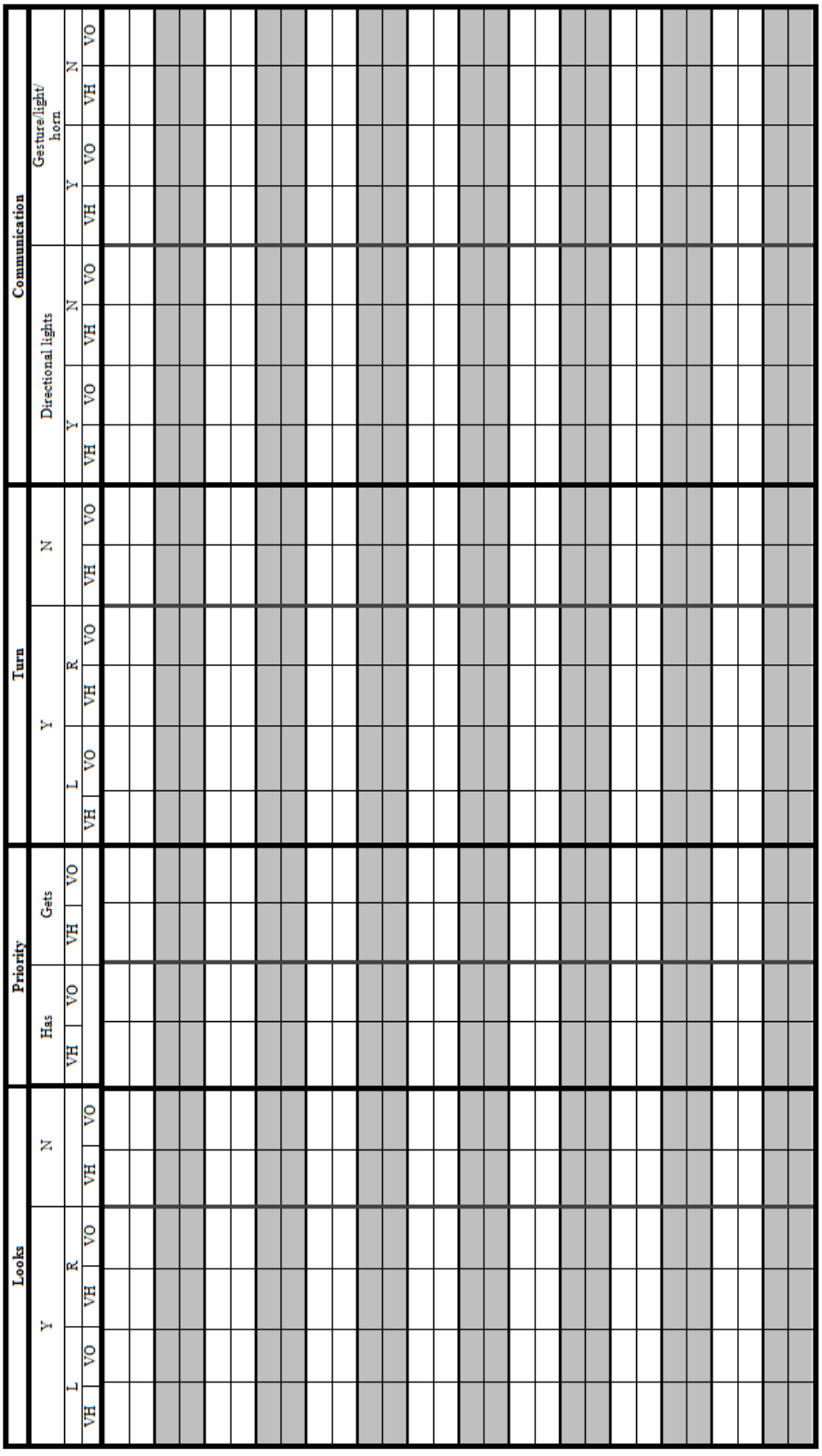
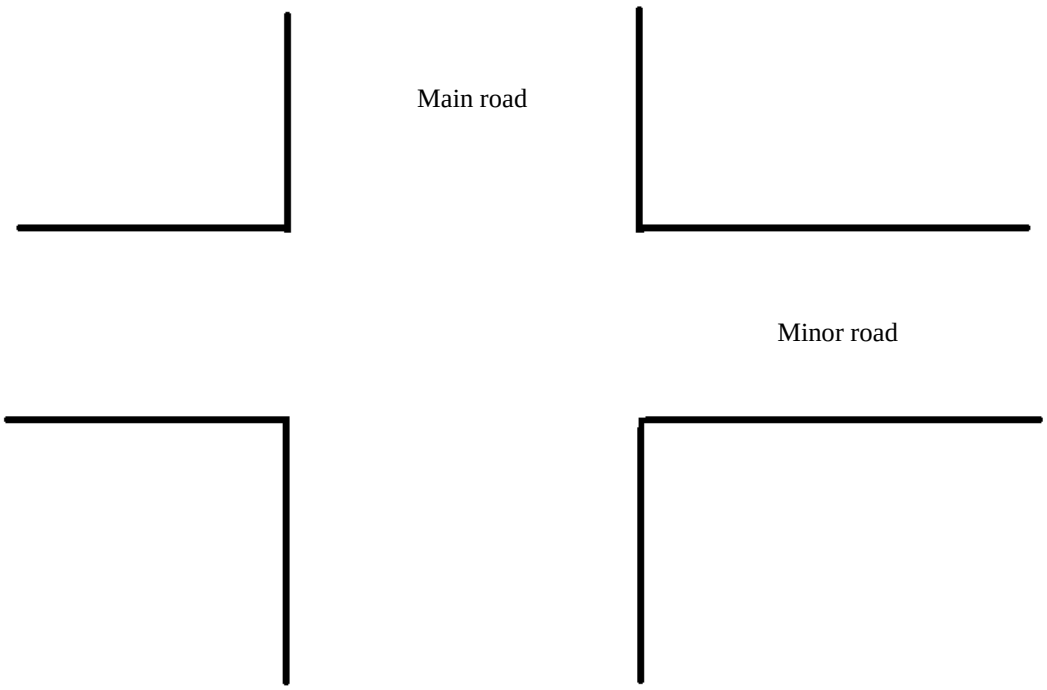

Looks
Priority
Turn
Communication
Y
L
R
N
Has
Gets
Directional lights
Gesture/light/horn
VH
VO

APPENDIX 6: INDICATION MAIN ROAD AND MINOR ROAD



For all observed intersections, a distinction is made if the vehicle drives on the main or minor road of the intersection to investigate whether eventual differences in road user behaviour are depend of the location of the vehicle. At the priority controlled intersection there is always a clear distinction while this is not the case for the intersection with priority to the right. For this intersection the main road is defined as the road which drivers seem to experience as a psychological main road, i.e. the road that is characterized by the highest approaching speed.

APPENDIX 7: CONFLICT OBSERVATION CAMERA SYSTEM

APPENDIX 8: INTERCODER RELIABILITY

	Both intersections		Priority intersection		Priority to the right intersection	
Variables	Percent agreement (%)	Cohen's kappa (%)	Percent agreement (%)	Cohen's kappa (%)	Percent agreement (%)	Cohen's kappa (%)
Gender main[1]	0.88	0.73	0.87	0.68	0.89	0.77
Gender minor[2]	0.90	0.81	0.88	0.78	0.92	0.83
Age main	0.89	0.62	0.87	0.55	0.91	0.70
Age minor	0.85	0.59	0.83	0.43	0.87	0.67
Interaction	1.00	1.00	1.00	1.00	1.00	1.00
Intersection first or equal	0.91	0.87	0.91	0.86	0.92	0.87
Intersection main	0.94	0.89	0.94	0.86	0.94	0.90
Intersection minor	0.93	0.82	0.92	0.31	0.93	0.88
LookLeft main	0.95	0.88	0.96	0.87	0.95	0.88
LookRight main	0.94	0.85	0.94	0.68	0.94	0.88
TotalLook main[3]	0.95	0.87	0.95	0.86	0.94	0.89
LookLeft minor	0.92	0.28	0.90	0.00	0.93	0.48
LookRight minor	0.90	0.60	0.88	0.23	0.92	0.74
TotalLook minor	0.91	0.84	0.88	0.79	0.93	0.88
HasPriority	0.98	0.96	1.00	1.00	0.97	0.94
GetPriority	0.97	0.90	1.00	1.00	0.94	0.88
Turn main	0.95	0.87	0.93	0.82	0.96	0.90
Turn minor	0.93	0.87	0.94	0.90	0.92	0.84
Direction main	0.92	0.80	0.91	0.78	0.93	0.81
Direction minor	0.91	0.72	0.90	0.72	0.92	0.71
Gesture main	1.00	1.00	1.00	1.00	1.00	1.00
Gesture minor	1.00	1.00	1.00	1.00	1.00	1.00
Note [1]Main = vehicle main road [2]Minor = vehicle minor road [3]The variables LookLeft and LookRight together						

TABLE 1 Results Intercoder Reliability-Cohen's Kappa and Percent Agreement

For all variables, the percent agreement is higher than 0.80 which indicates a high agreement between the two coders. Due to the correction for agreement by chance, the results of Cohen's kappa are for most variables slightly lower than the percent agreement. But these results still meet the postulated criterion of 0.70. For the variables age and looking behaviour the kappa values are very low although the percent agreement is quite high. These variables are subjected to the kappa paradox.

	Both intersections		Priority intersection		Priority to the right intersection	
Variables	Cohen's kappa (%)	Krippendorff's alpha (%)	Cohen's kappa (%)	Krippendorff's alpha (%)	Cohen's kappa (%)	Krippendorff's alpha (%)
Gender main[1]	0.73	0.73	0.68	0.67	0.77	0.77
Gender minor[2]	0.81	0.77	0.78	0.73	0.83	0.83
Age main	0.62	0.62	0.55	0.54	0.70	0.70
Age minor	0.59	0.58	0.43	0.43	0.67	0.67
Interaction	1.00	1.00	1.00	1.00	1.00	1.00
Intersection first or equal	0.87	0.87	0.86	0.86	0.87	0.87
Intersection main	0.89	0.89	0.86	0.86	0.90	0.90
Intersection minor	0.82	0.82	0.31	0.30	0.88	0.87
LookLeft main	0.88	0.88	0.87	0.87	0.88	0.88
LookRight main	0.85	0.85	0.68	0.68	0.88	0.88
TotalLook main[3]	0.87	0.87	0.86	0.81	0.89	0.89
LookLeft minor	0.28	0.28	0.00	-0.03	0.48	0.47
LookRight minor	0.60	0.60	0.23	-0.04	0.74	0.74
TotalLook minor	0.84	0.84	0.79	0.78	0.88	0.88
HasPriority	0.96	0.96	1.00	1.00	0.94	0.94
GetPriority	0.90	0.90	1.00	1.00	0.88	0.88
Turn main	0.87	0.87	0.82	0.82	0.90	0.90
Turn minor	0.87	0.87	0.90	0.90	0.84	0.84
Direction main	0.80	0.80	0.78	0.78	0.81	0.81
Direction minor	0.72	0.72	0.72	0.72	0.71	0.71
Gesture main	1.00	1.00	1.00	1.00	1.00	1.00
Gesture minor	1.00	1.00	1.00	1.00	1.00	1.00
Note [1]Main = vehicle main road [2]Minor = vehicle minor road [3]The variables LookLeft and LookRight together						

TABLE 2 Results Intercoder Reliability-Cohen's Kappa and Krippendorff's Alpha

The correction for proclivity is very low since the kappa and alpha values are nearly equal for all variables. Some variables have very low kappa and alpha values due to an unequal distribution of the values over the different code categories for these variables.

APPENDIX 9: CHI-SQUARE TESTS INTERACTION TYPES BASIS INTERSECTION DUO

9.1 Priority controlled intersection

The violation of the priority rule, looking behaviour and approach behaviour of the basis priority intersection in 90° interactions is compared with the road user behaviour in interactions between two vehicles on the main road and between two vehicles that approach the intersection from the minor roads.

Variable	Priority controlled intersection interaction 90° (N = 182) vs. priority controlled intersection interaction main road (N =49)		Priority controlled intersection interaction 90° (N = 182) vs. priority controlled intersection interaction minor road (N = 3)	
	Pearson Chi-square (exact)	Exceeding probability (p = 0.05)	Pearson Chi-square (exact)	Exceeding probability (p = 0.05)
Violation priority rule	0.749	0.404	0.269	1.000
Looking behaviour vehicle 1				
• Look left	48.042	0.000	/	Constant
• Look right	6.304	0.030	0.17	1.000
• Do not look	41.344	0.000	/	Constant
Looking behaviour vehicle 2				
• Look left	28.359	0.000	/	Constant
• Look right	0.483	0.503	0.153	1.000
• Do not look	23.461	0.000	/	Constant
Approach behaviour vehicle 1	66.418	0.000	215.058	0.000
Approach behaviour vehicle 2	30.390	0.000	216.059	0.000

TABLE 1 Chi-square Test Priority Controlled Intersection Interaction type 90° versus Priority Controlled Intersection Interaction Types Main and Minor road

Interaction type main road The Pearson chi-square value of the variable 'violation priority rule' is equal to 0.749. The probability that the chi-square value is exceeded when the null hypothesis – the variables violation priority rule and interaction type are statistically independent - is true, amounts to 0.404. The significance level is equal to 0.05 (α) and the null hypothesis is accepted since the exceeding probability of 0.404 > 0.05. This means that the violation of the priority rule is statistically independent of the interaction type. The looking behaviour of vehicle 1 and vehicle 2 (except look right) and the approach behaviour of both vehicles are dependent of the interaction type at the priority intersection since their exceeding value is smaller than 0.05. The looking behaviour of vehicle 2 when this driver looks right is independent of the interaction type.

Interaction type minor road The variables 'violation priority rule' and 'looking behaviour of vehicle 1 and 2' do not differ according to the interaction type since they are statistically independent of the kind of interaction. The approach behaviour of vehicle 1 and vehicle 2 have an exceeding probability that is smaller than 0.05. As a result, a difference exists between the approach behaviour of these two vehicles and the interaction type. These chi-square test should be interpreted carefully since only three side road interactions were observed at this intersection and this small interaction number is not enough to produce valid results.

To summarize, the chi-square test was able to detect differences between the road user behaviour and the interaction type at the priority intersection. The looking behaviour of vehicle 1 and 2 (except look right) and approach behaviour of both vehicles are dependent of the interaction type when the 90° interactions are compared with the interactions on the main road. This is not the case for the interactions between vehicles on the side roads. For the side roads, the only variables that are dependent of the interaction type are the approach behaviour of vehicle 1 and 2. The variables 'approach behaviour vehicle 1'and 'approach behaviour vehicle 2' are the only variables that are dependent of all interaction types since these variables are statistically dependent for the interactions on the main and side roads. This might indicate that the vehicle that arrives first at the intersection approaches the intersection differently according to the kind of interaction it has with other road

users. Subsequently, vehicle 2 adapts his approach behaviour according to the approach behaviour of vehicle 1 and the interaction type. The limited number of observed interactions between vehicles of the side roads are probably responsible for the fact that the road user behaviour in this situation is almost independent of the interaction type.

9.2 Priority to the right intersection

The violation of the priority rule, looking behaviour and approach behaviour of the basis priority to the right intersection in 90° interactions is compared with the road user behaviour in interactions between vehicles of the main road and between two vehicles that approach the intersection from the minor roads.

Variable	Priority to the right intersection interaction 90° (N = 201) vs. priority to the right intersection interaction main road (N = 35)		Priority to the right intersection interaction 90° (N = 201) vs. priority to the right intersection interaction minor road (N = 2)	
	Pearson Chi-square (exact)	Exceeding probability (p = 0.05)	Pearson Chi-square (exact)	Exceeding probability (p = 0.05)
Violation priority rule	9.613	0.001	0.732	1.000
Looking behaviour Vehicle Priority (VP) • Look left • Look right • Do not look	 29.703 36.659 34.541	 0.000 0.000 0.000	 1.260 1.134 0.973	 0.524 0.537 1.000
Looking behaviour Vehicle No Priority (VNP) • Look left • Look right • Do not look	 20.287 1.120 15.954	 0.000 0.345 0.000	 1.260 1.134 0.973	 0.524 0.537 1.000
Approach behaviour Vehicle Priority (VP)	17.844	0.000	97.679	0.000
Approach behaviour Vehicle No Priority (VNP)	6.102	0.106	98.136	0.000

TABLE 2 Chi-square Test Priority to the Right Intersection Interaction Type 90° versus Priority to the Right Intersection Interaction Types Main and Minor Road

Interaction type main road The variable 'violation priority rule' has a Pearson Chi-square value of 9.613. The probability that the chi-square value is exceeded when the null hypothesis – the variables violation priority rule and interaction type are statistically independent - is true, amounts to 0.001. The significance level is equal to 0.05 (α) and the null hypothesis is rejected since the exceeding probability of $0.001 < 0.05$. This means that the violation of the priority to the right rule is statistically dependent of the interaction type. The exceeding probability of looking behaviour VP, looking behaviour VNP (except look right) and approach behaviour VP is also smaller than 0.05 which means that these variables are statistically dependent of the interaction type. The approach behaviour of the vehicle that has no priority and the looking behaviour of this vehicle when the driver looks to the right are independent of the interaction type.

Interaction type minor road The situation for the interactions between vehicles of the minor roads is quite different from the situation with vehicle interactions on the main road. The variables 'violation priority rule', 'looking behaviour VP' and 'looking behaviour VNP' are statistically independent of the interaction type since their exceeding probability is greater than 0.05. The values of looking behaviour VP and VNP are exactly the same because only two interactions took place between the side roads and all drivers applied the same looking behaviour. Approach behaviour VP and VNP have an exceeding probability that is smaller than 0.05. Therefore, the null hypothesis – the variables approach behaviour VP and VNP are statistically independent of the interaction type – is rejected and a difference exists between approach behaviour VP and VNP at a priority to the right intersection and the interaction type.

The chi-square test was able to detect differences between the road user behaviour and the interaction type at the priority to the right intersection. The violation of the priority rule, the looking behaviour VNP (except look right) and VP and the approach behaviour VP are dependent of the interaction type when the 90° interactions are compared with the interactions on the main road. This is not the case for the interactions between vehicles on the side roads. For the side roads, the only variables that are dependent of the interaction type are the approach behaviour of VP and VNP. The variable 'approach behaviour VP' is the only variable that is dependent of all interaction types since this variable is statistically dependent for the interactions on the main and side roads. This might indicate that the vehicle that has priority approaches the intersection differently according to the kind of interaction it has with other road users. The limited number of observed interactions between vehicles of the side roads are probably responsible for the fact that the road user behaviour in this situation is almost independent of the interaction type.

9.3 Conclusions

To conclude, the road user behaviour differs according to the interaction type at the priority to the right and priority intersection but the extent to which it differs is dependent of the kind of interaction type. Since the road user behaviour differs more when the 90° interactions are compared with the interactions between two vehicles on the main road and almost no differences in road user behaviour are detected when the same 90° interactions are compared with the side road interactions. For these intersections, more research is necessary to confirm these findings since the number of interactions on the side roads and main road are quite limited, compared to the 90° interactions, to produce valid results and conclusions.

APPENDIX 10: TRAFFIC CONFLICT OBSERVATION

The Swedish Traffic Conflict Technique is used to identify traffic conflicts or near-accidents at the basis intersection duo. This method uses road user behaviour and interactions between road users and between road users and the environment as a condition for traffic safety. The technique is used to analyse the causes of a conflict. A conflict can be defined as: "an observational situation at which two or more road users approach each other in space and time to such an extent that a collision is imminent if their movements remain unchanged" *(1).* This definition implies that road users need to undertake an evasive action to avoid an accident. Evasive actions are actions like braking, accelerating or decelerating and evasive manoeuvres. The Swedish Traffic Conflict Technique uses two parameters to determine the severity of a conflict *(2)*:

- The speed of the road user who performs an evasive action at the moment of the evasive action;
- The distance from the road user who performs an evasive action to the imaginary point of collision.

10.1 Method

10.1.2 Indicators of the Swedish Traffic Conflicts Technique

Time-to-Accident (TA) The TTC-indicator (Time-to-Collision) is the time until two road users would have collided had they continued with unchanged speeds and directions *(3).* The TA-indicator is derived from the TTC-indicator since it is one specific value of the TTC-indicator. Time-to-Accident is the TTC that remains to an accident at the moment the evasive action is initiated, presupposed that the road users had continued with unchanged speeds and directions *(4).* Figure 1 shows a graphical representation of the TTC- and TA-indicators

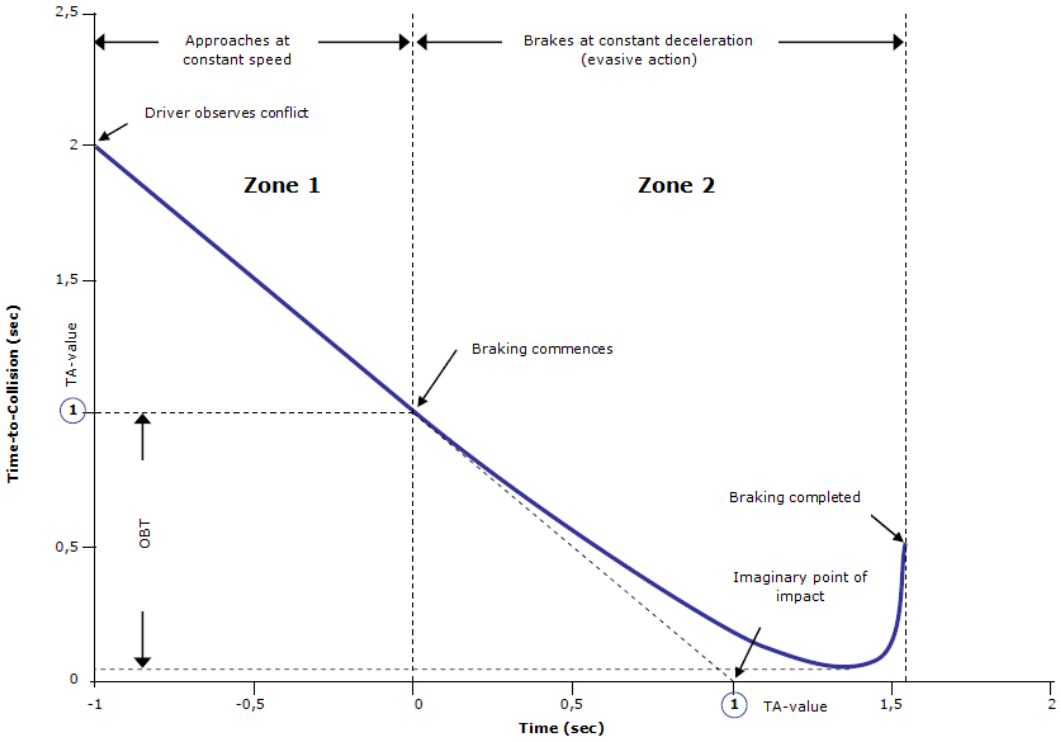


FIGURE 1 Time-to-Collision Graph Depicting TA, OBT and TTC_{min} *(5)*

The TA can only be determined when the road users have a collision course. This indicator is used to determine the severity of a conflict since it is based on the observed speed and distance of the road users at the moment of the evasive action. The TA-values, based on speed and distance, are determined by the values that are shown in table 1. The values that indicate a serious conflict are displayed in bold. When both road users undertake an evasive action, the TA-value is calculated for both of them. The severity of the conflict is than defined by the least serious TA-value.

