SWOV
INSTITUTE FOR ROAD SAFETY RESEARCH

RESEARCH ACTIVITIES

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## Contents:



## Editorial

**This issue of Research Activities opens with an article about the PhD thesis by SWOV researcher Saskia de Craen. Also in this issue you will find an article about SWOV Managing Director Fred Wegman's inaugural speech at Delft University of Technology.**

# The X-factor: the development of driving skills in young, novice drivers

**How does the development of driving skills contribute to the reduction of the young, novice drivers' crash rate and which relevant processes are involved? These are the questions which SWOV researcher Saskia de Craen has investigated for her PhD thesis which she successfully defended on March 16.**

Young, inexperienced drivers have a relatively high risk of being involved in a traffic crash. The crash rate is highest in the first months after having passed the driving test, and then decreases considerably during the initial two years of solo driving. The largest decrease of the crash rate occurs in the first six months, or during the first 5000 kilometres. Crash studies indicate that the decrease of the crash rate is due to growing driving experience as well as to increasing age. Saskia de Craen's PhD research has focused on the question how exactly the increase of driving experience contributes to the decrease of the crash rate.

### Calibration

There are indications that practice – making kilometres – results in different parts of the driving task to become more or less routine. However, lack of routine is only one cause of the high crash rate among young, novice drivers as the complexity of the driving task is to some extent the driver's own responsibility. Driving a car becomes easier by, for example, reducing speed or increasing headway distance. However, this strategy is only effective if a driver adequately assesses his own skills on the one hand, and recognizes the complexity of the traffic situation at that particular moment on the other. This balancing of the own driving skills against the complexity of the situation is called calibration.
An improvement of calibration skills is assumed to be an important explanation for the reduction of the crash involvement during the first years of driving. So far, however, there has been little factual support

*Continued on page 2*

**"Due to road crashes, every year the equivalent of a megalopolis disappears from the global map"**

Dmitry Medvedev, President of Russia
At the Global Ministerial Conference on Road Safety, Moscow, November 2009

QUOTE

*Continuing from page 1*

for this assumption. For this reason the PhD study focused on the role of calibration and its development in young, novice drivers. This knowledge can be an important contribution to the content and form of driver training and examination.

### Research method

For the study, approximately 500 young, inexperienced drivers were followed intensively for a period of two years after the moment they passed their driving exam. A group of drivers with a minimum of ten years of driving experience was also followed to make comparison possible. During these two years the participants filled in questionnaires and kept a driving diary. To compare the self-reported behaviour with their true driving skills a share of the drivers participated in a thirty minute on-road driving assessment in the first and the second year of the study.

### Overestimation

The results of the questionnaire show that both experienced and inexperienced drivers are less positive about their driving skills than is often thought. Young, inexperienced drivers are also very modest about their skills when they compare themselves with the 'average driver'. However, if we then look at their performance on the assessment, inexperienced drivers in particular are much more positive about their driving skills than is justified on the basis of their assessment. The difference between self-assessment and their behaviour in practice is not so large for experienced drivers. This indicates that young, inexperienced drivers are not as well-calibrated as the more experienced drivers. In addition, the PhD study indicates that overestimation of skills is connected to unsafe driving behaviour. Drivers who overestimate their driving skills, report more violations and adapt their driving speed less to the complexity of the traffic situation. However, the study did not find any improvement in the calibration of young drivers during the two years after having passed the driving examination. This leaves the question how these skills develop and whether they can be taught during the driver training.

### Assessment of driving skills

An interesting result was that the examiner's assessment of the driving test is a pretty good prediction of the (self-reported) crash rate. A strong connection was found between the examiner's assessment of safety in relation with the driving skills and the participant's number of reported crashes. 50% of the drivers with the lowest scores on the driving test in the first year reported one or more crashes during the following year. This in contrast with the drivers with higher scores of whom only 15% of reported one or more crashes during the following year.

### Driving experience

De Craen's study has shown once more that driving experience is an important factor in the decrease of the crash rate. The study also found empirical evidence for the existence of calibration and its importance for safe road use. However, it was not entirely clear how and when exactly this skill develops. Until we have a better understanding of how driving experience works and which aspects are important for the crash rate, it is best to ensure that drivers gain as much driving experience as possible, in an environment that is as safe as possible. This can, for instance, be done by accompanied driving, which is expected to become possible in the Netherlands from early 2011. Youths will then be allowed to take the driving examination at the age of 17, and when they pass they can only take part in traffic accompanied by an experienced driver until they are 18. Because driving with an experienced driver is considerably safer than solo driving, this measure allows the young driver to practise and gain experience in a relatively safe way.