Speed		**Distance (m)**																		
Km/h	m/s	0,5	1	2	3	4	5	6	7	8	9	**10**	15	**20**	25	**30**	35	**40**	45	**50**
5	*1,4*	**0,4**	0,7	1,4	2,2	2,9	3,6	4,3	5,0	5,8	6,5	7,2	10,8	14,4	18,0	21,6	25,2	28,8	32,4	36,0
10	*2,8*	**0,2**	**0,4**	**0,7**	1,1	1,4	1,8	2,2	2,5	2,9	3,2	3,6	5,4	7,2	9,0	10,8	12,6	14,4	16,2	18,0
15	*4,2*	**0,1**	**0,2**	**0,5**	**0,7**	1,0	1,2	1,4	1,7	1,9	2,2	2,4	3,6	4,8	6,0	7,2	8,4	9,6	10,8	12,0
20	*5,6*	**0,1**	**0,2**	**0,4**	**0,5**	**0,7**	**0,9**	**1,1**	1,3	1,4	1,6	1,8	2,7	3,6	4,5	5,4	6,3	7,2	8,1	9,0
25	*6,9*	**0,1**	**0,1**	**0,3**	**0,4**	**0,6**	**0,7**	**0,9**	**1,0**	**1,2**	1,3	1,4	2,2	2,9	3,6	4,3	5,0	5,8	6,5	7,2
30	*8,3*	**0,1**	**0,1**	**0,2**	**0,4**	**0,5**	**0,6**	**0,7**	**0,8**	**1,0**	**1,1**	**1,2**	1,8	2,4	3,0	3,6	4,2	4,8	5,4	6,0
35	*9,7*	**0,1**	**0,1**	**0,2**	**0,3**	**0,4**	**0,5**	**0,6**	**0,7**	**0,8**	**0,9**	**1,0**	**1,5**	2,1	2,6	3,1	3,6	4,1	4,6	5,1
40	*11,1*	**0,0**	**0,1**	**0,2**	**0,3**	**0,4**	**0,5**	**0,5**	**0,6**	**0,7**	**0,8**	**0,9**	**1,4**	1,8	2,3	2,7	3,2	3,6	4,1	4,5
45	*12,5*		**0,1**	**0,2**	**0,2**	**0,3**	**0,4**	**0,5**	**0,6**	**0,6**	**0,7**	**0,8**	**1,2**	**1,6**	2,0	2,4	2,8	3,2	3,6	4,0
50	*13,9*		**0,1**	**0,1**	**0,2**	**0,3**	**0,4**	**0,4**	**0,5**	**0,6**	**0,6**	**0,7**	**1,1**	**1,4**	**1,8**	2,2	2,5	2,9	3,2	3,6
55	*15,3*		**0,1**	**0,1**	**0,2**	**0,3**	**0,3**	**0,4**	**0,5**	**0,5**	**0,6**	**0,7**	**1,0**	**1,3**	**1,6**	**2,0**	2,3	2,6	2,9	3,3
60	*16,7*		**0,1**	**0,1**	**0,2**	**0,2**	**0,3**	**0,4**	**0,4**	**0,5**	**0,5**	**0,6**	**0,9**	**1,2**	**1,5**	**1,8**	**2,1**	**2,4**	2,7	3,0
65	*18,1*		**0,1**	**0,1**	**0,2**	**0,2**	**0,3**	**0,3**	**0,4**	**0,4**	**0,5**	**0,6**	**0,8**	**1,1**	**1,4**	**1,7**	**1,9**	**2,2**	**2,5**	2,8
70	*19,4*		**0,1**	**0,1**	**0,2**	**0,2**	**0,3**	**0,3**	**0,4**	**0,4**	**0,5**	**0,5**	**0,8**	**1,0**	**1,3**	**1,5**	**1,8**	**2,1**	**2,3**	**2,6**
75	*20,8*		**0,0**	**0,1**	**0,1**	**0,2**	**0,2**	**0,3**	**0,3**	**0,4**	**0,4**	**0,5**	**0,7**	**1,0**	**1,2**	**1,4**	**1,7**	**1,9**	**2,2**	**2,4**
80	*22,2*		**0,0**	**0,1**	**0,1**	**0,2**	**0,2**	**0,3**	**0,3**	**0,4**	**0,4**	**0,5**	**0,7**	**0,9**	**1,1**	**1,4**	**1,6**	**1,8**	**2,0**	**2,3**
85	*23,6*		**0,0**	**0,1**	**0,1**	**0,2**	**0,2**	**0,3**	**0,3**	**0,3**	**0,4**	**0,4**	**0,6**	**0,8**	**1,1**	**1,3**	**1,5**	**1,7**	**1,9**	**2,1**
90	*25,0*		**0,0**	**0,1**	**0,1**	**0,2**	**0,2**	**0,2**	**0,3**	**0,3**	**0,4**	**0,4**	**0,6**	**0,8**	**1,0**	**1,2**	**1,4**	**1,6**	**1,8**	**2,0**
95	*26,4*		**0,0**	**0,1**	**0,1**	**0,2**	**0,2**	**0,2**	**0,3**	**0,3**	**0,3**	**0,4**	**0,6**	**0,8**	**0,9**	**1,1**	**1,3**	**1,5**	**1,7**	**1,9**
100	*27,8*		**0,0**	**0,1**	**0,1**	**0,1**	**0,2**	**0,2**	**0,3**	**0,3**	**0,3**	**0,4**	**0,5**	**0,7**	**0,9**	**1,1**	**1,3**	**1,4**	**1,6**	**1,8**

TABLE 1: TA-Table Based on Speed and Distance ***(4)***

Figure 2 makes it possible to determine if a conflict is serious or not by matching the approach speed and the TA-value. The boundary between a serious and non-serious conflict is formed by the Optimal Braking Time (OBT) for an average vehicle needed to safely stop before the collision point with locked brakes on normal dry asphalt, plus an additional safety margin of 0.5 seconds *(6)*. The reaction time of the driver is neglected, because the evasive manoeuvre is the beginning for estimating the speed and distance of the road user.

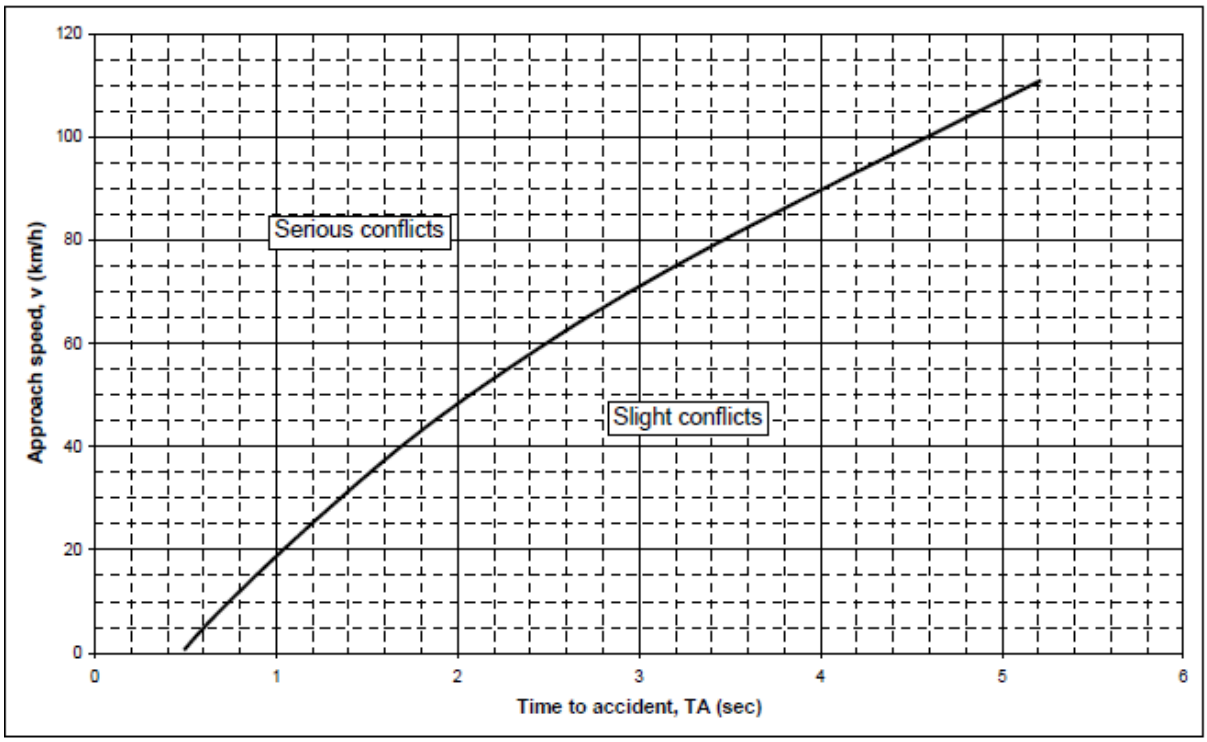


FIGURE 2 Graph to Determine the Severity of a Conflict ***(4)***

Post-Encroachment-Time (PET) The PET-indicator identifies near-miss situations. PET is defined as the time between the first road user leaving the conflict zone and the second one entering it *(7).* The PET is measured in the absence of a collision course, but a small change in direction or speed can result in a collision. The PET presents the risk that an accident occurs, more specifically the manner in which the accident did not occur. The likelihood of an accident is larger when the PET-value is small. A PET $\leq$ 1 second is considered as serious conflict *(8).*

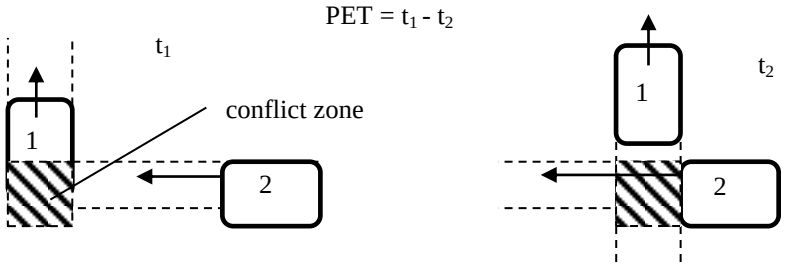


FIGURE 3 Definition of Post-Encroachment-Time ***(7)***

Because, the TA is derived from the TTC-indicator, only the TA and the PET will be used in this study to examine the conflict severity of the vehicle-vehicle interactions.

Conflict Observations The conflicts at the two basis intersections are registered for two weeks by an observer and a video camera that is installed at a distance of about 50 m of the junction plane. This footage is used to analyse and verify observed conflict situations. The vehicle speeds and distances are estimated according to the perception of the observer. Speed measurements executed with a speed gun are used to estimate the speed of the conflicting vehicles. The distance was estimated using predefined reference points such as the width of the lane, the distance between two trees or light poles, the length of a lane,.. (figure 4 and 5). The TA-values for the related speeds and distances were later retrieved from the TA-table (table 1).

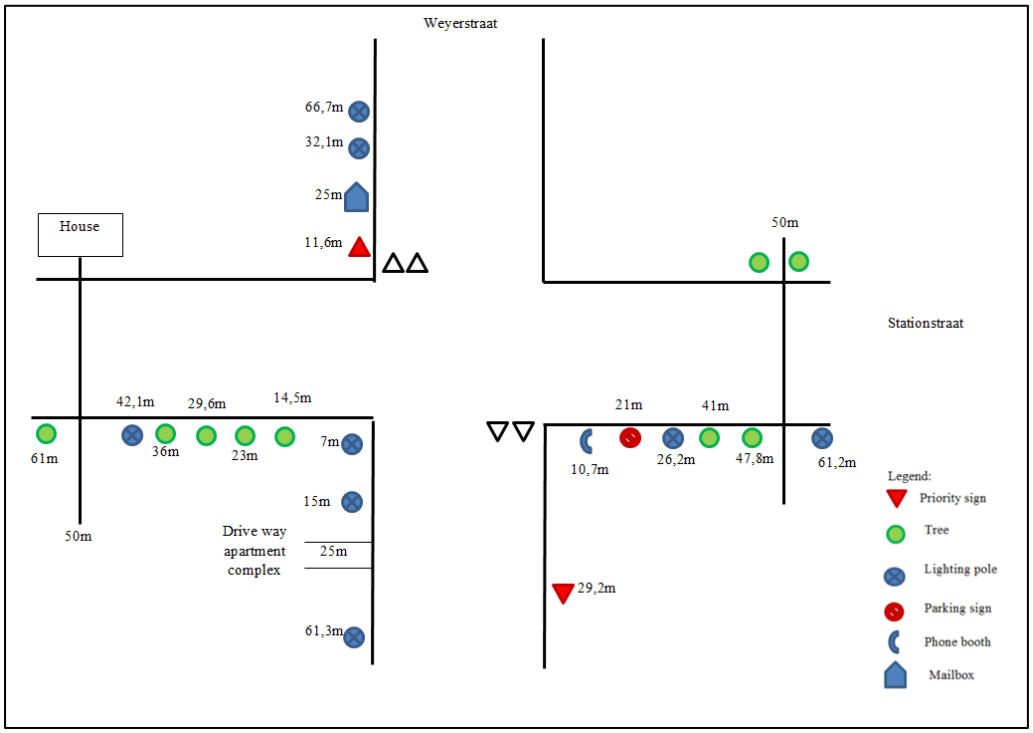


FIGURE 4 Reference Points for Distance – Priority Controlled Intersection

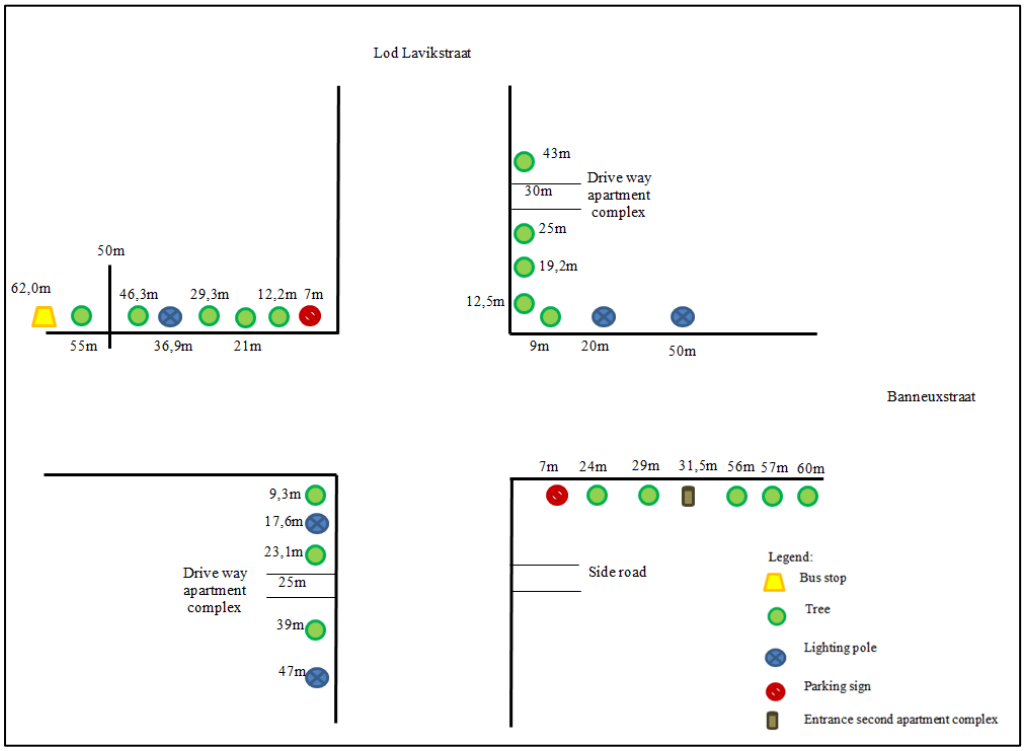


FIGURE 5 Reference Points for Distance – Priority to the Right Intersection

Finally, since conflicts are surrogate measures for accidents, the conflict data are compared with police registered accident data for the priority and priority to the right intersection.

10.2 Results

10.2.1 Analysis according to type of road user

During the observation period of two weeks, 12 conflicts were observed at the priority-controlled intersection. Only two of them were serious conflicts that occurred between vehicles. One non-serious conflict occurred between a vehicle and a bicyclist while the other nine occurred between vehicles.

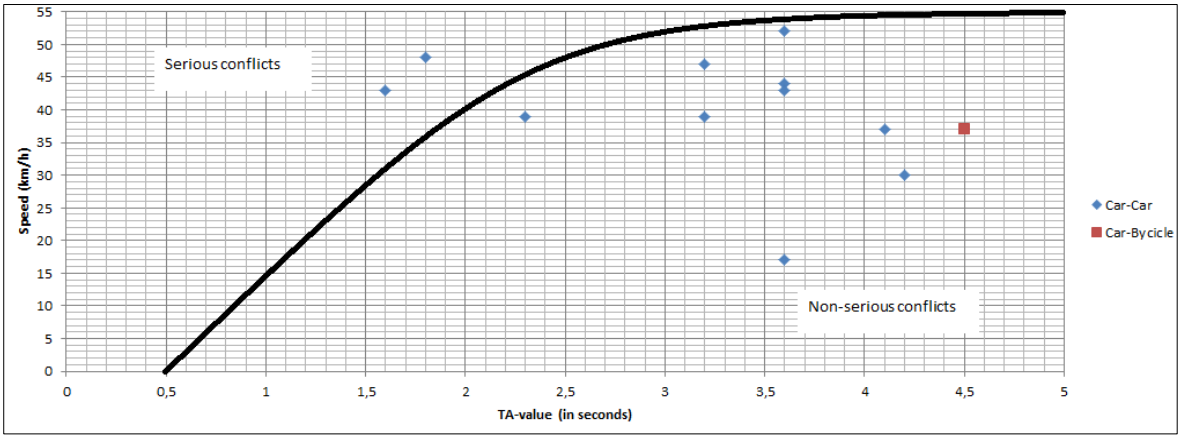


FIGURE 6 Conflict severity according to TA-value for priority-controlled intersection

Furthermore, at the priority-controlled intersection one conflict between a car and a moped was registered as a near-miss situation. Therefore, the PET-indicator was calculated. The car had a speed of 58 km/h and the PET was equal to two seconds. In this situation the PET was larger than 1 second and the conflict is therefore considered as non-serious.

At the intersection with the priority to the right rule, 37 conflicts were observed during the same observation period. Five serious conflicts were observed of which four of them took place between vehicles and one between a car and a pedestrian. The other 32 conflicts were non-serious and occurred between cars (19), cars-pedestrians (7) and cars-bicyclists (6).

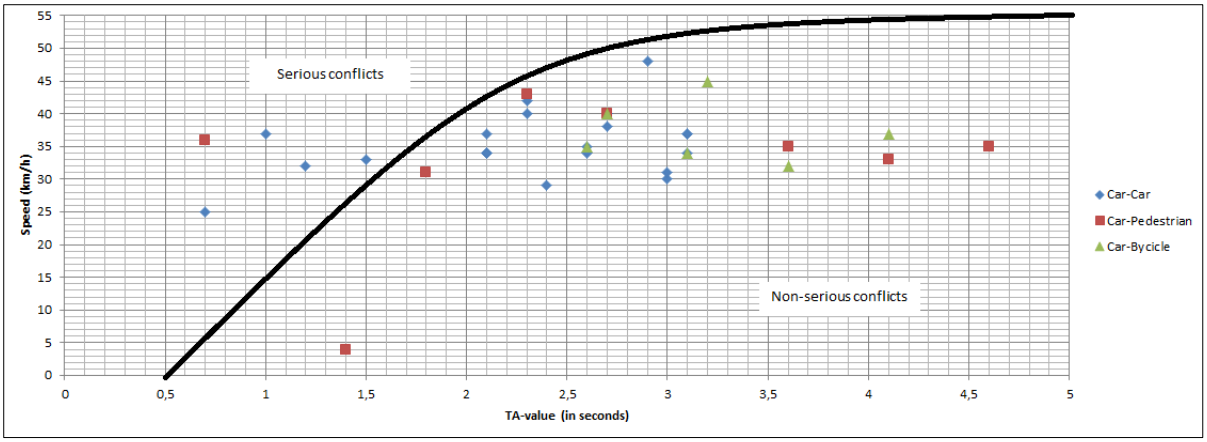


FIGURE 7 Conflict severity according to TA-value for priority to the right intersection

To summarize, at both intersections the majority of the conflicts, serious and non-serious took place between vehicles. When both intersections are compared with each other, it becomes clear that more conflicts, serious and non-serious, took place at the priority to the right intersection (37) than at the priority controlled intersection (12).

10.2.2 Analysis according to road user behaviour

The road user behaviour that precedes the conflicts is discussed by means of manoeuvre diagrams. These diagrams are based on the video footage of the conflicts. With these diagrams it is possible to present each conflict situation graphically. The diagrams are for both intersections constructed by type of involved road users. Table 2 explains the used symbols.

Used symbols			
Road user		Action	
	Pedestrian		Braking
B	Bicyclist		Reverse
	Car		Standing still
M	Moped		Swerving
			Accelerating
Conflict severity		Road surface	
	Serious conflict	X	Wet road surface
	Non-serious conflict		Dry road surface

TABLE 2 Used Symbols for Manoeuvre Diagrams

Priority Controlled Intersection For the priority controlled intersection, two diagrams are constructed: car- car conflicts and car-bicycle/moped conflicts.

Car-Car Conflicts

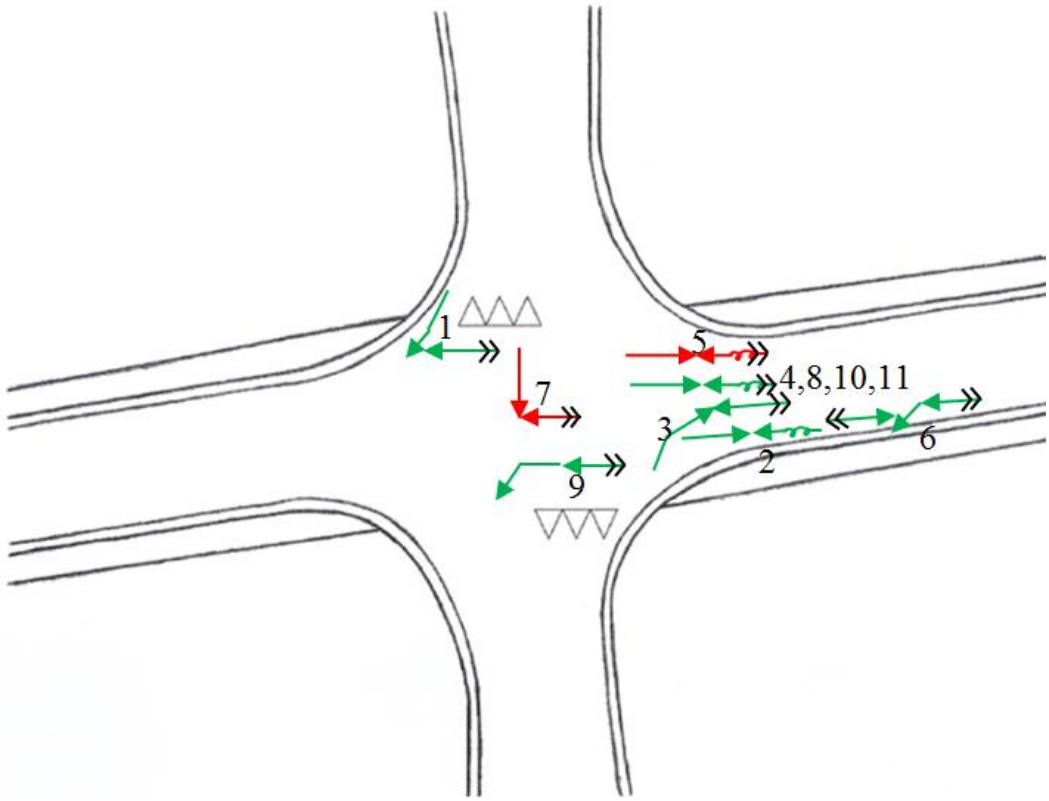


FIGURE 8 Manoeuvre Diagram Car-Car Conflicts

All conflicts between cars took place on a dry road surface. In total, 11 conflicts occurred of which 2 conflicts were serious. The registered conflicts can be divided in 7 head-on, 1 rear-end, 2 side conflicts and 1 conflict that is a combination of a side and rear-end conflict. Of these 7 head-on conflicts, 1 conflict can be regarded as a serious conflict (nr.1). This serious conflict took place because the vehicle that undertook the evasive action overtook several cars which were parked on the road. The driver noticed the approaching car from the opposite direction too late. The driver reacted by performing a sudden braking and swerving manoeuvre to avoid a collision. Four non-serious head-on conflicts (nr.2-5) occurred in the same circumstances as the serious head-on conflict. The difference is that the vehicle speeds of the cars that undertook the evasive action were lower and the drivers noticed the approaching car from the opposite direction a bit earlier. These two aspects led to an earlier start of the braking and swerving manoeuvre resulting in non-serious conflict situations. The fifth non-serious head-on conflict (nr.6) shared the same aspects as the other four non-serious conflicts, besides the fact that the evasive action of the overtaking vehicle was limited to swerving. The cause of the last non-serious conflict (nr.10) was a vehicle that turned right. The overtaking vehicle reacted by braking.

The rear-end conflict (nr.7) was caused by a vehicle that decided to turn left which led to a sudden braking manoeuvre of the following vehicle.

The two side-conflicts were both caused by the vehicles of the minor road which neglected to give priority to the vehicles on the main road. This resulted in 1 serious and 1 non-serious conflict. The car from the minor road kept his speed when it reached and crossed the junction plane without looking for cars on the main road. The driver on the main road did not expect such behaviour and just managed to execute a sudden braking manoeuvre to avoid a collision. This situation resulted in a serious conflict (nr.8). The non-serious conflict (nr.9) was caused by a car that turned right. The driver that approached the intersection from the main road noticed this car and reacted by executing a braking manoeuvre.

The combined rear-end and side conflict (nr.11) was caused by a vehicle that turned into a drive way and signalised his intention too late. Therefore, the cars that approached this car needed to perform a sudden braking manoeuvre.

Car-Bicycle/Moped Conflicts

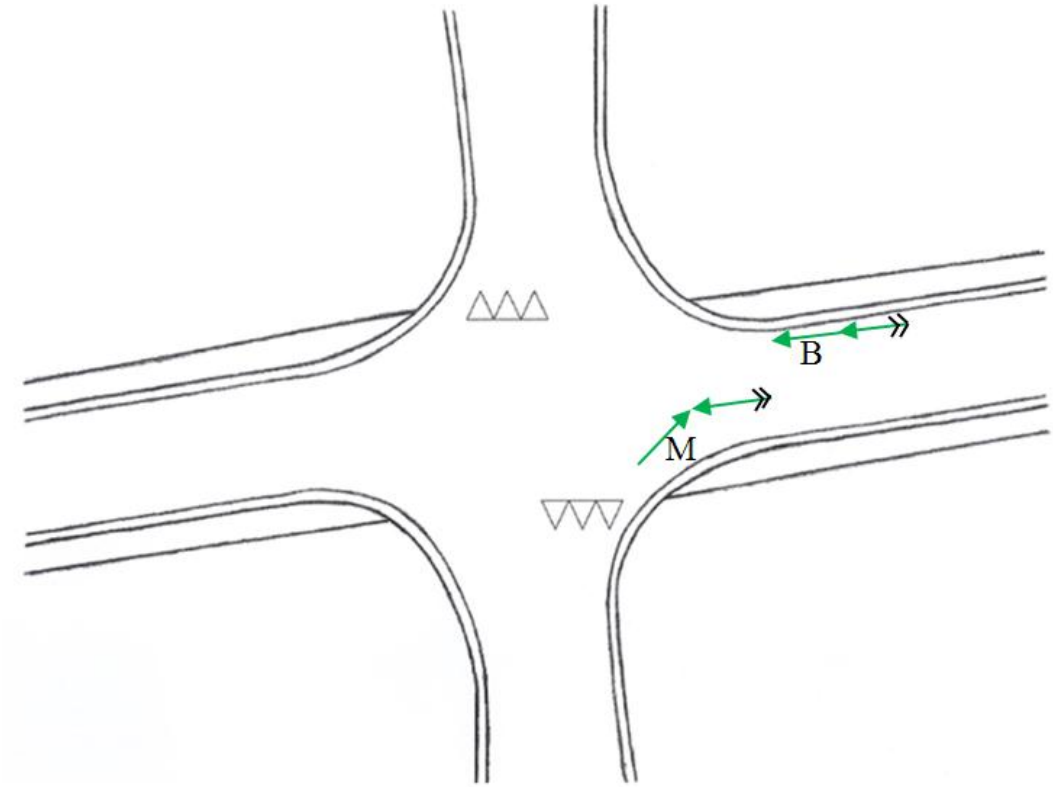


FIGURE 9 Manoeuvre Diagram Car-Bicycle/Moped Conflicts

Two non-serious conflicts took place between cars and bicyclists/mopeds. The conflict between the car and bicyclist was a rear-end conflict. This conflict took place because the approaching car wrongly estimated the bicyclist's speed. The bicyclist drove much slower than the driver expected. Therefore, the driver reacted by a sudden braking manoeuvre.

The car-moped conflict can be regarded as a head-on conflict which was caused by a moped that turned right at the moment that a car overtook other vehicles that were parked on the road. The driver noticed the moped in time and performed a sudden braking manoeuvre.

Priority to the right rule intersection Three diagrams are constructed for the intersection with the priority to the right rule: car-car conflicts, car-bicycle conflicts and car-pedestrian conflicts.

Car-Car Conflicts

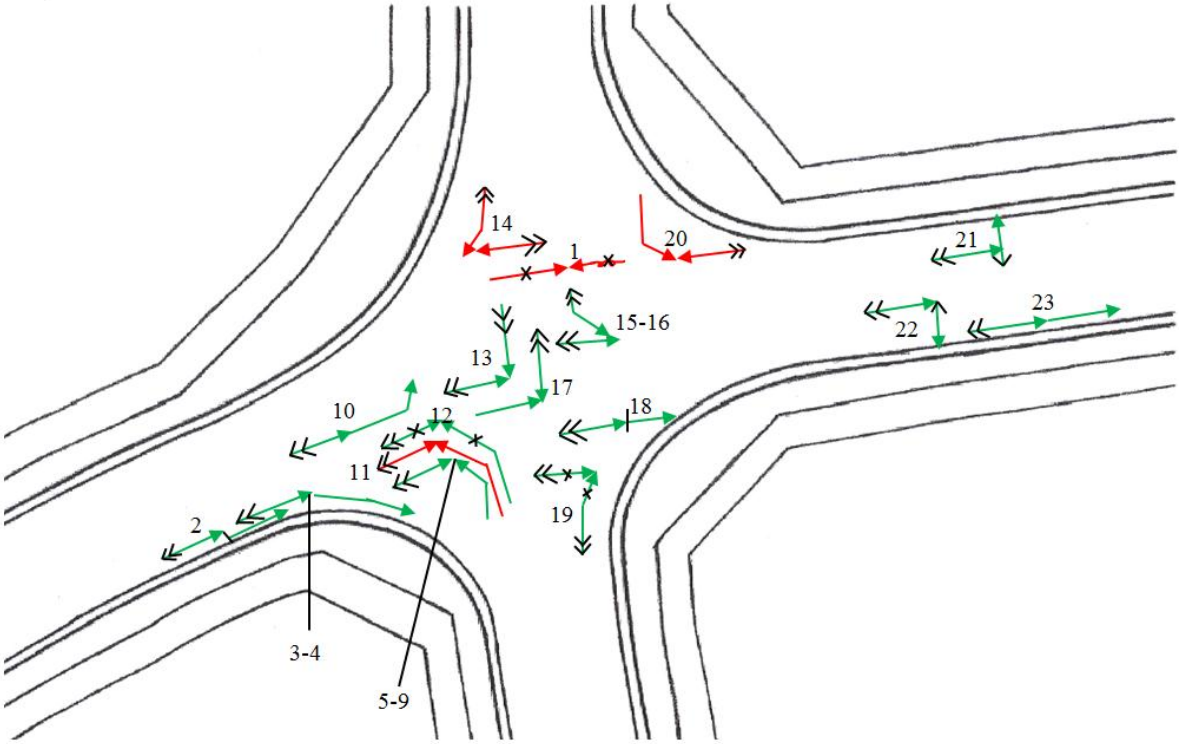


FIGURE 10 Manoeuvre Diagram Car-Car Conflicts

Three of the 19 car-car conflicts took place on a wet road surface. Four conflicts were serious conflicts. The registered conflicts can be divided in 1 head-on, 8 rear-end and 14 side conflicts. The head-on conflict (nr.1) was a serious conflict that occurred on a wet road surface. Two vehicles which approached the intersection from opposite directions reached the intersection simultaneously. Because one vehicle drove to much to the middle of the road, both vehicles needed to brake suddenly and one vehicle even needed to swerve in order to avoid a collision.

The first rear-end conflict (nr.2) was caused by a vehicle that was half parked on the road and on the graded shoulder. Therefore, the vehicle needed to brake suddenly before it could proceed its route. Two non-serious rear-end conflicts (nr.3-4) took place when the first vehicle signalised just before the intersection that it wanted to turn right. Therefore, the second vehicle needed to undertake a sudden braking manoeuvre. The fourth non-serious rear-end conflict (nr. 10) occurred in the same circumstances as the two aforementioned conflicts, with the only difference that the first car turned left instead of right. The rear-end conflict nr.18 was caused by a car that suddenly stopped at the intersection. Therefore, the second vehicle had to brake suddenly to avoid an accident. Conflicts nr. 21-22 are non-serious rear-end conflicts that were caused by a car that reversed from a driveway without scanning the road for other vehicles. Because of this, the approaching cars needed to undertake a sudden braking action. The last rear-end conflict, conflict nr.23, was caused by a slow driving

vehicle which was followed by a vehicle with a higher speed. The driver of the second car performed a braking manoeuvre to avoid a collision.

Three conflicts of the 14 side conflicts were serious conflicts. The first serious side conflict (nr.11) took place because an in-priority car, coming from the side road, turned left. The second car noticed this car too late and reacted in time by braking suddenly. This situation also led to five non-serious conflicts (nr.5-9) and one non-serious conflict (nr.12) that occurred on a wet road surface. Conflict nr. 14 is the second serious side conflict which was caused by a car that neglected to give priority to the right. The car turning to the right had priority and wanted to execute this right but performed a sudden braking manoeuvre because the other car made no intention to stop. The second car noticed the first car just in time and also braked suddenly. The last serious conflict (nr.20) occurred in the same circumstances as conflict nr.14 besides the fact that the in priority driver turned left and did not perform an evasive action. Conflict nr.13 took place because the car coming from the side road accelerated to give no priority to the right. The second car reacted by braking. Conflict nr.17 occurred because the car from the side road gave priority to the second car. The first car needed to brake suddenly. The non-serious side conflicts nr.15-16 were caused by a left turning vehicle coming from the side road. These cars drove so close to the junction plane before braking that the in priority car did not trust the situation and also braked to avoid a collision. The last conflict (nr.19) took place on a wet road surface. The car driving straight ahead could not stop, not even after braking, to give priority to the right turning car. The in priority car reacted by braking.

Car-Bicycle Conflicts

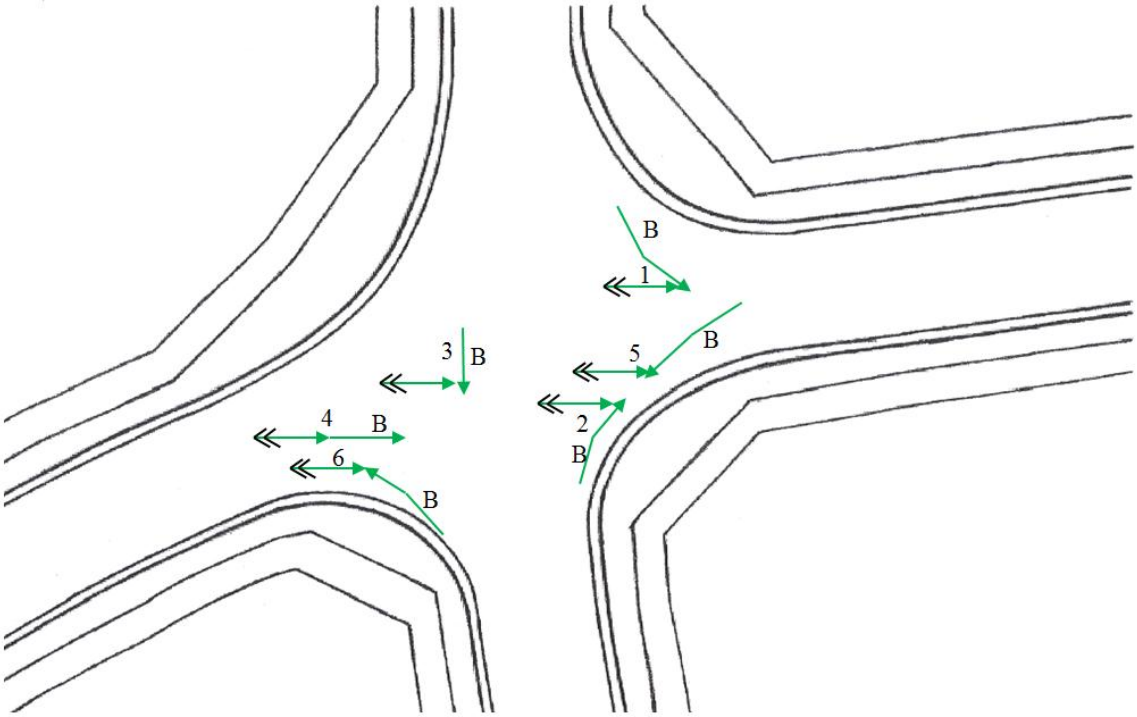


FIGURE 11 Manoeuvre Diagram Car-Bicycle Conflicts

All 6 observed conflicts between cars and bicyclists were non-serious conflicts. The conflicts can be divided in 5 side and 1 rear-end conflict. The first side conflict occurred because a bicyclist turned left at the intersection without scanning the road for other road users. Therefore, the bicyclist did not give priority to the car coming from the right. The driver reacted by braking. Side conflict nr.2 is characterized by an in-priority bicyclist that turned left and was noticed just in time by a fast approaching car which braked suddenly to avoid a collision. Side conflict nr.3 was caused by two bicyclists that crossed the intersection without giving the car priority to the right. The driver performed a braking manoeuvre to avoid the bicyclists. The fourth side conflict (nr.5) occurred because a bicyclist changed lanes to turn right. Therefore, the approaching car from the opposite

direction needed to brake. The fifth and final side conflict (nr.6) took place because the left turning bicyclist neglected to give the car priority to the right. Therefore, the driver had to brake suddenly.

Rear-end conflict nr.4 took place because a car followed a bicyclist at a high speed. The driver needed to perform a sudden braking manoeuvre to evade the bicyclist.

Car-Pedestrian Conflicts

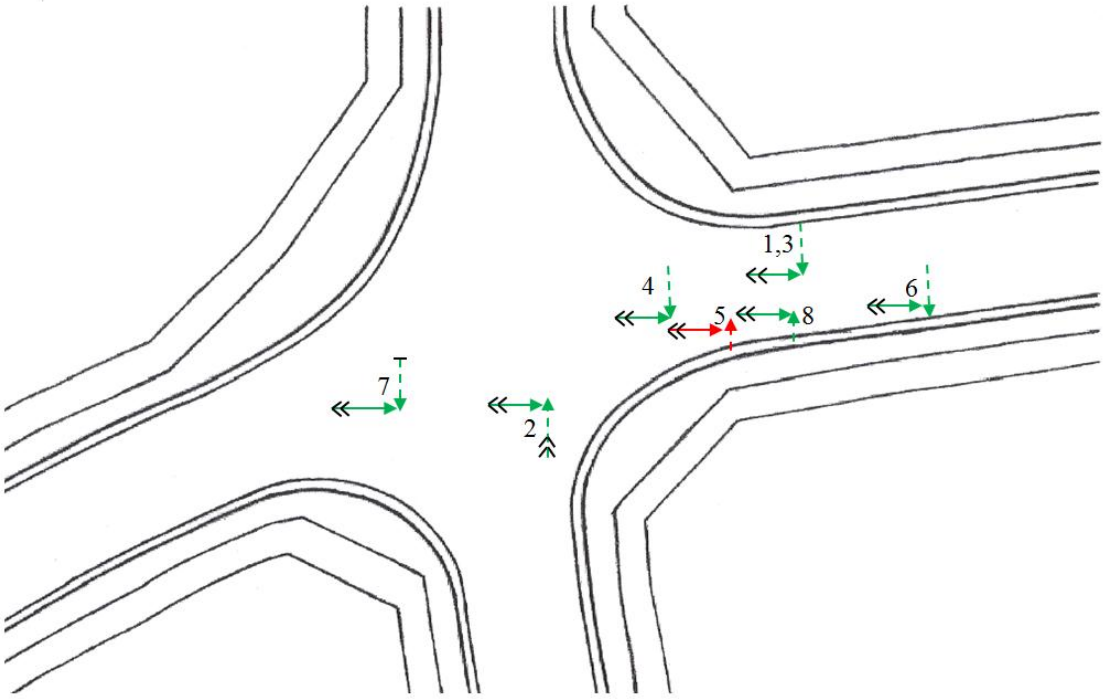


FIGURE 12 Manoeuvre Diagram Car-Pedestrian Conflicts

The 8 registered car-pedestrian conflicts were side-conflicts. One side conflict developed into a serious conflict. All car-pedestrian conflicts took place when the pedestrians wanted to cross the intersection. The serious conflict occurred because the car driver noticed too late that a pedestrian wanted to cross. As a result the driver reacted by performing a sudden braking manoeuvre. The non-serious conflicts nr.1,3,4,6 and 8 were caused by crossing pedestrians. All car drivers performed a braking manoeuvre to avoid a collision. The pedestrians that were involved in conflict nr. 1 and 8 slowed down during their crossing manoeuvre when they noticed the car. The sixth conflict (nr.2) took place because the crossing pedestrian wrongly estimated the speed of the approaching vehicle. As a result both road users performed an evasive action: the car driver braked suddenly while the pedestrian started to run in order to cross the intersection before the car reached him. The last conflict, conflict nr.7, is characterised by a slow moving pedestrian that stops his crossing manoeuvre in the middle of the road when he noticed an approaching car. The car braked and the pedestrian continued his crossing manoeuvre.