### The X-factor

In her thesis Saskia de Craen concludes that, although poor calibration is often mentioned as an explanatory factor for the high crash rate of young drivers, the decrease of the crash rate during the first two years after having passed the driving examination cannot be explained univocally by improved calibration. Where driving experience is concerned, we will need to continue our search for the 'X-factor'.

*Saskia de Craen's thesis, 'The X-factor; A longitudinal study of calibration in young novice drivers', can be found on the SWOV website under Research/ Publications/SWOV dissertation series.*

# DaCoTA on its way!

**In January a start was made with the European project DaCoTA, coordinated by the Vehicle Safety Research Centre of Loughborough University in the UK. The project aims to develop and implement new approaches to collect, structure and apply policy-related road safety data.**

DaCoTA stands for 'Road safety Data Collection, Transfer and Analysis'. It is a follow-up of the SafetyNet project that developed the framework and first contents of the European Road Safety Observatory ERSO. ERSO aims to bring together a range of data and knowledge sources to support policy making for road safety at both the national and the European level. The DaCoTA project aims to develop and expand the information that is available in ERSO. DaCoTA consists of seventeen partner organisations from twelve countries and SWOV is one of them.

### Six key areas

DaCoTA focuses on six key areas of road safety data to be entered in ERSO:

- Road safety management
- In-depth safety related accident data
- Collecting and structuring data
- Accident forecasting
- e-Safety
- Normal driving behaviour

### Normal driving behaviour

SWOV is in charge of the work in the key area of normal driving behaviour. The main aim is to develop a common methodology for getting reliable, European-wide data about a wide range of safety performance indicators, such as speed, seat belt usage and the use of daytime running lights and about exposure-to-risk data. In addition, it aims to get information on near-misses and the contributing factors to complement traditional accident analyses. The basis of the common methodology is the Naturalistic Driving approach. In Naturalistic Driving studies drivers and their behaviour are studied unobtrusively during day-to-day trips by means of various sensors and possible some cameras that are placed in their own vehicles. This method offers opportunities for more, better and more efficient data collection compared to traditional ways of data collection, such as interviews, surveys, field experiments with small sample sizes, et cetera. Moreover, it allows for better comparability of data between countries as exactly the same data can be gathered for each country in the same way. Together with five partner institutes, SWOV will specify the requirements for using Naturalistic Driving studies for the indicated purposes.

### Composite road safety index

Furthermore, SWOV works on the development of a composite road safety index, taking the earlier SUNflower studies as a basis. Such an index will provide a first overview of a country's road safety status and will be able to create a sense of urgency at the highest (political) level. Underlying data and data analyses will then provide insight into the phenomena that lead to a specific country score. Within DaCoTA many partners, including SWOV, work together to collect and analyse these and other data.

*DaCoTa started in January 2010 and is planned to finish in July 2012. The project's website http://www.dacota-project.eu/ will be operational soon. ERSO can be consulted at http://ec.europa.eu/transport/road_safety/specialist/knowledge.*

# Inaugural speech Professor Wegman
# The price of compromise

**From 1972 onward there has been an impressive decrease in the number of traffic fatalities in the Netherlands and it is becoming more and more difficult to achieve further gains. Therefore the time has come for a new phase in road safety policy. These were the words of Fred Wegman, SWOV's Managing Director, in his inaugural speech as professor of road safety on January 27th at Delft University of Technology.**

Between the 1970s and the present day, the number of traffic fatalities in the Netherlands went down from more than 3000 per annum to 750. At the same time, the number of kilometres travelled saw an enormous increase. 'An impressive achievement which is also due to many measures that have been taken and since 15 years have been based on the Sustainable Safety vision. But the number of casualties can still go down further', spoke Fred Wegman.


*Professor Fred Wegman (l) and Professor Pieter van Vollenhoven, Chairman of the Dutch Safety Board (r) Foto: Leen Vlasblom*

### New phase

Now is the time for a new phase in road safety policy, according to Wegman. Policy conducted so far, seems to have reached its limits. The figures indicate that less than one percent of the kilometres travelled in the Netherlands are driven under the influence of alcohol. More than 95 percent of the drivers wear a safety belt. High risk locations hardly exist any more and road deaths at those locations have in 20 years time gone down from ten percent to less than two percent. In other words, it is becoming increasingly difficult to achieve further gains. Wegman: 'Very specific policy is now required to detect the remaining hazards, to tackle them, and to change the human behaviour that goes with them.'