10.2.3 Accident records

The observed conflict data is compared with registered accident data for both intersections because conflicts are a surrogate measure for accidents. First, the available accident data for the period 2000-2011 will be discussed. Afterwards, the accident data are compared with the observed conflicts. Furthermore, it is important to indicate that both intersections did not undergo infrastructural adjustments during the analysed period. The arrow of the involved road user that was injured as a result of the accident is depicted in red. Both arrows are in black when the accident only caused material damage.

Priority Controlled Intersection The police started registering accidents on this intersection since 2003. For the priority controlled intersection only one accident was registered by the police during the period 2003-2011. The involved road users were a bicyclist and a car driver. The cause was a side collision of the bicyclist by the car driver. The bicyclist was slightly injured and had no priority.

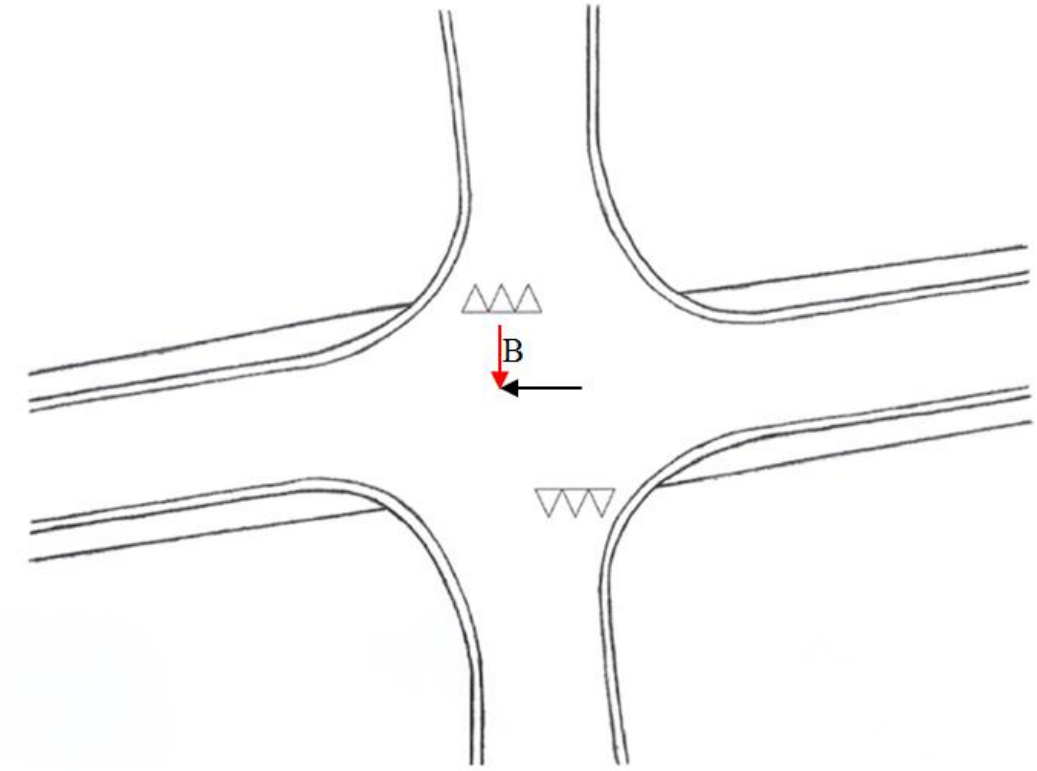


FIGURE 13 Manoeuvre Diagram Based on Accident Records

Table 3 compares the accident and conflict data for the priority controlled intersection. The manoeuvre types are limited to 3 classes: head-on, rear-end and lateral. The number of conflicts is much higher than the number of registered accidents. When a distinction is made according to the type of involved road users, it becomes clear that the only registered accident is a lateral or side collision between a car and a bicyclist. The majority of the registered conflicts took place between cars with as most frequent manoeuvre type the head-on manoeuvre. The head-on manoeuvre type was expected as the most dominant type since most conflicts took place when a car overtook parked cars and needed to brake and/or swerve to evade the vehicle that came from the opposite direction. It is remarkable, that the police did not register any car-car accident during the period of nine years. This might be due to under-registration of the number of car accidents since accidents with only material damage remain mostly unreported. It is also possible that no car accidents took place.

The only conclusion that can be drawn from this comparison is that the conflicts and accidents share no similar characteristic.

Road user	Manoeuvre	Accident records (2003-2011)	Data conflict observations
Car-car	Head-on	/	7
Car-car	Rear-end	/	1
Car-car	Lateral/turning	/	2
Car-car	Combination side and rear-end	/	1
Car-bicyclist	Rear-end	/	1
Car-bicyclist	Lateral	1	/
Car-moped	Head-on	/	1
Total		1	13

TABLE 3 Priority Controlled Intersection - Accident Data and Conflict Data according to Involved Road Users and Manoeuvre type

Priority to the right rule intersection For the period 2000-2011, the police registered in total 12 accidents at the intersection with priority to the right rule. Eleven accidents occurred between cars and 1 accident took place between a car and a bicyclist.

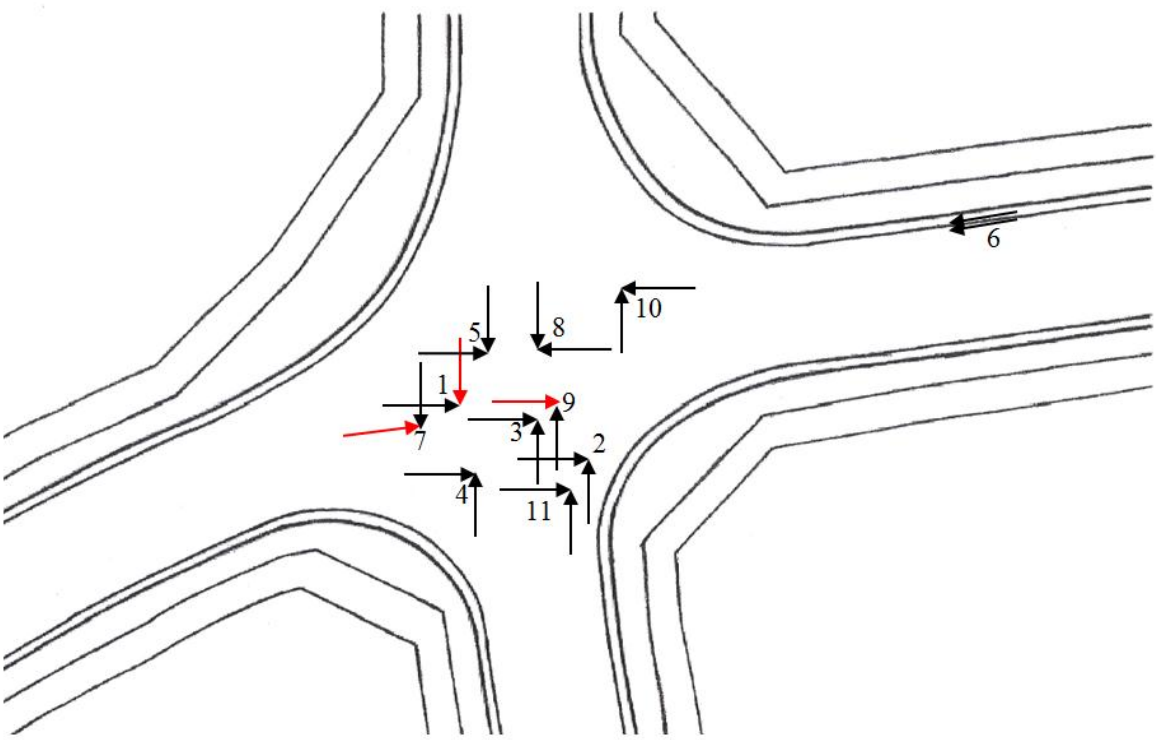


FIGURE 14 Manoeuvre Diagram Based on Car-Car Accident Records

The registered car-car accidents took place in the years 2000, 2002, 2003 and 2004. The police recorded no accidents in the years 2001, 2005, 2006, 2007, 2008, 2009, 2010 and 2011. The majority of the car-car accidents were side collisions. Only one rear-end collision occurred between a car and a parked car (nr.6). All side collisions took place between cars of the side and main road which drove straight on. Three side collisions caused slight injuries to one of the involved road users. Most likely, all side-collisions took place because one driver neglected to give priority to the car coming from the right.

For the intersection with priority to the right only one accident with vulnerable road users was registered by the police in the year 2002. The involved road users were a bicyclist and a car driver. The cause was a side collision of the bicyclist by the car driver. The bicyclist was slightly injured. The accident probably took place because the bicyclist neglected to give the car driver priority to the right.

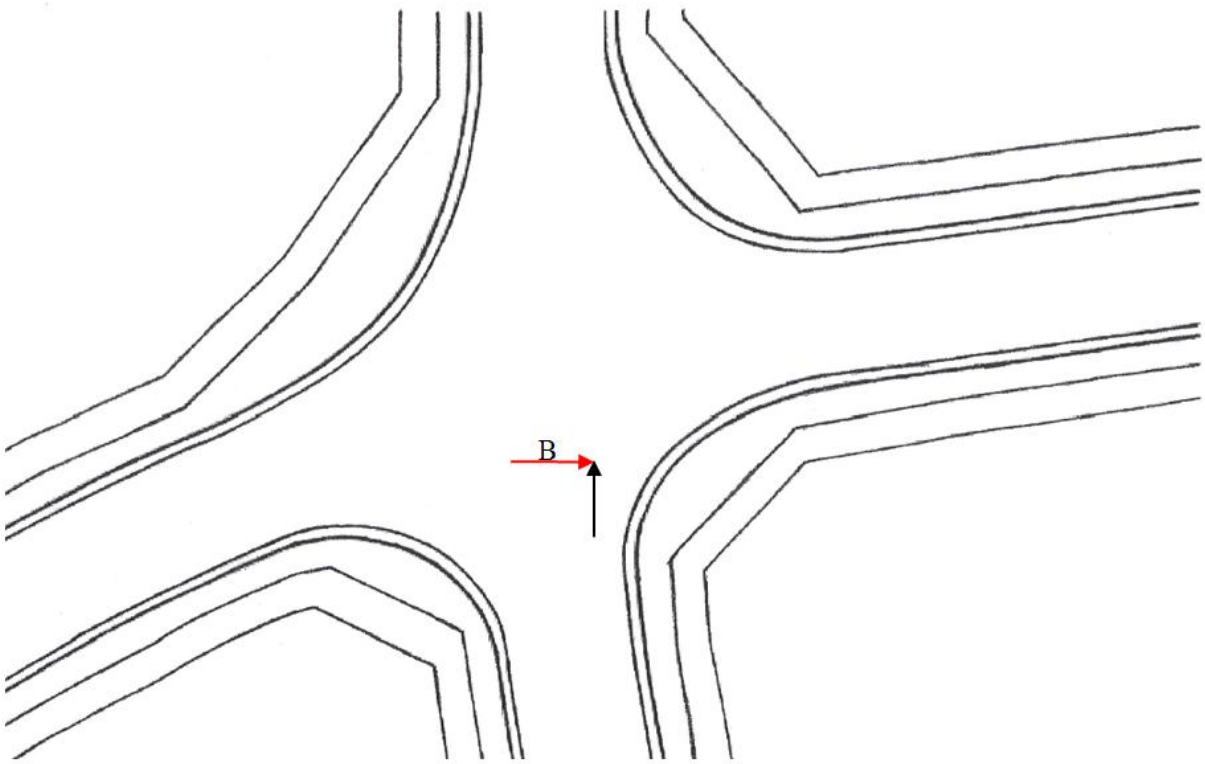


FIGURE 15 Manoeuvre Diagram Based on Car-Bicycle Accident Records

Table 4 compares the accident and conflict data for the intersection with priority to the right. The manoeuvre types are limited to 3 classes: head-on, rear-end and lateral. As with the priority controlled intersection, the number of conflicts is much higher than the number of registered accidents. When a distinction is made according to the type of involved road users, it becomes clear that 10 lateral accidents were registered between cars compared to 14 conflicts. The other accidents that were registered are one rear-end collision between cars compared to 8 conflicts and a lateral collision between a car and a bicyclist with respect to 5 conflicts. The most frequent manoeuvre type between cars was the lateral manoeuvre. This finding is consistent with the accident numbers and was expected because most conflicts occurred between vehicles of the main and side roads. Between cars and bicyclists, the most frequent manoeuvre type was also the lateral manoeuvre. This was expected since most conflicts took place because a bicyclist crossed the intersection. For the car-pedestrian conflicts, the lateral manoeuvre was the only and therefore most frequent manoeuvre type.

To conclude, although the number of registered accident and conflicts differ, it can be established that the most dominant manoeuvre types are the same for all types of accidents and conflicts.

Road user	Manoeuvre	Accident records (2000-2011)	Data conflict observations
Car-car	Head-on	/	1
Car-car	Rear-end	1	8
Car-car	Lateral/turning	10	14
Car-bicyclist	Rear-end	/	1
Car-bicyclist	Lateral	1	5
Car-pedestrian	Lateral	/	8
Total		12	37

TABLE 4 Priority to the Right Rule Intersection – Accident Data and Conflict Data according to Involved Road Users and Manoeuvre

10.3 Conclusions

For the same observation period, the number of observed conflicts is higher at the intersection with priority to the right than at the priority controlled intersection. More specifically, 37 conflicts were observed at the priority to the right intersection compared to 13 conflicts at the priority controlled intersection. The nature of the conflicts also differs. Only two conflicts could be regarded as serious conflicts at the priority controlled intersection while the intersection with priority to the right is characterised by five serious conflicts. The majority of the serious conflicts took place between vehicles. Only at the priority to the right intersection, one serious conflict took place between a vehicle and a crossing pedestrian.

The circumstances in which the serious conflicts occur differ according to the priority rule. At the priority controlled intersection the two situations that resulted in most serious conflicts, were a driver on the minor road that disobeyed the fixed priority rule, and a driver on the main road that noticed the approaching car from the opposite direction too late while overtaking cars that were parked on the road. The last situation can be regarded as problematic since the majority of the non-serious conflicts are also characterised by this action.

The situations that lead to a serious conflict at the priority to the right intersection are quite different and are related with disobeying the priority situation. Three serious conflicts occurred because the vehicles braked suddenly to give priority to the vehicle coming from the right. One serious conflict took place because an in-priority vehicle compelled his priority. The serious conflict between a pedestrian and a vehicle took place because the driver decided at the last moment to let the pedestrian cross. One non-serious vehicle-vehicle conflict was caused because a driver neglected to comply with the priority to the right. These two findings and the footage suggest that the drivers at the priority to the right rule intersection take into account that the priority rule may not be obeyed by other road users and approach the intersection most cautiously to avoid a collision. This cautious driving behaviour can be explained by the fact that the visibility of the main road on the side roads is not ideal. The drivers on the main road can only notice the vehicles on the side roads when they have almost reached the junction plane. Furthermore, it is remarkable that the vulnerable road users often disobey the priority to the right rule when they cross the intersection. Fortunately, the approaching vehicles were always able to perform an evasive action.

The most dominant manoeuvre type for the car-car conflicts at the priority controlled intersection was the head-on or frontal manoeuvre. This was expected since most conflicts took place when a car overtook parked cars and needed to brake and/or swerve to evade a vehicle that came from the opposite direction.

At the intersection with priority to the right, the prevailing manoeuvre type was a side or lateral conflict. This finding is confirmed by the registered accidents since most accidents were side collisions between vehicles of the main and side roads. Probably, these side collisions can be regarded as side conflicts that resulted in accidents because one of the drivers violated the priority to the right rule or compelled his priority while the other driver was unable to perform an evasive action. This hypothesis could not be confirmed by the accident records.

To conclude, after the analysis of the conflict observation data of both intersections, it cannot be determined whether the intersections are subjected to a traffic safety problem. It is also impossible to confirm whether the conflict types differ according to the priority rule that is in force because several characteristics that are inherent to both intersections also influence the cause of a conflict. For example, at the priority intersection most conflicts took place while vehicles were overtaking other vehicles that were parked on the road. On the other hand, the priority to the right intersection is characterised by a bad visibility from the main road on the side roads. In order to confirm whether a relation exists between a certain conflict type and the in-force priority rule it is necessary to execute additional conflict observations at more locations.

10.4 References

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APPENDIX 11: IMPACT OF INFRASTRCTURAL CHARACTERISTICS ON PRIORITY RULE COMPLIANCE

This appendix discusses the impact of infrastructural characteristics on priority rule compliance. Apart from the two basis intersections, four other intersections are also studied. These four intersections consist of two priority and two priority to the right intersections with four arms and a speed limit of 50km/h. The four intersections form two duo's consisting of a priority and a priority to the right intersection. Both intersection duo's differ from the basis scenario because they are characterised by specific characteristics which are identical for each duo. One duo contains intersections with a cycle path while the other duo consists of elevated intersections. The differences in priority rule are preserved within both duo's. Because of this, it becomes possible to investigate whether the conclusions from the basis scenario are transferable to other locations.

The definition of a road user interaction provided in section 3.2 of the paper for the basis scenario also applies for these intersection duo's. Road user behaviour observations were carried out for four hours during weekdays at the both intersection duo's. Appendix 1 and 3 provided an outline of the intersection characteristics and vehicle speeds at both duo's.

11.1 Infrastructural characteristics

Priority controlled intersections and intersections governed by the right hand priority rule also differ in infrastructural characteristics. Examples of infrastructural characteristics are the number of arms (three- or four-arm junctions), elevated intersections, the presence or absence of facilities for vulnerable road users, the speed limits,… These specific infrastructural characteristics may influence the safety of intersections controlled by priority or the priority rule to the right.

Several studies *(1)(2)(3)(4)* investigated the effect of the intersection design on the number of accidents. The first intersection design characteristic is the number of arms. Three-arm intersections are characterised by a lower accident number than four-arm intersections *(1)(2)*. In general (e.g. without taking the speed limits, priority rules and other infrastructural characteristics into account), the accident risk is 37% lower at three-arm intersections compared to four-arm intersections*(1)*. This difference might be a result of the lower traffic volumes that are present on three-arm intersections and the lower number of average injury accidents per million vehicles (0,07 compared to 0,11 for four-arm intersections)*(1)*. The difference in accident risk becomes more apparent when the speed limits and priority rules are taken into account. At a speed limit of 50 km/h, the accident risk is 36% lower at three-arm priority controlled intersections compared to four-arm priority controlled intersections*(1)*. The accident number of 50 km/h at three-arm intersections with priority to the right is 76% lower than that of 50 km/h at four-arm intersections with priority to the right*(1)*.

In residential areas it is common practice to elevate intersections in order to reduce vehicle speeds and emphasize the conflict area. Research about the impact of elevated intersections on traffic safety is quite limited and the available results are partly based on estimations and limited before and after studies. A Dutch study assumes that elevated intersections in residential areas decrease the accident number with 35% *(5)*. An evaluation study executed in the Dutch province of Zuid-Holland established that elevated intersections reduce the number of injury accidents with 25% *(6)*. According to a study executed in the Dutch province of Gelderland, the construction of an elevated intersection results in a decrease of 60% in the number of material damage-only accidents, a decline of 80% in the number of injury accidents and a general reduction in accident severity *(7)*. Roughly concluded, it can be assumed that an elevated intersection decreases the number of injury accidents and material damage-only accidents with 25-80% and 20-60% respectively.

Thirdly, the presence of a cycle path affects the safety of an intersection. A number of studies *(1)(2)(4)(8)* indicated that the presence of a cycle track at an intersection leads to an increase of accidents with vulnerable road users. The accident risk of intersections with an adjoining cycle path amounts to 10% while the risk contains 19% at intersections with a separate cycle path *(1)*. A Finnish in-depth study of bicycle-car accidents indicated that cyclists noticed the driver before the collision and were convinced that the driver would yield or give priority to the right as obliged by law. But only a small fraction of the drivers detected the cyclist before the collision *(8)*. A lack of attention due to the physical separation of the cyclists and vehicles is the cause of higher accident numbers at intersections with cycle tracks*(4)*. Bicycle-vehicle accidents will not be further discussed since they do not belong to the scope of this study. The effect of cycle paths at intersections on vehicle-vehicle accidents or encounters is until now not investigated in the international and national literature and can therefore not be discussed.

Finally, the speed limit at an intersection also influences traffic safety. A Dutch study *(1)* investigated the effect of different speed limits. The study compared intersections with speed limits of 30, 50 and 70 km/h. The results of the study indicated that intersections with a speed limit of 70 km/h are characterised by less accidents than intersections with a speed limit of 50 km/h. According to the average number of injury accidents for each intersection per year, the 50 km/h-intersections have the highest accident number (44%), followed by the 70 km/h intersections (32%) and intersections with a speed limit of 30 km/h (13%) *(1)*. The lower number of accidents at 70 km/h intersections compared to 50 km/h intersections can be allocated to the function that 70 km/h intersections fulfil. Although the road environment is adjusted to the function, the accidents have a more severe nature since the speed limit is 20 km/h higher than a speed limit of 50 km/u. A Finnish study *(2)* compared the effect of speed limits at rural three- and four-arm intersections. The study used 80 km/h as a threshold value. The most significant factor to traffic safety at three-arm intersections is the speed limit preceding the intersection on the non-priority road *(2)*. The most important speed limit at four-arm intersections is the one that precedes the intersection on the main road *(2)*. Furthermore, the results of the before and after study indicated that the accident number at three-arm intersections was 26% lower after a reduction in speed limits *(2)*. At four-arm intersections the accident number decreased with 17% *(2)*.

To conclude, other infrastructural characteristics, such as the number of lanes or the presence of a pedestrian crossing, may have an influence on the safety of priority and priority to the right intersections. But for this study, the most important characteristics are discussed.

11.2 Method

Pearson's chi-square tests are used to determine whether a relation exists between the road user behaviour and the infrastructural characteristics of the intersections. The road user behaviour of the basis priority and priority to the right intersection is compared with the behaviour at the elevated and cycle path intersection duo. This test measures whether a statistical significant relation is present between two variables in a cross table but does not mention the strength of the relation *(9)*. The null hypothesis of the chi-square test always assumes that both variables are statically independent of each other; implying that no relation exists between both variables *(9)*. The chi-square test is calculated for every cell in the table by comparing the expected cell frequency with the observed cell frequency *(9)*. The value of the test differs from zero when the observed cell frequencies differ from the expected cell frequencies. In this case, a relation (whether or not significant) exists between both variables in the table *(9)*. A Chi-square test can only be performed when two conditions are met: the expected cell frequencies need to be ≥ 1 and 20% of the expected cell frequencies must lie between 1 and 5 *(9)*. The last condition is not met in this study. Therefore, all chi-square test are calculated with Fisher's Exact Test. This test calculates the exact probabilities for a given cell frequency in the case of independence and can be used when the expected cell frequencies are < 5 *(9)*.

11.3 Results

This section discusses the results of the chi-square tests of the other intersection duo's.

11.3.1 Priority controlled intersection

The violation of the priority rule, looking behaviour and approach behaviour of the basis priority controlled intersection is compared with the road user behaviour at an elevated priority intersection and a priority intersection with a cycle path.

Priority intersection with cycle path The Pearson chi-square value of the variable 'violation priority rule' is equal to 0.148. The probability that the chi-square value is exceeded when the null hypothesis – the variables violation priority rule and intersection type are statistically independent - is true , amounts to 1.000. The significance level is equal to 0.05 (α) and the null hypothesis is accepted since the exceeding probability of $1.000 > 0.05$. This means that the violation of the priority rule is statistically independent of the presence or absence of a cycle path. The looking behaviour of the driver on the main and minor road and the approach behaviour of both drivers are also statistically independent of the presence or absence of a cycle path since the exceeding probabilities are greater than 0.05.

Elevated priority intersection The violation of the priority rule, the looking behaviour of the driver on the minor road and the approach behaviour on the main and minor road are statistically independent of

the fact whether the intersection is elevated or not since the exceeding probabilities are greater than 0.05. The variable 'looking behaviour main road' consists of three categories: look left, look right and do not look. The Pearson chi-square values of these variables are 5.760, 9.477 and 11.126 respectively. The exceeding probability of these three categories is in all cases smaller than 0.05. As a result, the null hypothesis is rejected and a difference exists between the looking behaviour of a driver on the main road at a priority intersection and an elevated priority intersection.

Variable	Priority controlled intersection (N = 182) vs. priority controlled intersection with cycle path (N = 32)		Priority controlled intersection (N = 182) vs. elevated priority controlled intersection (N = 33)	
	Pearson Chi-square (exact)	Exceeding probability (p = 0.05)	Pearson Chi-square (exact)	Exceeding probability (p = 0.05)
Violation priority rule	0.148	1.000	1.101	0.476
Looking behaviour main road • Look left • Look right • Do not look	 0.024 0.718 0.320	 0.773 0.418 0.579	 5.760 9.477 11.126	 0.026 0.007 0.002
Looking behaviour minor road • Look left • Look right • Do not look	 / 0.177 /	 Constant 1.000 Constant	 / 0.182 /	 Constant 1.000 Constant
Approach behaviour main road	0.784	0.808	7.384	0.061
Approach behaviour minor road	2.444	0.479	4.938	0.084

TABLE 1 Chi-square Test Priority Controlled Intersection versus Priority Controlled Intersection Duo

11.3.2 Priority to the right intersection

The violation of the priority rule, looking behaviour and approach behaviour of the basis priority to the right intersection is compared with the road user behaviour at an elevated priority to the right rule intersection and intersection with cycle path.

Priority to the right intersection with cycle path The variable 'violation priority rule' has a Pearson chi-square value of 0.815. The probability that the chi-square value is exceeded when the null hypothesis – the variables violation priority rule and intersection type are statistically independent - is true , amounts to 0.415. The significance level is equal to 0.05 (α) and the null hypothesis is accepted since the exceeding probability of 0.415 > 0.05. This means that the violation of the priority to the right rule is statistically independent of the presence or absence of a cycle path. The exceeding probability of the looking behaviour VP, looking behaviour VNP and approach behaviour VNP is also greater than 0.05 which means that these variables are statistically independent of the presence or absence of a cycle path. The approach behaviour of the vehicle in priority has a Pearson chi-square value of 12.856 and an exceeding probability of 0.003. Since 0.003 is smaller than 0.05, the null hypothesis - the variables approach behaviour VP and intersection type are statistically independent – is rejected and a difference exists between the approach behaviour of the vehicle in priority at a priority to the right intersection and a priority to the right intersection with cycle path.

Elevated priority to the right intersection The situation for the elevated priority to the right intersection is exactly the same as for the priority to the right intersection with cycle path. The variables 'violation of the priority rule', 'looking behaviour VP and VNP' and 'approach behaviour VNP' have an exceeding probability that is greater than 0.05. As a result, the null hypothesis – the variables are statistically independent of the intersection type - is accepted and no difference exists between these variables at a priority to the right intersection and an elevated priority to the right intersection. The variable 'approach behaviour VP'

has an exceeding probability that is smaller than 0.05. Therefore, the chi-square test shows that the approach behaviour of the vehicle in priority at a priority to the right intersection differs from the approach behaviour of this vehicle at an elevated priority to the right intersection.

Variable	Priority to the right intersection (N = 201) vs. priority to the right intersection with cycle path (N = 35)		Priority to the right intersection (N = 201) vs. elevated priority to the right intersection (N = 33)	
	Pearson Chi-square (exact)	Exceeding probability (p = 0.05)	Pearson Chi-square (exact)	Exceeding probability (p = 0.05)
Violation priority rule	0.815	0.415	0.591	0.529
Looking behaviour Vehicle Priority (VP) • Look left • Look right • Do not look	 2.195 1.478 1.379	 0.184 0.254 0.324	 2.586 1.019 2.858	 0.122 0.431 0.106
Looking behaviour Vehicle No Priority (VNP) • Look left • Look right • Do not look	 0.816 0.198 0.198	 0.463 0.820 0.820	 0.894 0.797 0.797	 0.452 0.366 0.366
Approach behaviour Vehicle Priority (VP)	12.856	0.003	12.795	0.004
Approach behaviour Vehicle No Priority (VNP)	3.307	0.369	0.908	0.877

TABLE 2 Chi-square Test Priority to the Right Intersection versus Priority to the Right Intersection Duo

11.4 Conclusions

According to the results of the chi-square tests, the infrastructural characteristics of the priority and priority to the right intersection exert only a small to no influence on the road user behaviour. Almost no difference exists between the road user behaviour and the infrastructural characteristics of the priority intersection with regard to the presence of a cycle path and an elevated junction plane. This means that the violation of the priority rule, the looking behaviour and the approach behaviour is independent of the infrastructural characteristics of the priority intersection. The only variable that differs is the looking behaviour on the main road between a priority and an elevated priority intersection. The elevated junction plane might reassure the drivers on the main road that the probability that their priority is violated is quite small since the elevated junction plane acts as an extra obstacle to the drivers of the minor road. As a result, the drivers on the main road of the elevated intersection might have a different looking behaviour compared to the drivers of the basis priority intersection.

The situation for the priority to the right intersection is quite similar. Since the violation of the priority to the right rule, the looking behaviour (VP and VNP) and the approach behaviour of VNP are independent of the infrastructural characteristics of the priority to the right intersection. The only variable that differs is the approach behaviour of the vehicle in priority between the basis priority to the right intersection and the intersection with cycle path and elevated junction plane. The presence of a cycle path might narrow the road view of the in-priority vehicle or may act as a barrier when the in-priority vehicle approaches the intersection from the side roads which may result in a different approach behaviour compared to the intersection where no cycle path is present. The elevated junction plane might reassure the in-priority vehicles that the probability that their priority is violated is quite small since the elevated junction plane acts as an extra obstacle to the drivers on the side roads. When the in-priority vehicle approaches the intersection from the side roads, they are subjected to the barrier-effect which influences their approach behaviour. As a result, both situations may lead to a different approach behaviour compared to the basis priority to the right intersection.

To conclude, after the analysis of the road user behaviour data of both intersection duo's, it cannot be determined whether the priority and road user behaviour differs according to the infrastructural characteristics of the intersections. The looking behaviour of the vehicle on the main road is for the priority intersection the only

variable that is influenced by the infrastructural characteristic of an elevated junction plane. A cycle path exerts no influence on the road user behaviour at priority intersections. The approach behaviour of the in-priority vehicle at the priority to the right intersection is the only road user behaviour that is influenced by the infrastructural characteristics. The cycle path and the elevated junction plane both influence this variable. This low influence of the infrastructural intersection characteristics on the road user behaviour might be the result of the low number of road user interactions that were observed at the intersection duo's compared to the basis intersection duo.

In order to confirm whether a relation exists between the infrastructural characteristics and the road user behaviour it is necessary to perform more research because the interaction numbers of the intersections with specific infrastructural characteristics are smaller than these of the basis intersections. Preferably, the observation period for the intersection duo's needs to be equal to the observation period of the basis intersection duo. But nevertheless, these findings provide a first insight in the impact of infrastructural intersection characteristics on the road user behaviour.

11.5 References

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APPENDIX 12: SAS-OUTPUT

12.1 PRIORITY INTERSECTION

12.1.1 Violation priority

Logistic Regression Results
The LOGISTIC Procedure

Model Information	
Data Set	WORK.SORTTEMPTABLESORTED
Response Variable	ViolationPriority
Number of Response Levels	2
Model	binary logit
Optimization Technique	Fisher's scoring
Likelihood Penalty	Firth's bias correction

Number of Observations Read	182
Number of Observations Used	182

Response Profile		
Ordered Value	ViolationPriority	Total Frequency
1	0	167
2	1	15

Probability modeled is ViolationPriority='1'.

Class Level Information			
Class	Value	Design Variables	
LookRight VH	Ja	1	
	Nee	-1	
Intersection VO	SH	1	0
	ST	0	1
	VERT	-1	-1
Intersectionfirst VO	Ja	1	
	Nee	-1	

Intercept-Only Model Convergence Status
Convergence criterion (GCONV=1E-8) satisfied.

Model Convergence Status
Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics		
Criterion	Intercept Only	Intercept and Covariates
AIC	101.378	82.464
SC	104.582	98.484

Model Fit Statistics		
Criterion	Intercept Only	Intercept and Covariates
-2 Log L	99.378	72.464

Testing Global Null Hypothesis: BETA=0			
Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	26.9140	4	<.0001
Score	46.0976	4	<.0001
Wald	13.7924	4	0.0080

Type 3 Analysis of Effects			
Effect	DF	Wald Chi-Square	Pr > ChiSq
LookRight VH	1	6.7854	0.0092
Intersection VO	2	6.2081	0.0449
Intersectionfirst VO	1	4.4737	0.0344

Analysis of Maximum Likelihood Estimates						
Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept		1	0.0268	1.0843	0.0006	0.9802
LookRight VH	Ja	1	1.0981	0.4216	6.7854	0.0092
Intersection VO	SH	1	1.1542	1.5659	0.5433	0.4611
Intersection VO	ST	1	-2.6527	1.1131	5.6793	0.0172
Intersectionfirst VO	Ja	1	1.5265	0.7217	4.4737	0.0344

Odds Ratio Estimates				
Effect		Point Estimate	95% Wald Confidence Limits	
LookRight VH	Ja vs Nee	8.991	1.722	46.936
Intersection VO	SH vs VERT	0.709	0.001	474.235
Intersection VO	ST vs VERT	0.016	<0.001	3.232
Intersectionfirst VO	Ja vs Nee	21.180	1.251	358.575

Association of Predicted Probabilities and Observed Responses			
Percent Concordant	60.5	Somers' D	0.589
Percent Discordant	1.6	Gamma	0.949
Percent Tied	37.9	Tau-a	0.090

12.1.2 Looking behaviour: vehicle main road

Logistic Regression Results
The LOGISTIC Procedure

Model Information	
Data Set	WORK.SORTTEMPTABLESORTED
Response Variable	Look VH
Number of Response Levels	2
Model	binary logit
Optimization Technique	Fisher's scoring
Likelihood Penalty	Firth's bias correction

Number of Observations Read	182
Number of Observations Used	182

Response Profile		
Ordered Value	Look VH	Total Frequency
1	0	155
2	1	27

Probability modeled is Look VH='1'.

Class Level Information		
Class	Value	Design Variables
Turn VH	Ja	1
	Nee	-1
Intersectionfirst VH	Ja	1
	Nee	-1

Intercept-Only Model Convergence Status
Convergence criterion (GCONV=1E-8) satisfied.

Model Convergence Status
Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics		
Criterion	Intercept Only	Intercept and Covariates
AIC	147.842	110.654
SC	151.046	120.266
-2 Log L	145.842	104.654

Testing Global Null Hypothesis: BETA=0			
Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	41.1886	2	<.0001
Score	63.9011	2	<.0001
Wald	26.2464	2	<.0001

Type 3 Analysis of Effects			
Effect	DF	Wald Chi-Square	Pr > ChiSq
Turn VH	1	24.6511	<.0001
Intersectionfirst VH	1	1.8785	0.1705

Analysis of Maximum Likelihood Estimates						
Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept		1	0.0292	0.4711	0.0038	0.9506
Turn VH	Ja	1	1.9041	0.3835	24.6511	<.0001
Intersectionfirst VH	Ja	1	0.5017	0.3661	1.8785	0.1705

Odds Ratio Estimates				
Effect		Point Estimate	95% Wald Confidence Limits	
Turn VH	Ja vs Nee	45.071	10.023	202.668
Intersectionfirst VH	Ja vs Nee	2.728	0.650	11.456

Association of Predicted Probabilities and Observed Responses			
Percent Concordant	50.8	Somers' D	0.470
Percent Discordant	3.8	Gamma	0.860
Percent Tied	45.3	Tau-a	0.119
Pairs	4185	c	0.735

12.1.3 Approach behaviour: vehicle main road

Logistic Regression Results

The LOGISTIC Procedure

Model Information	
Data Set	WORK.SORTTEMPTABLESORTED
Response Variable	Intersection VH
Number of Response Levels	2
Model	binary logit
Optimization Technique	Fisher's scoring
Likelihood Penalty	Firth's bias correction

Number of Observations Read	182
Number of Observations Used	182

Response Profile		
Ordered Value	Intersection VH	Total Frequency
1	0	157
2	1	25

Probability modeled is Intersection VH='0'.

Class Level Information			
Class	Value	Design Variables	
Intersectionfirst VH	Ja	1	
	Nee	-1	
Intersection VO	SH	1	0
	ST	0	1
	VERT	-1	-1
DontLook VH	Ja	1	
	Nee	-1	
DontTurn VH	Ja	1	
	Nee	-1	

Intercept-Only Model Convergence Status
Convergence criterion (GCONV=1E-8) satisfied.

Model Convergence Status
Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics		
Criterion	Intercept Only	Intercept and Covariates
AIC	140.193	104.028
SC	143.397	123.252
-2 Log L	138.193	92.028

Testing Global Null Hypothesis: BETA=0			
Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	46.1647	5	<.0001
Score	67.4222	5	<.0001
Wald	30.4104	5	<.0001

Type 3 Analysis of Effects			
Effect	DF	Wald Chi-Square	Pr > ChiSq
Intersectionfirst VH	1	1.7697	0.1834
Intersection VO	2	4.6063	0.0999
DontLook VH	1	8.8918	0.0029
DontTurn VH	1	10.1114	0.0015

Analysis of Maximum Likelihood Estimates						
Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept		1	-0.7859	0.9690	0.6577	0.4174
Intersectionfirst VH	Ja	1	0.7666	0.5763	1.7697	0.1834
Intersection VO	SH	1	-0.7371	1.2811	0.3310	0.5651
Intersection VO	ST	1	1.9095	1.0050	3.6103	0.0574
DontLook VH	Ja	1	0.9371	0.3143	8.8918	0.0029
DontTurn VH	Ja	1	1.3524	0.4253	10.1114	0.0015

Odds Ratio Estimates				
Effect		Point Estimate	95% Wald Confidence Limits	
Intersectionfirst VH	Ja vs Nee	4.633	0.484	44.353
Intersection VO	SH vs VERT	1.546	0.005	494.243
Intersection VO	ST vs VERT	21.802	0.133	>999.999
DontLook VH	Ja vs Nee	6.516	1.901	22.336
DontTurn VH	Ja vs Nee	14.952	2.823	79.204

Association of Predicted Probabilities and Observed Responses			
Percent Concordant	64.3	Somers' D	0.600
Percent Discordant	4.3	Gamma	0.876
Percent Tied	31.5	Tau-a	0.143
Pairs	3925	c	0.800

12.1.4 Approach behaviour: vehicle minor road

Logistic Regression Results
The LOGISTIC Procedure

Model Information	
Data Set	WORK.SORTTEMPTABLESORTED
Response Variable	Intersection VO
Number of Response Levels	2
Model	binary logit
Optimization Technique	Fisher's scoring
Likelihood Penalty	Firth's bias correction

Number of Observations Read	182
Number of Observations Used	182

Response Profile		
Ordered Value	Intersection VO	Total Frequency
1	0	180
2	1	2

Probability modeled is Intersection VO='0'.

Class Level Information			
Class	Value	Design Variables	
Intersection VH	SH	1	0
	ST	0	1
	VERT	-1	-1
GetsPriority VH	Ja	1	
	Nee	-1	

Intercept-Only Model Convergence Status
Convergence criterion (GCONV=1E-8) satisfied.

Model Convergence Status
Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics		
Criterion	Intercept Only	Intercept and Covariates
AIC	26.222	19.801
SC	29.426	32.617
-2 Log L	24.222	11.801

Testing Global Null Hypothesis: BETA=0			
Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	12.4210	3	0.0061
Score	28.8759	3	<.0001
Wald	8.2154	3	0.0418

Type 3 Analysis of Effects			
Effect	DF	Wald Chi-Square	Pr > ChiSq
Intersection VH	2	3.2920	0.1928
GetsPriority VH	1	6.5669	0.0104

Analysis of Maximum Likelihood Estimates						
Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept		1	2.0087	0.8768	5.2490	0.0220
Intersection VH	SH	1	1.8393	1.0282	3.2000	0.0736
Intersection VH	ST	1	-2.8570	1.7883	2.5524	0.1101
GetsPriority VH	Ja	1	1.9466	0.7596	6.5669	0.0104

Odds Ratio Estimates			
Effect	Point Estimate	95% Wald Confidence Limits	
Intersection VH SH vs VERT	2.274	0.187	27.650
Intersection VH ST vs VERT	0.021	<0.001	5.393
GetsPriority VH Ja vs Nee	49.070	2.498	963.852

Association of Predicted Probabilities and Observed Responses			
Percent Concordant	95.0	Somers' D	0.936
Percent Discordant	1.4	Gamma	0.971
Percent Tied	3.6	Tau-a	0.020
Pairs	360	c	0.968

12.2 PRIORITY TO THE RIGHT RULE INTERSECTION (MODEL A)

12.2.1 Violation priority

Logistic Regression Results
The LOGISTIC Procedure

Model Information	
Data Set	WORK.SORTTEMPTABLESORTED
Response Variable	ViolationPriority
Number of Response Levels	2
Model	binary logit
Optimization Technique	Fisher's scoring
Likelihood Penalty	Firth's bias correction

Number of Observations Read	201
Number of Observations Used	201

Response Profile		
Ordered Value	ViolationPriority	Total Frequency
1	0	147
2	1	54

Probability modeled is ViolationPriority='1'.

Class Level Information		
Class	Value	Design Variables
HasPriority VO	Ja	1
	Nee	-1
Intersectionfirst VO	Ja	1
	Nee	-1
DontLook VH	Ja	1
	Nee	-1
TurnRight VO	Ja	1
	Nee	-1

Intercept-Only Model Convergence Status
Convergence criterion (GCONV=1E-8) satisfied.

Model Convergence Status
Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics		
Criterion	Intercept Only	Intercept and Covariates
AIC	218.555	175.205
SC	221.858	191.722
-2 Log L	216.555	165.205

Testing Global Null Hypothesis: BETA=0			
Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	51.3495	4	<.0001
Score	47.7560	4	<.0001
Wald	36.8073	4	<.0001

Type 3 Analysis of Effects			
Effect	DF	Wald Chi-Square	Pr > ChiSq
HasPriority VO	1	24.2858	<.0001
Intersectionfirst VO	1	5.1503	0.0232
DontLook VH	1	14.2481	0.0002
TurnRight VO	1	2.2026	0.1378

Analysis of Maximum Likelihood Estimates						
Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept		1	-1.3227	0.2873	21.1917	<.0001
HasPriority VO	Ja	1	1.1983	0.2432	24.2858	<.0001
Intersectionfirst VO	Ja	1	-0.4364	0.1923	5.1503	0.0232
DontLook VH	Ja	1	0.7832	0.2075	14.2481	0.0002
TurnRight VO	Ja	1	0.3555	0.2395	2.2026	0.1378

Odds Ratio Estimates				
Effect		Point Estimate	95% Wald Confidence Limits	
HasPriority VO	Ja vs Nee	10.986	4.235	28.497
Intersectionfirst VO	Ja vs Nee	0.418	0.197	0.888
DontLook VH	Ja vs Nee	4.790	2.124	10.803
TurnRight VO	Ja vs Nee	2.036	0.796	5.206

Association of Predicted Probabilities and Observed Responses			
Percent Concordant	77.0	Somers' D	0.590
Percent Discordant	18.0	Gamma	0.621
Percent Tied	4.9	Tau-a	0.233
Pairs	7938	c	0.795

12.2.2 Looking behaviour: vehicle main road

Logistic Regression Results
The LOGISTIC Procedure

Model Information	
Data Set	WORK.SORTTEMPTABLESORTED
Response Variable	Look VH1
Number of Response Levels	2
Model	binary logit
Optimization Technique	Fisher's scoring
Likelihood Penalty	Firth's bias correction

Number of Observations Read	201
Number of Observations Used	201

Response Profile		
Ordered Value	Look VH1	Total Frequency
1	0	105
2	1	96

Probability modeled is Look VH1='1'.

Class Level Information				
Class	Value	Design Variables		
Intersection VH1	SH	1	0	0
	ST	0	1	0
	VERS	0	0	1
	VERT	-1	-1	-1
GetsPriority VO	Ja	1		
	Nee	-1		
Turn VH	Ja	1		
	Nee	-1		

Intercept-Only Model Convergence Status
Convergence criterion (GCONV=1E-8) satisfied.