### Ordinary drivers

The majority of crashes is caused by ordinary drivers' ordinary behaviour in ordinary circumstances, and not by criminal traffic behaviour of manifest offenders. 'From that perspective and because many large problems have already been dealt with, what is required now is a system-oriented approach that is aimed at the inherently hazardous character of present day road traffic. The traffic conditions need to be made such that ordinary drivers commit fewer errors and if they do, they should not be punished with serious injury', said Wegman.

### Observation of natural driving

To get a better insight in the ordinary driving behaviour of ordinary drivers and the origin of crashes, Wegman has high expectations of, among others, the so-called *Naturalistic Driving* studies. In this type of study researchers observe the ordinary, natural behaviour of drivers during their daily trips by making use of for instance video images. 'These days it is possible to observe drivers with small cameras fitted inside the vehicle for the period of, for example, a year and to store this data to analyze it later. The great advantage is that you collect factual information about road user behaviour, also in situations of near-misses and real crashes. This provides us with a wealth of information.' In the United States this approach has been used successfully for some years now. Recently a European feasibility study, PROLOGUE, was started and is coordinated by SWOV.

### The price of compromise

According to Wegman, a new phase in road safety policy asks for an integral approach of road safety, traffic flow, mobility, and environment. Road safety must explicitly be included in decisions on traffic and transport. Whenever necessary, the required knowledge and tools must be developed further. 'A sectoral road safety approach brings us increasingly less profit', says Wegman. 'At the present moment there is too much compromise where road safety is concerned. If we look at the costs, this really is surprising. In the Netherlands, the annual costs of road crashes amount to 12 billion euro. To compare: the costs of environmental consequences of traffic and transport are a maximum of 8 billion euro and those of congestion amount to a maximum of 4 billion euro. In this case the compromise has a clear price. Wegman is of the opinion that the knowledge of how much compromise is made is sometimes lacking. He advocates systematic collection of the required knowledge and making it available for those who have to make decisions about traffic and road safety.

*Prof. Fred Wegman's inaugural speech has only been published in Dutch. It can be consulted on www.swov.nl under Publicaties/Inaugurations or on www.transport.citg.tudelft.nl under Actueel/Nieuws.*

### Westminster Lecture: Putting People at the Centre

The British organization PACTS, the Parliamentary Advisory Council for Transport Safety, invited Fred Wegman to give the 20th Westminster Lecture on Transport Safety in December 2009. Under the title "Putting People at the Centre: How to Enhance Road Safety in the 21st Century" Wegman gave an account of progress in the Netherlands made by applying the Sustainable Safety vision and how further road safety improvement can be accomplished. Some of the ideas Wegman spoke about in his Westminster Lecture in London were also addressed in the inaugural speech.

*The 20th Westminster Lecture is available on the PACTS website www. pacts.org.uk under Event resources.*

# State awareness: correctly assessing one's capabilities

**State awareness is a new principle in the advanced Sustainable Safety vision. State awareness focuses on human factors rather than on road or vehicle in the prevention of crashes and/or injuries. It refers to the perceived capability in relation to the actual capability: how good a road user do you think you are, and how good are you really?**

In the recently published SWOV report *State awareness, risk awareness and calibration of road users* the theoretical concept of state awareness is discussed in more detail and placed in the context of the related concepts of risk awareness and calibration.

### Skills and fitness to drive

Road users largely differ in their capabilities to participate in traffic. Some are far more capable than others. Capabilities can be less for various reasons, related either to a lack of skills or to temporary or permanent limitations of fitness to drive. A lack of skills can, for example, be found in the group of inexperienced drivers. Many traffic situations are new for them and they do not yet know how to respond and behave safely. On the other hand, for the elderly, the fitness to drive can be suboptimal because of deteriorating cognitive functions or permanent physical disabilities, e.g. related to vision or particular motor functions. At least as important is the temporary lack of fitness to drive, e.g. due to distraction, fatigue, the use of medicines, drugs or alcohol.

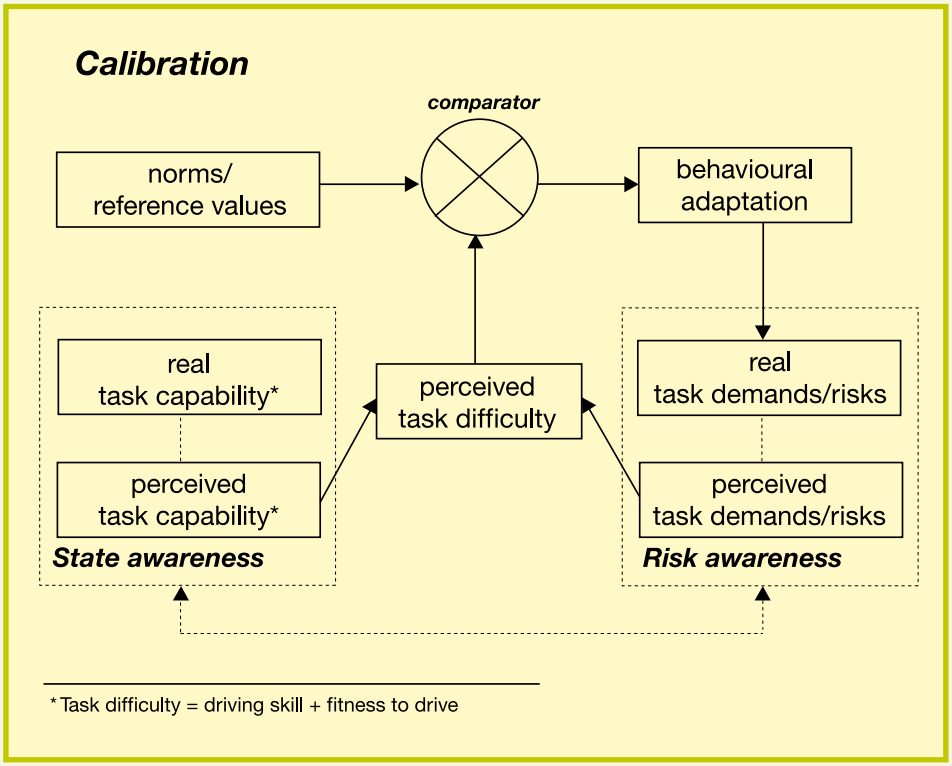



*Diagram of the relationship between state awareness, risk awareness and calibration*

### State awareness

The idea behind the concept of state awareness is that road users always need to be aware of physical or mental limitations, both the permanent ones and the temporary ones. But what to do when you come to the conclusion that you are not in perfect shape? Clearly, the ideal situation is that people decide not to participate in traffic when they are physically and mentally not sufficiently in shape. But that is not always realistic. Another option is to compensate for your limitations. One type of compensation for particularly permanent physical limitations are adaptations to the vehicle, for example an extra mirror to compensate for a reduced possibility of turning the head. Compensation is also possible at a behavioural level. For example, by reducing your speed or by avoiding a complicated intersection, the traffic task can be made less complex.

### Risk awareness and calibration

An adequate decision on when and how to compensate requires not only state awareness, but also a sound judgement on the task difficulty and the risks. When is a situation so difficult that some compensatory action is required, for example because you are not in a perfect mental or physical shape or because you do not have the required skills? This process of estimating one's own skills and capabilities and compare these with the estimated complexity of a traffic task is called calibration. Clearly, for safety reasons it is important that the estimates of both the capabilities and the task difficulty are as realistic as possible. The diagram provides a schematic summary of the fairly complex concepts of state awareness, risk awareness and calibration.

### Fatigue and dementia

Many questions remain that need to be answered to make the theoretical concept of state awareness usable for practical improvements in road safety. Relevant research questions are: To what extent are road users aware of the effects of factors that can affect their fitness to participate in traffic or the risks involved? Can road users adapt their behaviour sufficiently? What measures would be effective to make them aware of factors that affect their fitness to participate in traffic, and how can we motivate them to actually do something with this insight and act correctly? SWOV is currently looking for an answer to the first two questions. One study focuses on the temporary state of fatigue and another on the permanent or even progressive state of dementia.