Model Convergence Status
Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics		
Criterion	Intercept Only	Intercept and Covariates
AIC	264.056	143.047
SC	267.359	162.867
-2 Log L	262.056	131.047

Testing Global Null Hypothesis: BETA=0			
Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	131.0085	5	<.0001
Score	114.9229	5	<.0001
Wald	68.3804	5	<.0001

Type 3 Analysis of Effects			
Effect	DF	Wald Chi-Square	Pr > ChiSq
Intersection VH1	3	40.6720	<.0001
GetsPriority VO	1	4.4152	0.0356
Turn VH	1	1.7592	0.1847

Analysis of Maximum Likelihood Estimates						
Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept		1	1.3678	0.6239	4.8060	0.0284
Intersection VH1	SH	1	-2.2181	0.4789	21.4549	<.0001
Intersection VH1	ST	1	2.0562	0.7515	7.4856	0.0062
Intersection VH1	VERS	1	-0.1997	1.1007	0.0329	0.8560
GetsPriority VO	Ja	1	0.5124	0.2439	4.4152	0.0356
Turn VH	Ja	1	0.6550	0.4938	1.7592	0.1847

Odds Ratio Estimates			
Effect	Point Estimate	95% Wald Confidence Limits	
Intersection VH1 SH vs VERT	0.076	0.030	0.192
Intersection VH1 ST vs VERT	5.444	0.913	32.459
Intersection VH1 VERS vs VERT	0.570	0.032	10.287
GetsPriority VO Ja vs Nee	2.786	1.071	7.248
Turn VH Ja vs Nee	3.706	0.535	25.683

Association of Predicted Probabilities and Observed Responses			
Percent Concordant	85.3	Somers' D	0.813
Percent Discordant	4.0	Gamma	0.911
Percent Tied	10.7	Tau-a	0.408
Pairs	10080	c	0.907

12.2.3 Approach behaviour: vehicle main road

Logistic Regression Results
The LOGISTIC Procedure

Model Information	
Data Set	WORK.SORTTEMPTABLESORTED
Response Variable	Intersection VH
Number of Response Levels	2
Model	binary logit
Optimization Technique	Fisher's scoring
Likelihood Penalty	Firth's bias correction

Number of Observations Read	201
Number of Observations Used	201

Response Profile		
Ordered Value	Intersection VH	Total Frequency
1	0	93
2	1	108

Probability modeled is Intersection VH='0'.

Class Level Information		
Class	Value	Design Variables
Intersectionequal	Ja	1
	Nee	-1
LookRight VH	Ja	1
	Nee	-1
GetsPriority VO	Ja	1
	Nee	-1
DontTurn VH	Ja	1
	Nee	-1

Intercept-Only Model Convergence Status
Convergence criterion (GCONV=1E-8) satisfied.

Model Convergence Status
Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics		
Criterion	Intercept Only	Intercept and Covariates
AIC	262.397	123.898
SC	265.700	140.415
-2 Log L	260.397	113.898

Testing Global Null Hypothesis: BETA=0			
Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	146.4987	4	<.0001
Score	124.6685	4	<.0001
Wald	68.5126	4	<.0001

Type 3 Analysis of Effects			
Effect	DF	Wald Chi-Square	Pr > ChiSq
Intersectionequal	1	2.7022	0.1002
LookRight VH	1	40.8096	<.0001
GetsPriority VO	1	19.0126	<.0001
DontTurn VH	1	4.4927	0.0340

Analysis of Maximum Likelihood Estimates						
Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept		1	1.7171	0.6820	6.3390	0.0118
Intersectionequal	Ja	1	0.4317	0.2626	2.7022	0.1002
LookRight VH	Ja	1	1.4720	0.2304	40.8096	<.0001
GetsPriority VO	Ja	1	1.0994	0.2521	19.0126	<.0001
DontTurn VH	Ja	1	-1.3496	0.6367	4.4927	0.0340

Odds Ratio Estimates			
Effect	Point Estimate	95% Wald Confidence Limits	
Intersectionequal Ja vs Nee	2.371	0.847	6.638
LookRight VH Ja vs Nee	18.992	7.697	46.866
GetsPriority VO Ja vs Nee	9.014	3.355	24.218
DontTurn VH Ja vs Nee	0.067	0.006	0.816

Association of Predicted Probabilities and Observed Responses			
Percent Concordant	91.7	Somers' D	0.874
Percent Discordant	4.3	Gamma	0.911
Percent Tied	4.1	Tau-a	0.437
Pairs	10044	c	0.937

12.2.4 Approach behaviour: vehicle minor road

Logistic Regression Results

The LOGISTIC Procedure

Model Information	
Data Set	WORK.SORTTEMPTABLESORTED
Response Variable	Intersection VO
Number of Response Levels	2
Model	binary logit
Optimization Technique	Fisher's scoring
Likelihood Penalty	Firth's bias correction

Number of Observations Read	201
Number of Observations Used	201

Response Profile		
Ordered Value	Intersection VO	Total Frequency
1	0	179
2	1	22

Probability modeled is Intersection VO='0'.

Class Level Information		
Class	Value	Design Variables
LookRight VO	Ja	1
	Nee	-1
GetsPriority VH	Ja	1
	Nee	-1
TurnRight VO	Ja	1
	Nee	-1

Intercept-Only Model Convergence Status
Convergence criterion (GCONV=1E-8) satisfied.

Model Convergence Status
Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics		
Criterion	Intercept Only	Intercept and Covariates
AIC	132.169	120.739
SC	135.472	133.953
-2 Log L	130.169	112.739

Testing Global Null Hypothesis: BETA=0			
Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	17.4293	3	0.0006

Testing Global Null Hypothesis: BETA=0			
Test	Chi-Square	DF	Pr > ChiSq
Score	22.2008	3	<.0001
Wald	14.7453	3	0.0020

Type 3 Analysis of Effects			
Effect	DF	Wald Chi-Square	Pr > ChiSq
LookRight VO	1	3.2067	0.0733
GetsPriority VH	1	8.1102	0.0044
TurnRight VO	1	2.3182	0.1279

Analysis of Maximum Likelihood Estimates						
Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept		1	0.9376	0.5870	2.5510	0.1102
LookRight VO	Ja	1	0.9700	0.5417	3.2067	0.0733
GetsPriority VH	Ja	1	0.7088	0.2489	8.1102	0.0044
TurnRight VO	Ja	1	-0.4158	0.2731	2.3182	0.1279

Odds Ratio Estimates			
Effect	Point Estimate	95% Wald Confidence Limits	
LookRight VO Ja vs Nee	6.959	0.832	58.166
GetsPriority VH Ja vs Nee	4.127	1.556	10.950
TurnRight VO Ja vs Nee	0.435	0.149	1.270

Association of Predicted Probabilities and Observed Responses			
Percent Concordant	61.0	Somers' D	0.468
Percent Discordant	14.2	Gamma	0.622
Percent Tied	24.8	Tau-a	0.092
Pairs	3938	c	0.734

12.3 PRIORITY TO THE RIGHT RULE INTERSECTION (MODEL B)

12.3.1 Violation priority

Logistic Regression Results
The LOGISTIC Procedure

Model Information	
Data Set	WORK.SORTTEMPTABLESORTED
Response Variable	ViolationPriority
Number of Response Levels	2
Model	binary logit
Optimization Technique	Fisher's scoring
Likelihood Penalty	Firth's bias correction

Number of Observations Read	201
Number of Observations Used	201

Response Profile		
Ordered Value	ViolationPriority	Total Frequency
1	0	147
2	1	54

Probability modeled is ViolationPriority='1'.

Class Level Information				
Class	Value	Design Variables		
Intersectionfirst VNP	Ja	1		
	Nee	-1		
Intersection VP	SH	1	0	0
	ST	0	1	0
	VERS	0	0	1
	VERT	-1	-1	-1
Intersection VNP	SH	1	0	0
	ST	0	1	0
	VERS	0	0	1
	VERT	-1	-1	-1

Intercept-Only Model Convergence Status
Convergence criterion (GCONV=1E-8) satisfied.

Model Convergence Status
Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics		
Criterion	Intercept Only	Intercept and Covariates
AIC	218.809	122.640
SC	222.113	149.066
-2 Log L	216.809	106.640

Testing Global Null Hypothesis: BETA=0			
Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	110.1695	7	<.0001
Score	105.2021	7	<.0001
Wald	54.5083	7	<.0001

Type 3 Analysis of Effects			
Effect	DF	Wald Chi-Square	Pr > ChiSq
Intersectionfirst VN	1	15.7573	<.0001
Intersection VP	3	20.2120	0.0002
Intersection VNP	3	35.5313	<.0001

Analysis of Maximum Likelihood Estimates						
Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept		1	-0.7651	0.8437	0.8224	0.3645
Intersectionfirst VN	Ja	1	1.1975	0.3017	15.7573	<.0001
Intersection VP	SH	1	-1.0085	0.7000	2.0759	0.1496
Intersection VP	ST	1	2.1525	0.7510	8.2137	0.0042
Intersection VP	VERS	1	-1.1340	1.7865	0.4029	0.5256
Intersection VNP	SH	1	1.5437	0.6788	5.1716	0.0230
Intersection VNP	ST	1	-1.8228	0.6715	7.3694	0.0066
Intersection VNP	VERS	1	0.6767	1.7667	0.1467	0.7017

Odds Ratio Estimates			
Effect	Point Estimate	95% Wald Confidence Limits	
Intersectionfirst VN Ja vs Nee	10.967	3.362	35.780
Intersection VP SH vs VERT	0.368	0.111	1.225
Intersection VP ST vs VERT	8.692	2.547	29.668
Intersection VP VERS vs VERT	0.325	0.003	34.733
Intersection VNP SH vs VERT	6.969	2.187	22.201

Odds Ratio Estimates			
Effect	Point Estimate	95% Wald Confidence Limits	
Intersection VNP ST vs VERT	0.240	0.076	0.765
Intersection VNP VERS vs VERT	2.928	0.027	312.862

Association of Predicted Probabilities and Observed Responses			
Percent Concordant	91.7	Somers' D	0.860
Percent Discordant	5.7	Gamma	0.883
Percent Tied	2.6	Tau-a	0.340
Pairs	7938	c	0.930

12.3.2 Looking behaviour: in-priority vehicle

Logistic Regression Results
The LOGISTIC Procedure

Model Information	
Data Set	WORK.SORTTEMPTABLESORTED
Response Variable	LookVP
Number of Response Levels	2
Model	binary logit
Optimization Technique	Fisher's scoring
Likelihood Penalty	Firth's bias correction

Number of Observations Read	201
Number of Observations Used	201

Response Profile		
Ordered Value	LookVP	Total Frequency
1	0	66
2	1	135

Probability modeled is LookVP='1'.

Class Level Information			
Class	Value	Design Variables	
Gender VP	M	1	
	V	-1	
Age VP	JV	1	0
	S	0	1
	V	-1	-1
Intersectionfirst VP	Ja	1	
	Nee	-1	
GetsPriority VNP	Ja	1	
	Nee	-1	

Intercept-Only Model Convergence Status
Convergence criterion (GCONV=1E-8) satisfied.

Model Convergence Status
Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics		
Criterion	Intercept Only	Intercept and Covariates
AIC	238.231	202.697
SC	241.535	222.517
-2 Log L	236.231	190.697

Testing Global Null Hypothesis: BETA=0			
Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	45.5342	5	<.0001
Score	38.3343	5	<.0001
Wald	28.1503	5	<.0001

Type 3 Analysis of Effects			
Effect	DF	Wald Chi-Square	Pr > ChiSq
Gender VP	1	2.6907	0.1009
Age VP	2	4.7086	0.0950
Intersectionfirst VP	1	7.0965	0.0077
GetsPriority VNP	1	17.9735	<.0001

Analysis of Maximum Likelihood Estimates						
Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept		1	2.2604	0.5540	16.6454	<.0001
Gender VP	M	1	-0.2870	0.1750	2.6907	0.1009
Age VP	JV	1	-0.5288	0.8378	0.3984	0.5279
Age VP	S	1	1.2481	0.7145	3.0519	0.0806
Intersectionfirst VP	Ja	1	0.4649	0.1745	7.0965	0.0077
GetsPriority VNP	Ja	1	1.2622	0.2977	17.9735	<.0001

Odds Ratio Estimates			
Effect	Point Estimate	95% Wald Confidence Limits	
Gender VP M vs V	0.563	0.284	1.118
Age VP JV vs V	1.210	0.119	12.286
Age VP S vs V	7.152	1.207	42.386
Intersectionfirst VP Ja vs Nee	2.534	1.279	5.023
GetsPriority VNP Ja vs Nee	12.484	3.886	40.105

Association of Predicted Probabilities and Observed Responses			
Percent Concordant	71.7	Somers' D	0.560
Percent Discordant	15.7	Gamma	0.641
Percent Tied	12.6	Tau-a	0.248
Pairs	8910	c	0.780

12.3.4 Looking behaviour: no-priority vehicle

Logistic Regression Results
The LOGISTIC Procedure

Model Information	
Data Set	WORK.SORTTEMPTABLESORTED
Response Variable	LookVNP
Number of Response Levels	2
Model	binary logit
Optimization Technique	Fisher's scoring
Likelihood Penalty	Firth's bias correction

Number of Observations Read	201
Number of Observations Used	201

Response Profile		
Ordered Value	LookVNP	Total Frequency
1	0	41
2	1	160

Probability modeled is LookVNP='1'.

Class Level Information				
Class	Value	Design Variables		
GetsPriority VP	Ja	1		
	Nee	-1		
Intersection VNP	SH	1	0	0
	ST	0	1	0
	VERS	0	0	1
	VERT	-1	-1	-1

Intercept-Only Model Convergence Status
Convergence criterion (GCONV=1E-8) satisfied.

Model Convergence Status
Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics		
Criterion	Intercept Only	Intercept and Covariates
AIC	194.670	96.658
SC	197.973	113.175
-2 Log L	192.670	86.658

Testing Global Null Hypothesis: BETA=0			
Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	106.0118	4	<.0001
Score	114.5755	4	<.0001
Wald	55.3290	4	<.0001

Type 3 Analysis of Effects			
Effect	DF	Wald Chi-Square	Pr > ChiSq
GetsPriority VP	1	3.7769	0.0520
Intersection VNP	3	33.2693	<.0001

Analysis of Maximum Likelihood Estimates						
Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept		1	1.5704	0.6292	6.2285	0.0126
GetsPriority VP	Ja	1	0.5608	0.2886	3.7769	0.0520
Intersection VNP	SH	1	-2.4720	0.6848	13.0303	0.0003
Intersection VNP	ST	1	2.1727	0.8784	6.1176	0.0134
Intersection VNP	VERS	1	0.0898	1.7686	0.0026	0.9595

Odds Ratio Estimates			
Effect	Point Estimate	95% Wald Confidence Limits	
GetsPriority VP Ja vs Nee	3.070	0.990	9.514
Intersection VNP SH vs VERT	0.068	0.021	0.223
Intersection VNP ST vs VERT	7.121	1.165	43.540
Intersection VNP VERS vs VERT	0.887	0.008	94.388

Association of Predicted Probabilities and Observed Responses			
Percent Concordant	89.7	Somers' D	0.867
Percent Discordant	3.0	Gamma	0.935
Percent Tied	7.2	Tau-a	0.283
Pairs	6560	c	0.933

12.3.5 Approach behaviour: in-priority vehicle

Logistic Regression Results
The LOGISTIC Procedure

Model Information	
Data Set	WORK.SORTTEMPTABLESORTED
Response Variable	IntersectionVP
Number of Response Levels	2
Model	binary logit
Optimization Technique	Fisher's scoring
Likelihood Penalty	Firth's bias correction

Number of Observations Read	201
Number of Observations Used	201

Response Profile		
Ordered Value	IntersectionVP	Total Frequency
1	0	85
2	1	116

Probability modeled is IntersectionVP='0'.

Class Level Information		
Class	Value	Design Variables
DontLook VP	Ja	1
	Nee	-1
GetsPriority VP	Ja	1
	Nee	-1
DontTurn VP	Ja	1
	Nee	-1

Intercept-Only Model Convergence Status
Convergence criterion (GCONV=1E-8) satisfied.

Model Convergence Status
Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics		
Criterion	Intercept Only	Intercept and Covariates
AIC	261.688	148.344
SC	264.992	161.557

Model Fit Statistics		
Criterion	Intercept Only	Intercept and Covariates
-2 Log L	259.688	140.344

Testing Global Null Hypothesis: BETA=0			
Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	119.3448	3	<.0001
Score	107.4708	3	<.0001
Wald	64.7953	3	<.0001

Type 3 Analysis of Effects			
Effect	DF	Wald Chi-Square	Pr > ChiSq
DontLook VP	1	18.7623	<.0001
GetsPriority VP	1	2.6783	0.1017
DontTurn VP	1	7.2706	0.0070

Analysis of Maximum Likelihood Estimates						
Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept		1	0.0635	0.3089	0.0422	0.8372
DontLook VP	Ja	1	1.3412	0.3096	18.7623	<.0001
GetsPriority VP	Ja	1	0.4096	0.2503	2.6783	0.1017
DontTurn VP	Ja	1	0.6779	0.2514	7.2706	0.0070

Odds Ratio Estimates			
Effect	Point Estimate	95% Wald Confidence Limits	
DontLook VP Ja vs Nee	14.620	4.343	49.213
GetsPriority VP Ja vs Nee	2.269	0.851	6.052
DontTurn VP Ja vs Nee	3.880	1.448	10.396

Association of Predicted Probabilities and Observed Responses			
Percent Concordant	82.8	Somers' D	0.766
Percent Discordant	6.2	Gamma	0.861
Percent Tied	11.0	Tau-a	0.376
Pairs	9860	c	0.883

12.3.6 Approach behaviour: no-priority vehicle

Logistic Regression Results
The LOGISTIC Procedure

Model Information	
Data Set	WORK.SORTTEMPTABLESORTED
Response Variable	IntersectionVNP
Number of Response Levels	2
Model	binary logit
Optimization Technique	Fisher's scoring
Likelihood Penalty	Firth's bias correction

Number of Observations Read	201
Number of Observations Used	201

Response Profile		
Ordered Value	IntersectionVNP	Total Frequency
1	0	156
2	1	45

Probability modeled is IntersectionVNP='0'.

Class Level Information		
Class	Value	Design Variables
GetsPriority VP	Ja	1
	Nee	-1
LookRight VNP	Ja	1
	Nee	-1

Intercept-Only Model Convergence Status
Convergence criterion (GCONV=1E-8) satisfied.

Model Convergence Status
Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics		
Criterion	Intercept Only	Intercept and Covariates
AIC	206.138	91.448
SC	209.442	101.358
-2 Log L	204.138	85.448

Testing Global Null Hypothesis: BETA=0			
Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	118.6900	2	<.0001
Score	125.0276	2	<.0001
Wald	53.3526	2	<.0001

Type 3 Analysis of Effects			
Effect	DF	Wald Chi-Square	Pr > ChiSq
GetsPriority VP	1	22.9256	<.0001
LookRight VNP	1	34.4478	<.0001

Analysis of Maximum Likelihood Estimates						
Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept		1	0.4142	0.2865	2.0903	0.1482
GetsPriority VP	Ja	1	1.2946	0.2704	22.9256	<.0001
LookRight VNP	Ja	1	1.6863	0.2873	34.4478	<.0001

Odds Ratio Estimates			
Effect	Point Estimate	95% Wald Confidence Limits	
GetsPriority VP Ja vs Nee	13.319	4.615	38.438
LookRight VNP Ja vs Nee	29.154	9.453	89.911

Association of Predicted Probabilities and Observed Responses			
Percent Concordant	87.5	Somers' D	0.853
Percent Discordant	2.2	Gamma	0.952
Percent Tied	10.4	Tau-a	0.298
Pairs	7020	c	0.927

APPENDIX 13: OUTPUT CHI-SQUARE TESTS BASIS INTERSECTION DUO

13.1 Output basis priority intersection: interaction type main road versus interaction type 90°

13.1.1 Violation priority rule

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Overtreding voorrang * Interactie type	231	96,7%	8	3,3%	239	100,0%

Overtreding voorrang * Interactie type Crosstabulation

Count

		Interactie type		Total
		90°	Hoofdweg	
Overtreding voorrang	0	167	43	210
	1	15	6	21
Total		182	49	231

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	,749[a]	1	,387	,404	,270
Continuity Correction[b]	,343	1	,558		
Likelihood Ratio	,701	1	,403	,579	,270
Fisher's Exact Test				,404	,270
N of Valid Cases	231				

a. 1 cells (25,0%) have expected count less than 5. The minimum expected count is 4,45.

b. Computed only for a 2x2 table

13.1.2 Looking behaviour vehicle 1

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
LookLeft V1 * Interactie type	231	100,0%	0	0,0%	231	100,0%
LookRight V1 * Interactie type	231	100,0%	0	0,0%	231	100,0%
DontLook V1 * Interactie type	231	100,0%	0	0,0%	231	100,0%

LookLeft V1 * Interactie type

Crosstab

Count

		Interactie type		Total
		90°	Hoofdweg	
LookLeft V1	0	161	21	182
	1	21	28	49
Total		182	49	231

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	48,042[a]	1	,000	,000	,000
Continuity Correction[b]	45,352	1	,000		
Likelihood Ratio	41,639	1	,000	,000	,000
Fisher's Exact Test				,000	,000
N of Valid Cases	231				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 10,39.

b. Computed only for a 2x2 table

LookRight V1 * Interactie type

Crosstab

Count

		Interactie type		Total
		90°	Hoofdweg	
LookRight V1	0	172	41	213
	1	10	8	18
Total		182	49	231

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	6,304[a]	1	,012	,018	,018
Continuity Correction[b]	4,887	1	,027		
Likelihood Ratio	5,350	1	,021	,030	,018
Fisher's Exact Test				,030	,018
N of Valid Cases	231				

a. 1 cells (25,0%) have expected count less than 5. The minimum expected count is 3,82.

b. Computed only for a 2x2 table

DontLook V1 * Interactie type

Crosstab

Count

		Interactie type		Total
		90°	Hoofdweg	
DontLook V1	0	27	29	56
	1	155	20	175
Total		182	49	231

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	41,344[a]	1	,000	,000	,000
Continuity Correction[b]	38,964	1	,000		
Likelihood Ratio	36,795	1	,000	,000	,000
Fisher's Exact Test				,000	,000
N of Valid Cases	231				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 11,88.

b. Computed only for a 2x2 table

13.1.3 Looking behaviour vehicle 2

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
LookLeft V2 * Interactie type	231	100,0%	0	0,0%	231	100,0%
LookRight V2 * Interactie type	231	100,0%	0	0,0%	231	100,0%
DontLook V2 * Interactie type	231	100,0%	0	0,0%	231	100,0%

LookLeft V2 * Interactie type

Crosstab

Count

		Interactie type		Total
		90°	Hoofdweg	
LookLeft V2	0	161	27	188
	1	21	22	43
Total		182	49	231

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	28,359[a]	1	,000	,000	,000
Continuity Correction[b]	26,200	1	,000		
Likelihood Ratio	24,438	1	,000	,000	,000
Fisher's Exact Test				,000	,000
N of Valid Cases	231				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 9,12.

b. Computed only for a 2x2 table

LookRight V2 * Interactie type

Crosstab

Count

		Interactie type		Total
		90°	Hoofdweg	
LookRight V2	0	172	45	217
	1	10	4	14
Total		182	49	231

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	,483[a]	1	,487	,503	,342
Continuity Correction[b]	,128	1	,721		
Likelihood Ratio	,451	1	,502	,740	,342
Fisher's Exact Test				,503	,342
N of Valid Cases	231				

a. 1 cells (25,0%) have expected count less than 5. The minimum expected count is 2,97.

b. Computed only for a 2x2 table

DontLook V2 * Interactie type

Crosstab

Count

		Interactie type		Total
		90°	Hoofdweg	
DontLook V2	0	27	23	50
	1	155	26	181
Total		182	49	231

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	23,461[a]	1	,000	,000	,000
Continuity Correction[b]	21,606	1	,000		
Likelihood Ratio	20,773	1	,000	,000	,000
Fisher's Exact Test				,000	,000
N of Valid Cases	231				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 10,61.

b. Computed only for a 2x2 table

13.1.4 Approach behaviour vehicle 1

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Intersection V1 * Interactie type	231	100,0%	0	0,0%	231	100,0%

Intersection V1 * Interactie type Crosstabulation

Count

		Interactie type		Total
		90°	Hoofdweg	
Intersection V1	SH	157	17	174
	ST	1	17	18
	VERT	24	15	39
Total		182	49	231

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)
Pearson Chi-Square	78,335[a]	2	,000	,000
Likelihood Ratio	67,686	2	,000	,000
Fisher's Exact Test	66,418			,000
N of Valid Cases	231			

a. 1 cells (16,7%) have expected count less than 5. The minimum expected count is 3,82.

13.1.5 Approach behaviour vehicle 2

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Intersection V2 * Interactie type	231	100,0%	0	0,0%	231	100,0%

Intersection V2 * Interactie type Crosstabulation

Count

		Interactie type		Total
		90°	Hoofdweg	
Intersection V2	SH	157	27	184
	ST	1	9	10
	VERT	24	13	37
Total		182	49	231

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)
Pearson Chi-Square	37,311[a]	2	,000	,000
Likelihood Ratio	30,806	2	,000	,000
Fisher's Exact Test	30,390			,000
N of Valid Cases	231			

a. 1 cells (16,7%) have expected count less than 5. The minimum expected count is 2,12.

13.2 Output basis priority intersection: interaction type minor road versus interaction type 90°

13.2.1 Violation priority rule

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Overtreding voorrang * Interactie type	185	77,4%	54	22,6%	239	100,0%

Overtreding voorrang * Interactie type Crosstabulation

Count

		Interactie type		Total
		90°	Zijweg	
Overtreding voorrang	0	167	3	170
	1	15	0	15
Total		182	3	185

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	,269[a]	1	,604	1,000	,775
Continuity Correction[b]	,000	1	1,000		
Likelihood Ratio	,512	1	,474	1,000	,775
Fisher's Exact Test				1,000	,775
N of Valid Cases	185				

a. 2 cells (50,0%) have expected count less than 5. The minimum expected count is ,24.

b. Computed only for a 2x2 table

13.2.2 Looking behaviour vehicle 1

Warnings

No measures of association are computed for the crosstabulation of LookLeft V1 * Interactie type. At least one variable in each 2-way table upon which measures of association are computed is a constant.

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
LookLeft V1 * Interactie type	185	72,3%	71	27,7%	256	100,0%
LookRight V1 * Interactie type	185	72,3%	71	27,7%	256	100,0%
DontLook V1 * Interactie type	185	72,3%	71	27,7%	256	100,0%

LookLeft V1 * Interactie type

Crosstab

Count

		Interactie type		Total
		90°	Zijweg	
LookLeft V1	1	182	3	185
Total		182	3	185

Chi-Square Tests

	Value
Pearson Chi-Square	.[a]
N of Valid Cases	185

a. No statistics are computed because LookLeft V1 is a constant.

LookRight V1 * Interactie type

Crosstab

Count

		Interactie type		Total
		90°	Zijweg	
LookRight V1	0	1	0	1
	1	181	3	184
Total		182	3	185

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	,017[a]	1	,898	1,000	,984
Continuity Correction[b]	,000	1	1,000		
Likelihood Ratio	,033	1	,856	1,000	,984
Fisher's Exact Test				1,000	,984
N of Valid Cases	185				

a. 3 cells (75,0%) have expected count less than 5. The minimum expected count is ,02.

b. Computed only for a 2x2 table

DontLook V1 * Interactie type

Crosstab

Count

		Interactie type		Total
		90°	Zijweg	
DontLook V1	0	182	3	185
Total		182	3	185

Chi-Square Tests

	Value
Pearson Chi-Square	.[a]
N of Valid Cases	185

a. No statistics are computed because DontLook V1 is a constant.

13.2.3 Looking behaviour vehicle 2

Warnings

No measures of association are computed for the crosstabulation of LookLeft V2 * Interactie type. At least one variable in each 2-way table upon which measures of association are computed is a constant.

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
LookLeft V2 * Interactie type	185	86,0%	30	14,0%	215	100,0%
LookRight V2 * Interactie type	185	86,0%	30	14,0%	215	100,0%
DontLook V2 * Interactie type	185	86,0%	30	14,0%	215	100,0%

LookLeft V2 * Interactie type

Crosstab

Count

		Interactie type		Total
		90°	Zijweg	
LookLeft V2	1	182	3	185
Total		182	3	185

Chi-Square Tests

	Value
Pearson Chi-Square	.[a]
N of Valid Cases	185

a. No statistics are computed because LookLeft V2 is a constant.

LookRight V2 * Interactie type

Crosstab

Count

		Interactie type		Total
		90°	Zijweg	
LookRight V2	0	1	0	1
	1	181	3	184
Total		182	3	185

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	,0153[a]	1	,898	1,000	,984
Continuity Correction[b]	,000	1	1,000		
Likelihood Ratio	,033	1	,856	1,000	,984
Fisher's Exact Test				1,000	,984
N of Valid Cases	185				

a. 3 cells (75,0%) have expected count less than 5. The minimum expected count is ,02.

b. Computed only for a 2x2 table

DontLook V2 * Interactie type

Crosstab

Count

		Interactie type		Total
		90°	Zijweg	
DontLook V2	0	182	3	185
Total		182	3	185

Chi-Square Tests

	Value
Pearson Chi-Square	.[a]
N of Valid Cases	185

a. No statistics are computed because DontLook V2 is a constant.

13.2.4 Approach behaviour vehicle 1

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Intersection V1 * Interactie type	215	100,0%	0	0,0%	215	100,0%

Intersection V1 * Interactie type Crosstabulation

Count

		Interactie type			Total
			90°	Zijweg	
Intersection V1		30	0	0	30
	SH	0	2	0	2
	ST	0	179	3	182
	VERT	0	1	0	1
Total		30	182	3	215

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)
Pearson Chi-Square	215,058[a]	6	,000	,000
Likelihood Ratio	173,870	6	,000	,000
Fisher's Exact Test	169,117			,000
N of Valid Cases	215			

a. 9 cells (75,0%) have expected count less than 5. The minimum expected count is ,01.

13.2.5 Approach behaviour vehicle 2

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Intersection V2 * Interactie type	216	100,0%	0	0,0%	216	100,0%

Intersection V2 * Interactie type Crosstabulation

Count

		Interactie type			Total
			90°	Zijweg	
Intersection V2		31	0	0	31
	SH	0	2	0	2
	ST	0	179	3	182
	VERT	0	1	0	1
Total		31	182	3	216

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)
Pearson Chi-Square	216,059[a]	6	,000	,000
Likelihood Ratio	177,780	6	,000	,000
Fisher's Exact Test	172,886			,000
N of Valid Cases	216			

a. 9 cells (75,0%) have expected count less than 5. The minimum expected count is ,01.

13.3 Output basis priority to the right intersection: interaction type main road versus interaction type 90°

13.3.1 Violation priority rule

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Overtreding voorrang * Interactie type	236	98,7%	3	1,3%	239	100,0%

Overtreding voorrang * Interactie type Crosstabulation

Count

		Interactie type		Total
		90°	Hoofdweg	
Overtreding voorrang	0	147	34	181
	1	54	1	55
Total		201	35	236

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	9,613[a]	1	,002	,002	,001
Continuity Correction[b]	8,317	1	,004		
Likelihood Ratio	13,253	1	,000	,001	,001
Fisher's Exact Test				,001	,001
N of Valid Cases	236				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 8,16.

b. Computed only for a 2x2 table

13.3.1 Looking behaviour VP

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
LookLeft VP * Interactie type	236	100,0%	0	0,0%	236	100,0%
LookRight VP * Interactie type	236	100,0%	0	0,0%	236	100,0%
DontLook VP * Interactie type	236	100,0%	0	0,0%	236	100,0%

LookLeft VP * Interactie type

Crosstab

Count

		Interactie type		Total
		90°	Hoofdweg	
LookLeft VP	0	78	31	109
	1	123	4	127
Total		201	35	236

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	29,703[a]	1	,000	,000	,000
Continuity Correction[b]	27,735	1	,000		
Likelihood Ratio	32,430	1	,000	,000	,000
Fisher's Exact Test				,000	,000
N of Valid Cases	236				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 16,17.

b. Computed only for a 2x2 table

LookRight VP * Interactie type

Crosstab

Count

		Interactie type		Total
		90°	Hoofdweg	
LookRight VP	0	73	32	105
	1	128	3	131
Total		201	35	236

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	36,659[a]	1	,000	,000	,000
Continuity Correction[b]	34,461	1	,000		
Likelihood Ratio	40,418	1	,000	,000	,000
Fisher's Exact Test				,000	,000
N of Valid Cases	236				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 15,57.

b. Computed only for a 2x2 table

DontLook VP * Interactie type

Crosstab

Count

		Interactie type		Total
		90°	Hoofdweg	
DontLook VP	0	135	5	140
	1	66	30	96
Total		201	35	236

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	34,541[a]	1	,000	,000	,000
Continuity Correction[b]	32,384	1	,000		
Likelihood Ratio	35,736	1	,000	,000	,000
Fisher's Exact Test				,000	,000
N of Valid Cases	236				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 14,24.

b. Computed only for a 2x2 table

13.3.3 Looking behaviour VNP

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
LookLeft VNP * Interactie type	236	100,0%	0	0,0%	236	100,0%
LookRight VNP * Interactie type	236	100,0%	0	0,0%	236	100,0%
DontLook VNP * Interactie type	236	100,0%	0	0,0%	236	100,0%

LookLeft VNP * Interactie type

Crosstab

Count

		Interactie type		Total
		90°	Hoofdweg	
LookLeft VNP	0	78	0	78
	1	123	35	158
Total		201	35	236

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	20,287[a]	1	,000	,000	,000
Continuity Correction[b]	18,571	1	,000		
Likelihood Ratio	31,017	1	,000	,000	,000
Fisher's Exact Test				,000	,000
N of Valid Cases	236				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 11,57.

b. Computed only for a 2x2 table

LookRight VNP * Interactie type

Crosstab

Count

		Interactie type		Total
		90°	Hoofdweg	
LookRight VNP	0	73	16	89
	1	128	19	147
Total		201	35	236

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1,120[a]	1	,290	,345	,192
Continuity Correction[b]	,756	1	,385		
Likelihood Ratio	1,100	1	,294	,345	,192
Fisher's Exact Test				,345	,192
N of Valid Cases	236				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 13,20.

b. Computed only for a 2x2 table

DontLook VNP * Interactie type

Crosstab

Count

		Interactie type		Total
		90°	Hoofdweg	
DontLook VNP	0	135	35	170
	1	66	0	66
Total		201	35	236

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	15,954[a]	1	,000	,000	,000
Continuity Correction[b]	14,366	1	,000		
Likelihood Ratio	25,253	1	,000	,000	,000
Fisher's Exact Test				,000	,000
N of Valid Cases	236				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 9,79.

b. Computed only for a 2x2 table

13.3.4 Approach behaviour VP

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Intersection VP * Interactie type	236	100,0%	0	0,0%	236	100,0%

Intersection VP * Interactie type Crosstabulation

Count

		Interactie type		Total
		90°	Hoofdweg	
Intersection VP	SH	84	27	111
	ST	52	1	53
	VERS	1	0	1
	VERT	64	7	71
Total		201	35	236

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)
Pearson Chi-Square	16,514[a]	3	,001	,001
Likelihood Ratio	19,320	3	,000	,000
Fisher's Exact Test	17,844			,000
N of Valid Cases	236			

a. 2 cells (25,0%) have expected count less than 5. The minimum expected count is ,15.

13.3.5 Approach behaviour VNP

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Intersection VNP * Interactie type	236	100,0%	0	0,0%	236	100,0%

Intersection VNP * Interactie type Crosstabulation

Count

		Interactie type		Total
		90°	Hoofdweg	
Intersection VNP	SH	44	2	46
	ST	98	21	119
	VERS	1	0	1
	VERT	58	12	70
Total		201	35	236

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)
Pearson Chi-Square	5,220[a]	3	,156	,221
Likelihood Ratio	6,624	3	,085	,082
Fisher's Exact Test	6,102			,106
N of Valid Cases	236			

a. 2 cells (25,0%) have expected count less than 5. The minimum expected count is ,15.

13.4 Output basis priority to the right intersection: interaction type minor road versus interaction type 90°

13.4.1 Violation priority rule

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Overtreding voorrang * Interactie type	203	84,9%	36	15,1%	239	100,0%

Overtreding voorrang * Interactie type Crosstabulation

Count

		Interactie type		Total
		90°	Zijweg	
Overtreding voorrang	0	147	2	149
	1	54	0	54
Total		201	2	203

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	,732[a]	1	,392	,608	,538
Continuity Correction[b]	,003	1	,959		
Likelihood Ratio	1,244	1	,265	,608	,538
Fisher's Exact Test				1,000	,538
N of Valid Cases	203				

a. 2 cells (50,0%) have expected count less than 5. The minimum expected count is ,53.

b. Computed only for a 2x2 table

13.4.2 Looking behaviour VP

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
LookLeft VP * Interactie type	203	93,5%	14	6,5%	217	100,0%
LookRight VP * Interactie type	203	93,5%	14	6,5%	217	100,0%
DontLook VP * Interactie type	203	93,5%	14	6,5%	217	100,0%

LookLeft VP * Interactie type

Crosstab

Count

		Interactie type		Total
		90°	Zijweg	
LookLeft VP	0	78	0	78
	1	123	2	125
Total		201	2	203

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1,260[a]	1	,262	,524	,378
Continuity Correction[b]	,154	1	,695		
Likelihood Ratio	1,952	1	,162	,524	,378
Fisher's Exact Test				,524	,378
N of Valid Cases	203				

a. 2 cells (50,0%) have expected count less than 5. The minimum expected count is ,77.

b. Computed only for a 2x2 table

LookRight VP * Interactie type

Crosstab

Count

		Interactie type		Total
		90°	Zijweg	
LookRight VP	0	73	0	73
	1	128	2	130
Total		201	2	203

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1,134[a]	1	,287	,537	,409
Continuity Correction[b]	,105	1	,745		
Likelihood Ratio	1,794	1	,180	,537	,409
Fisher's Exact Test				,537	,409
N of Valid Cases	203				

a. 2 cells (50,0%) have expected count less than 5. The minimum expected count is ,72.

b. Computed only for a 2x2 table

DontLook VP * Interactie type

Crosstab

Count

		Interactie type		Total
		90°	Zijweg	
DontLook VP	0	135	2	137
	1	66	0	66
Total		201	2	203

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	,973[a]	1	,324	,559	,454
Continuity Correction[b]	,052	1	,820		
Likelihood Ratio	1,582	1	,208	,559	,454
Fisher's Exact Test				1,000	,454
N of Valid Cases	203				

a. 2 cells (50,0%) have expected count less than 5. The minimum expected count is ,65.

b. Computed only for a 2x2 table

13.4.3 Looking behaviour VNP

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
LookLeft VNP * Interactie type	203	93,5%	14	6,5%	217	100,0%
LookRight VNP * Interactie type	203	93,5%	14	6,5%	217	100,0%
DontLook VNP * Interactie type	203	93,5%	14	6,5%	217	100,0%

LookLeft VNP * Interactie type

Crosstab

Count

		Interactie type		Total
		90°	Zijweg	
LookLeft VNP	0	78	0	78
	1	123	2	125
Total		201	2	203

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1,260[a]	1	,262	,524	,378
Continuity Correction[b]	,154	1	,695		
Likelihood Ratio	1,952	1	,162	,524	,378
Fisher's Exact Test				,524	,378
N of Valid Cases	203				

a. 2 cells (50,0%) have expected count less than 5. The minimum expected count is ,77.

b. Computed only for a 2x2 table

Crosstab

Count

		Interactie type		Total
		90°	Zijweg	
LookRight VNP	0	73	0	73
	1	128	2	130
Total		201	2	203

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1,134[a]	1	,287	,537	,409
Continuity Correction[b]	,105	1	,745		
Likelihood Ratio	1,794	1	,180	,537	,409
Fisher's Exact Test				,537	,409
N of Valid Cases	203				

a. 2 cells (50,0%) have expected count less than 5. The minimum expected count is ,72.

b. Computed only for a 2x2 table

DontLook VNP * Interactie type

Crosstab

Count

		Interactie type		Total
		90°	Zijweg	
DontLook VNP	0	135	2	137
	1	66	0	66
Total		201	2	203

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	,973[a]	1	,324	,559	,454
Continuity Correction[b]	,052	1	,820		
Likelihood Ratio	1,582	1	,208	,559	,454
Fisher's Exact Test				1,000	,454
N of Valid Cases	203				

a. 2 cells (50,0%) have expected count less than 5. The minimum expected count is ,65.

b. Computed only for a 2x2 table

13.4.4 Approach behaviour VP

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Intersection VP * Interactie type	217	100,0%	0	0,0%	217	100,0%

Intersection VP * Interactie type Crosstabulation

Count

		Interactie type			Total
			90°	Zijweg	
Intersection VP		14	0	0	14
	SH	0	84	1	85
	ST	0	52	0	52
	VERS	0	1	0	1
	VERT	0	64	1	65
Total		14	201	2	217

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)
Pearson Chi-Square	217,816[a]	8	,000	,000
Likelihood Ratio	105,074	8	,000	,000
Fisher's Exact Test	97,679			,000
N of Valid Cases	217			

a. 10 cells (66,7%) have expected count less than 5. The minimum expected count is ,01.

13.4.5 Approach behaviour VNP

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Intersection VNP * Interactie type	217	100,0%	0	0,0%	217	100,0%

Intersection VNP * Interactie type Crosstabulation

Count

		Interactie type			Total
			90°	Zijweg	
Intersection VNP		14	0	0	14
	SH	0	44	0	44
	ST	0	98	2	100
	VERS	0	1	0	1
	VERT	0	58	0	58
Total		14	201	2	217

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)
Pearson Chi-Square	219,224[a]	8	,000	,000
Likelihood Ratio	106,673	8	,000	,000
Fisher's Exact Test	98,136			,000
N of Valid Cases	217			

a. 10 cells (66,7%) have expected count less than 5. The minimum expected count is ,01.

APPENDIX 14: OUTPUT CHI-SQUARE TESTS OTHER INTERSECTION DUO'S

14.1 Output priority intersection versus priority intersection with cycle path

14.1.1 Violation priority

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Overtreding voorrang * KruispuntType	214	89,5%	25	10,5%	239	100,0%

Overtreding voorrang * KruispuntType Crosstabulation

Count

		KruispuntType		Total
		Kruispunt vaste voorrang	Kruispunt vaste voorrang fietspad	
Overtreding voorrang	0	167	30	197
	1	15	2	17
Total		182	32	214

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	,148[a]	1	,701	,754	,517
Continuity Correction[b]	,001	1	,976		
Likelihood Ratio	,157	1	,692	,754	,517
Fisher's Exact Test				1,000	,517
N of Valid Cases	214				

a. 1 cells (25,0%) have expected count less than 5. The minimum expected count is 2,54.

b. Computed only for a 2x2 table

14.1.2 Looking behaviour main

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
LookLeft VH1 * KruispuntType	214	100,0%	0	0,0%	214	100,0%
LookRight VH1 * KruispuntType	214	100,0%	0	0,0%	214	100,0%
DontLook VH1 * KruispuntType	214	100,0%	0	0,0%	214	100,0%

LookLeft VH1 * KruispuntType

Crosstab

Count

		KruispuntType		Total
		Kruispunt vaste voorrang	Kruispunt vaste voorrang fietspad	
LookLeft VH1	0	161	28	189
	1	21	4	25
Total		182	32	214

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	,024[a]	1	,876	1,000	,535
Continuity Correction[b]	,000	1	1,000		
Likelihood Ratio	,024	1	,877	1,000	,535
Fisher's Exact Test				,773	,535
N of Valid Cases	214				

a. 1 cells (25,0%) have expected count less than 5. The minimum expected count is 3,74.

b. Computed only for a 2x2 table

LookRight VH1 * KruispuntType

Crosstab

Count

		KruispuntType		Total
		Kruispunt vaste voorrang	Kruispunt vaste voorrang fietspad	
LookRight VH1	0	172	29	201
	1	10	3	13
Total		182	32	214

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	,718[a]	1	,397	,418	,304
Continuity Correction[b]	,199	1	,655		
Likelihood Ratio	,640	1	,424	,697	,304
Fisher's Exact Test				,418	,304
N of Valid Cases	214				

a. 1 cells (25,0%) have expected count less than 5. The minimum expected count is 1,94.

b. Computed only for a 2x2 table

DontLook VH1 * KruispuntType

Crosstab

Count

		KruispuntType		Total
		Kruispunt vaste voorrang	Kruispunt vaste voorrang fietspad	
DontLook VH1	0	27	6	33
	1	155	26	181
Total		182	32	214

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	,320[a]	1	,572	,597	,367
Continuity Correction[b]	,090	1	,764		
Likelihood Ratio	,306	1	,580	,597	,367
Fisher's Exact Test				,597	,367
N of Valid Cases	214				

a. 1 cells (25,0%) have expected count less than 5. The minimum expected count is 4,93.

b. Computed only for a 2x2 table

14.1.3 Looking behaviour minor

Warnings

No measures of association are computed for the crosstabulation of LookLeft VO1 * KruispuntType. At least one variable in each 2-way table upon which measures of association are computed is a constant.

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
LookLeft VO1 * KruispuntType	214	100,0%	0	0,0%	214	100,0%
LookRight VO1 * KruispuntType	214	100,0%	0	0,0%	214	100,0%
DontLook VO1 * KruispuntType	214	100,0%	0	0,0%	214	100,0%

LookLeft VO1 * KruispuntType

Crosstab

Count

		KruispuntType		Total
		Kruispunt vaste voorrang	Kruispunt vaste voorrang fietspad	
LookLeft VO1	1	182	32	214
Total		182	32	214

Chi-Square Tests

	Value
Pearson Chi-Square	.[a]
N of Valid Cases	214

a. No statistics are computed because LookLeft VO1 is a constant.

LookRight VO1 * KruispuntType

Crosstab

Count

		KruispuntType		Total
		Kruispunt vaste voorrang	Kruispunt vaste voorrang fietspad	
LookRight VO1	0	1	0	1
	1	181	32	213
Total		182	32	214

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	,177[a]	1	,674	1,000	,850
Continuity Correction[b]	,000	1	1,000		
Likelihood Ratio	,325	1	,569	1,000	,850
Fisher's Exact Test				1,000	,850
N of Valid Cases	214				

a. 2 cells (50,0%) have expected count less than 5. The minimum expected count is ,15.

b. Computed only for a 2x2 table

DontLook VO1 * KruispuntType

Crosstab

Count

		KruispuntType		Total
		Kruispunt vaste voorrang	Kruispunt vaste voorrang fietspad	
DontLook VO1	0	182	32	214
Total		182	32	214

Chi-Square Tests

	Value
Pearson Chi-Square	.[a]
N of Valid Cases	214

a. No statistics are computed because DontLook VO1 is a constant.

14.1.4 Approach behaviour main

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Intersection VH1 * KruispuntType	214	100,0%	0	0,0%	214	100,0%

Intersection VH1 * KruispuntType Crosstabulation

Count

		KruispuntType		Total
		Kruispunt vaste voorrang	Kruispunt vaste voorrang fietspad	
Intersection VH1	SH	157	29	186
	ST	1	0	1
	VERT	24	3	27
Total		182	32	214

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)
Pearson Chi-Square	,549[a]	2	,760	,652
Likelihood Ratio	,722	2	,697	,652
Fisher's Exact Test	,784			,808
N of Valid Cases	214			

a. 3 cells (50,0%) have expected count less than 5. The minimum expected count is ,15.

14.1.5 Approach behaviour minor

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Intersection VO1 * KruispuntType	214	100,0%	0	0,0%	214	100,0%

Intersection VO1 * KruispuntType Crosstabulation

Count

		KruispuntType		Total
		Kruispunt vaste voorrang	Kruispunt vaste voorrang fietspad	
Intersection VO1	SH	2	0	2
	ST	179	31	210
	VERT	1	1	2
Total		182	32	214

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)
Pearson Chi-Square	2,289[a]	2	,318	,479
Likelihood Ratio	2,006	2	,367	,479
Fisher's Exact Test	2,444			,479
N of Valid Cases	214			

a. 4 cells (66,7%) have expected count less than 5. The minimum expected count is ,30.

14.2 Output priority intersection versus elevated priority intersection

14.2.1 Violation priority

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Overtreding voorrang * KruispuntType	215	90,0%	24	10,0%	239	100,0%

Overtreding voorrang * KruispuntType Crosstabulation

Count

		KruispuntType		Total
		Kruispunt vaste voorrang	Kruispunt vaste voorrang verhoogd	
Overtreding voorrang	0	167	32	199
	1	15	1	16
Total		182	33	215

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1,101[a]	1	,294	,476	,260
Continuity Correction[b]	,475	1	,491		
Likelihood Ratio	1,347	1	,246	,338	,260
Fisher's Exact Test				,476	,260
N of Valid Cases	215				

a. 1 cells (25,0%) have expected count less than 5. The minimum expected count is 2,46.

b. Computed only for a 2x2 table

14.2.2 Looking behaviour main

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
LookLeft VH1 * KruispuntType	215	100,0%	0	0,0%	215	100,0%
LookRight VH1 * KruispuntType	215	100,0%	0	0,0%	215	100,0%
DontLook VH1 * KruispuntType	215	100,0%	0	0,0%	215	100,0%

LookLeft VH1 * KruispuntTyp**e**

Crosstab

Count

		KruispuntType		Total
		Kruispunt vaste voorrang	Kruispunt vaste voorrang verhoogd	
LookLeft VH1	0	161	24	185
	1	21	9	30
Total		182	33	215

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	5,760[a]	1	,016	,026	,022
Continuity Correction[b]	4,524	1	,033		
Likelihood Ratio	4,922	1	,027	,055	,022
Fisher's Exact Test				,026	,022
N of Valid Cases	215				

a. 1 cells (25,0%) have expected count less than 5. The minimum expected count is 4,60.

b. Computed only for a 2x2 table

LookRight VH1 * KruispuntType

Crosstab

Count

		KruispuntType		Total
		Kruispunt vaste voorrang	Kruispunt vaste voorrang verhoogd	
LookRight VH1	0	172	26	198
	1	10	7	17
Total		182	33	215

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	9,477[a]	1	,002	,007	,007
Continuity Correction[b]	7,442	1	,006		
Likelihood Ratio	7,317	1	,007	,007	,007
Fisher's Exact Test				,007	,007
N of Valid Cases	215				

a. 1 cells (25,0%) have expected count less than 5. The minimum expected count is 2,61.

b. Computed only for a 2x2 table

DontLook VH1 * KruispuntType

Crosstab

Count

		KruispuntType		Total
		Kruispunt vaste voorrang	Kruispunt vaste voorrang verhoogd	
DontLook VH1	0	27	13	40
	1	155	20	175
Total		182	33	215

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	11,126[a]	1	,001	,002	,002
Continuity Correction[b]	9,563	1	,002		
Likelihood Ratio	9,516	1	,002	,002	,002
Fisher's Exact Test				,002	,002
N of Valid Cases	215				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 6,14.

b. Computed only for a 2x2 table

14.2.3 Looking behaviour minor

Warnings

No measures of association are computed for the crosstabulation of LookLeft VO1 * KruispuntType. At least one variable in each 2-way table upon which measures of association are computed is a constant.

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
LookLeft VO1 * KruispuntType	215	100,0%	0	0,0%	215	100,0%
LookRight VO1 * KruispuntType	215	100,0%	0	0,0%	215	100,0%
DontLook VO1 * KruispuntType	215	100,0%	0	0,0%	215	100,0%

LookLeft VO1 * KruispuntType

Crosstab

Count

		KruispuntType		Total
		Kruispunt vaste voorrang	Kruispunt vaste voorrang verhoogd	
LookLeft VO1	1	182	33	215
Total		182	33	215

Chi-Square Tests

	Value
Pearson Chi-Square	.[a]
N of Valid Cases	215

a. No statistics are computed because LookLeft VO1 is a constant.

LookRight VO1 * KruispuntType

Crosstab

Count

		KruispuntType		Total
		Kruispunt vaste voorrang	Kruispunt vaste voorrang verhoogd	
LookRight VO1	0	1	0	1
	1	181	33	214
Total		182	33	215

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	,182[a]	1	,670	1,000	,847
Continuity Correction[b]	,000	1	1,000		
Likelihood Ratio	,334	1	,563	1,000	,847
Fisher's Exact Test				1,000	,847
N of Valid Cases	215				

a. 2 cells (50,0%) have expected count less than 5. The minimum expected count is ,15.

b. Computed only for a 2x2 table

DontLook VO1 * KruispuntType

Crosstab

Count

		KruispuntType		Total
		Kruispunt vaste voorrang	Kruispunt vaste voorrang verhoogd	
DontLook VO1	0	182	33	215
Total		182	33	215

Chi-Square Tests

	Value
Pearson Chi-Square	.[a]
N of Valid Cases	215

a. No statistics are computed because DontLook VO1 is a constant.

14.2.4 Approach behaviour main

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Intersection VH1 * KruispuntType	215	100,0%	0	0,0%	215	100,0%

Intersection VH1 * KruispuntType Crosstabulation

Count

		KruispuntType		Total
		Kruispunt vaste voorrang	Kruispunt vaste voorrang verhoogd	
Intersection VH1	SH	157	24	181
	ST	1	0	1
	VERS	0	1	1
	VERT	24	8	32
Total		182	33	215

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)
Pearson Chi-Square	8,599[a]	3	,035	,053
Likelihood Ratio	6,709	3	,082	,081
Fisher's Exact Test	7,384			,061
N of Valid Cases	215			

a. 5 cells (62,5%) have expected count less than 5. The minimum expected count is ,15.

14.2.5 Approach behaviour minor

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Intersection VO1 * KruispuntType	215	100,0%	0	0,0%	215	100,0%

Intersection VO1 * KruispuntType Crosstabulation

Count

		KruispuntType		Total
		Kruispunt vaste voorrang	Kruispunt vaste voorrang verhoogd	
Intersection VO1	SH	2	0	2
	ST	179	31	210
	VERT	1	2	3
Total		182	33	215

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)
Pearson Chi-Square	6,499[a]	2	,039	,084
Likelihood Ratio	4,733	2	,094	,084
Fisher's Exact Test	4,938			,084
N of Valid Cases	215			

a. 4 cells (66,7%) have expected count less than 5. The minimum expected count is ,31.

14.3 Output priority to the right intersection versus priority to the right intersection with cycle path

14.3.1 Violation priority

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Overtreding voorrang * KruispuntType	236	98,7%	3	1,3%	239	100,0%

Overtreding voorrang * KruispuntType Crosstabulation

Count

		KruispuntType		Total
		Voorrang van rechts	Voorrang van rechts met fietspad	
Overtreding voorrang	0	147	23	170
	1	54	12	66
Total		201	35	236

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	,815[a]	1	,367	,415	,239
Continuity Correction[b]	,488	1	,485		
Likelihood Ratio	,788	1	,375	,415	,239
Fisher's Exact Test				,415	,239
N of Valid Cases	236				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 9,79.

b. Computed only for a 2x2 table

14.3.2 Looking behaviour VP

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
LookLeft VP * KruispuntType	236	100,0%	0	0,0%	236	100,0%
LookRight VP * KruispuntType	236	100,0%	0	0,0%	236	100,0%
DontLook VP * KruispuntType	236	100,0%	0	0,0%	236	100,0%

LookLeft VP * KruispuntType

Crosstab

Count

		KruispuntType		Total
		Voorrang van rechts	Voorrang van rechts met fietspad	
LookLeft VP	0	78	9	87
	1	123	26	149
Total		201	35	236

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2,195[a]	1	,138	,184	,096
Continuity Correction[b]	1,669	1	,196		
Likelihood Ratio	2,297	1	,130	,184	,096
Fisher's Exact Test				,184	,096
N of Valid Cases	236				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 12,90.

b. Computed only for a 2x2 table

LookRight VP * KruispuntType

Crosstab

Count

		KruispuntType		Total
		Voorrang van rechts	Voorrang van rechts met fietspad	
LookRight VP	0	73	9	82
	1	128	26	154
Total		201	35	236

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1,478[a]	1	,224	,254	,153
Continuity Correction[b]	1,048	1	,306		
Likelihood Ratio	1,540	1	,215	,254	,153
Fisher's Exact Test				,254	,153
N of Valid Cases	236				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 12,16.

b. Computed only for a 2x2 table

DontLook VP * KruispuntType

Crosstab

Count

		KruispuntType		Total
		Voorrang van rechts	Voorrang van rechts met fietspad	
DontLook VP	0	135	27	162
	1	66	8	74
Total		201	35	236

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1,379[a]	1	,240	,324	,165
Continuity Correction[b]	,954	1	,329		
Likelihood Ratio	1,448	1	,229	,248	,165
Fisher's Exact Test				,324	,165
N of Valid Cases	236				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 10,97.

b. Computed only for a 2x2 table

14.3.3 Looking behaviour VNP

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
LookLeft VNP * KruispuntType	236	100,0%	0	0,0%	236	100,0%
LookRight VNP * KruispuntType	236	100,0%	0	0,0%	236	100,0%
DontLook VNP * KruispuntType	236	100,0%	0	0,0%	236	100,0%

LookLeft VNP * KruispuntType

Crosstab

Count

		KruispuntType		Total
		Voorrang van rechts	Voorrang van rechts met fietspad	
LookLeft VNP	0	104	21	125
	1	97	14	111
Total		201	35	236

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	,816[a]	1	,366	,463	,236
Continuity Correction[b]	,518	1	,472		
Likelihood Ratio	,822	1	,365	,463	,236
Fisher's Exact Test				,463	,236
N of Valid Cases	236				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 16,46.

b. Computed only for a 2x2 table

LookRight VNP * KruispuntType

Crosstab

Count

		KruispuntType		Total
		Voorrang van rechts	Voorrang van rechts met fietspad	
LookRight VNP	0	41	6	47
	1	160	29	189
Total		201	35	236

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	,198[a]	1	,656	,820	,427
Continuity Correction[b]	,047	1	,829		
Likelihood Ratio	,204	1	,651	,820	,427
Fisher's Exact Test				,820	,427
N of Valid Cases	236				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 6,97.

b. Computed only for a 2x2 table

DontLook VNP * KruispuntType

Crosstab

Count

		KruispuntType		Total
		Voorrang van rechts	Voorrang van rechts met fietspad	
DontLook VNP	0	160	29	189
	1	41	6	47
Total		201	35	236

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	,198[a]	1	,656	,820	,427
Continuity Correction[b]	,047	1	,829		
Likelihood Ratio	,204	1	,651	,820	,427
Fisher's Exact Test				,820	,427
N of Valid Cases	236				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 6,97.

b. Computed only for a 2x2 table

14.3.4 Approach behaviour VP

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Intersection VP * KruispuntType	236	100,0%	0	0,0%	236	100,0%

Intersection VP * KruispuntType Crosstabulation

Count

		KruispuntType		Total
		Voorrang van rechts	Voorrang van rechts met fietspad	
Intersection VP	SH	84	9	93
	ST	52	20	72
	VERS	1	0	1
	VERT	64	6	70
Total		201	35	236

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)
Pearson Chi-Square	13,856[a]	3	,003	,003
Likelihood Ratio	12,957	3	,005	,003
Fisher's Exact Test	12,856			,003
N of Valid Cases	236			

a. 2 cells (25,0%) have expected count less than 5. The minimum expected count is ,15.

14.3.5 Approach behaviour VNP

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Intersection VNP * KruispuntType	236	100,0%	0	0,0%	236	100,0%

Intersection VNP * KruispuntType Crosstabulation

Count

		KruispuntType		Total
		Voorrang van rechts	Voorrang van rechts met fietspad	
Intersection VNP	SH	44	5	49
	ST	98	15	113
	VERS	1	0	1
	VERT	58	15	73
Total		201	35	236

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)
Pearson Chi-Square	3,110[a]	3	,375	,338
Likelihood Ratio	3,182	3	,364	,356
Fisher's Exact Test	3,307			,369
N of Valid Cases	236			

a. 2 cells (25,0%) have expected count less than 5. The minimum expected count is ,15.

14.4 Output priority to the right intersection versus elevated priority to the right intersection

14.4.1 Violation priority

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Overtreding voorrang * KruispuntType	234	97,9%	5	2,1%	239	100,0%

Overtreding voorrang * KruispuntType Crosstabulation

Count

		KruispuntType		Total
		Voorrang van rechts	Voorrang van rechts verhoogd	
Overtreding voorrang	0	147	22	169
	1	54	11	65
Total		201	33	234

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	,591[a]	1	,442	,529	,283
Continuity Correction[b]	,313	1	,576		
Likelihood Ratio	,573	1	,449	,529	,283
Fisher's Exact Test				,529	,283
N of Valid Cases	234				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 9,17.

b. Computed only for a 2x2 table

14.4.2 Looking behaviour VP

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
LookLeft VP * KruispuntType	234	100,0%	0	0,0%	234	100,0%
LookRight VP * KruispuntType	234	100,0%	0	0,0%	234	100,0%
DontLook VP * KruispuntType	234	100,0%	0	0,0%	234	100,0%

LookLeft VP * KruispuntType

Crosstab

Count

		KruispuntType		Total
		Voorrang van rechts	Voorrang van rechts verhoogd	
LookLeft VP	0	78	8	86
	1	123	25	148
Total		201	33	234

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2,586[a]	1	,108	,122	,076
Continuity Correction[b]	1,998	1	,158		
Likelihood Ratio	2,728	1	,099	,122	,076
Fisher's Exact Test				,122	,076
N of Valid Cases	234				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 12,13.

b. Computed only for a 2x2 table

LookRight VP * KruispuntType

Crosstab

Count

		KruispuntType		Total
		Voorrang van rechts	Voorrang van rechts verhoogd	
LookRight VP	0	73	9	82
	1	128	24	152
Total		201	33	234

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1,019[a]	1	,313	,334	,210
Continuity Correction[b]	,660	1	,416		
Likelihood Ratio	1,054	1	,305	,334	,210
Fisher's Exact Test				,431	,210
N of Valid Cases	234				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 11,56.

b. Computed only for a 2x2 table

DontLook VP * KruispuntType

Crosstab

Count

		KruispuntType		Total
		Voorrang van rechts	Voorrang van rechts verhoogd	
DontLook VP	0	135	27	162
	1	66	6	72
Total		201	33	234

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2,858[a]	1	,091	,106	,065
Continuity Correction[b]	2,211	1	,137		
Likelihood Ratio	3,106	1	,078	,106	,065
Fisher's Exact Test				,106	,065
N of Valid Cases	234				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 10,15.

b. Computed only for a 2x2 table

14.4.3 Looking behaviour VNP

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
LookLeft VNP * KruispuntType	234	100,0%	0	0,0%	234	100,0%
LookRight VNP * KruispuntType	234	100,0%	0	0,0%	234	100,0%
DontLook VNP * KruispuntType	234	100,0%	0	0,0%	234	100,0%

LookLeft VNP * KruispuntType

Crosstab

Count

		KruispuntType		Total
		Voorrang van rechts	Voorrang van rechts verhoogd	
LookLeft VNP	0	104	20	124
	1	97	13	110
Total		201	33	234

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	,894[a]	1	,344	,355	,225
Continuity Correction[b]	,574	1	,449		
Likelihood Ratio	,902	1	,342	,355	,225
Fisher's Exact Test				,452	,225
N of Valid Cases	234				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 15,51.

b. Computed only for a 2x2 table

LookRight VNP * KruispuntType

Crosstab

Count

		KruispuntType		Total
		Voorrang van rechts	Voorrang van rechts verhoogd	
LookRight VNP	0	41	9	50
	1	160	24	184
Total		201	33	234

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	,797[a]	1	,372	,492	,248
Continuity Correction[b]	,441	1	,507		
Likelihood Ratio	,759	1	,384	,492	,248
Fisher's Exact Test				,366	,248
N of Valid Cases	234				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 7,05.

b. Computed only for a 2x2 table

DontLook VNP * KruispuntType

Crosstab

Count

		KruispuntType		Total
		Voorrang van rechts	Voorrang van rechts verhoogd	
DontLook VNP	0	160	24	184
	1	41	9	50
Total		201	33	234

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	,797[a]	1	,372	,492	,248
Continuity Correction[b]	,441	1	,507		
Likelihood Ratio	,759	1	,384	,492	,248
Fisher's Exact Test				,366	,248
N of Valid Cases	234				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 7,05.

b. Computed only for a 2x2 table

14.4.4 Approach behaviour VP

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Intersection VP * KruispuntType	234	100,0%	0	0,0%	234	100,0%

Intersection VP * KruispuntType Crosstabulation

Count

		KruispuntType		Total
		Voorrang van rechts	Voorrang van rechts verhoogd	
Intersection VP	SH	84	7	91
	ST	52	19	71
	VERS	1	0	1
	VERT	64	7	71
Total		201	33	234

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)
Pearson Chi-Square	13,697[a]	3	,003	,004
Likelihood Ratio	12,832	3	,005	,004
Fisher's Exact Test	12,795			,004
N of Valid Cases	234			

a. 2 cells (25,0%) have expected count less than 5. The minimum expected count is ,14.

14.4.5 Approach behaviour VNP

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Intersection VNP * KruispuntType	234	100,0%	0	0,0%	234	100,0%

Intersection VNP * KruispuntType Crosstabulation

Count

		KruispuntType		Total
		Voorrang van rechts	Voorrang van rechts verhoogd	
Intersection VNP	SH	44	7	51
	ST	98	15	113
	VERS	1	0	1
	VERT	58	11	69
Total		201	33	234

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)
Pearson Chi-Square	,427[a]	3	,935	,900
Likelihood Ratio	,561	3	,905	,900
Fisher's Exact Test	,908			,877
N of Valid Cases	234			

a. 2 cells (25,0%) have expected count less than 5. The minimum expected count is ,14.

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Richting: **master in de verkeerskunde-verkeersveiligheid**
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