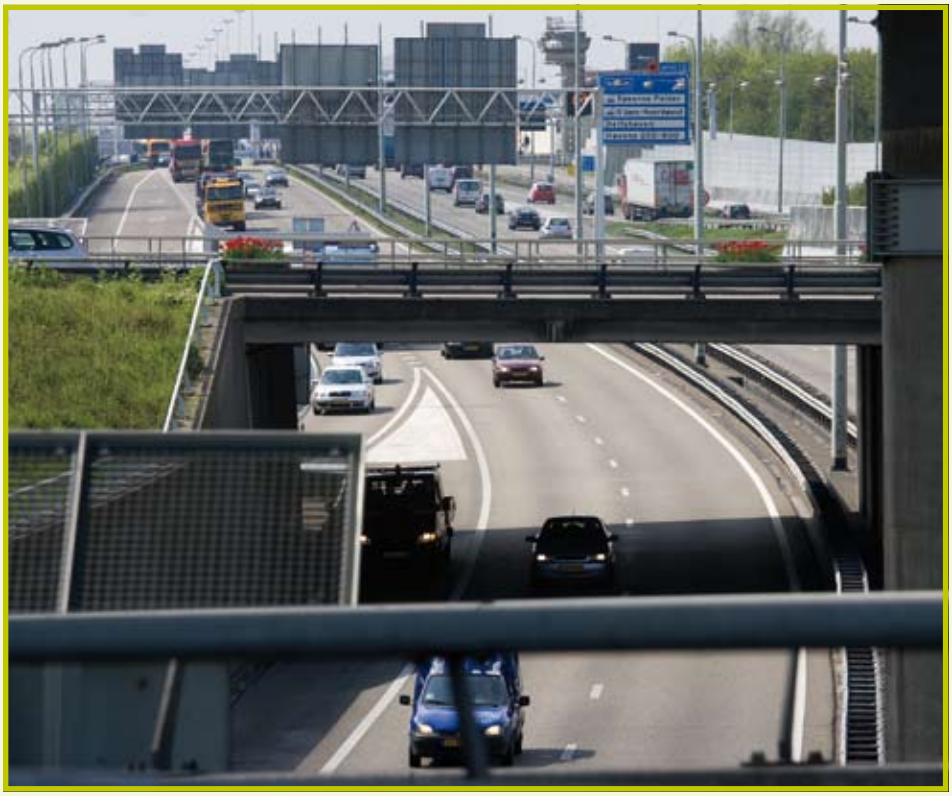
*The report 'State awareness, risk awareness and calibration of road users', report number R-2010-2, can be downloaded from the SWOV website www.swov.nl/publications. The report is in Dutch and contains an English summary. There is also an English fact sheet available on this topic through www.swov.nl/research/fact sheets.*

## SWOV joins ECTRI

SWOV has become a member of the European Conference of Transport Research Institutes (ECTRI), an international non-profit organization in the area of transport. The majority of ECTRI members are research institutes in 20 European countries. The SWOV membership is for a duration of two years, after which SWOV will evaluate the membership.

# Many ways to Rome: routes and rates

**When in the Netherlands drivers travel from A to B, they can generally choose different alternative routes. An important criterion for this choice is the length of the route in time and distance. Usually, the shorter the route is, the more attractive. According to the Sustainable Safety principles the shortest route should therefore always be the safest route.**



Road authorities have different reasons for trying to redistribute traffic across their road network. However, it is not easy to make an estimate of the safety effects in advance. Using the crash or casualty rates in preceding years is not advisable: more or less traffic using a road and changing traffic volumes on the branches of intersections have an effect on both the number of crashes and the casualty rates of that particular road or intersection. Taking a different route also affects the safety of individual road users. For example, a driver may now need to make the more complex turn left instead of the easier turn right at a busy intersection. Microsimulation models may be of assistance here.

## Microsimulation models

For an ex-ante calculation of the effects of the redistribution of traffic across the road network and consequently of the road safety effects, road authorities often make use of microsimulation techniques. Microsimulation models offer the opportunity of calculating the number of conflicts as an indicator of the safety level. A conflict is usually defined as a situation in which two vehicles approach each other and would collide if one of the vehicles, or both, did not take action by, for instance, reducing speed or by swerving.

## Simulation versus reality

In a microsimulation model such conflicts are calculated using the calculated positions and speeds of the vehicles. The important question which arises next is to what extent these calculated conflicts correspond to real conflicts or, even better, to real crashes. To investigate this, SWOV had a microsimulation model built which covers part of the coastal area of the Netherlands. Next, SWOV investigated the relation between the real numbers of crashes and the numbers of conflicts that were predicted by this model. Only intersections were investigated, because microsimulation models are well capable of simulating conflicts at intersections. Conflicts at road sections, especially the shoulder crashes, are not simulated well by the present generation of microsimulation models.

## More conflicts than crashes

The number of conflicts predicted by the model turned out to be considerably higher than the number of registered crashes. This is not surprising, seeing that a driver will generally take some kind of action when he finds himself on a colliding course with another vehicle. The model found almost 400 conflicts per intersection as an average of all the investigated intersections. In reality the same intersections had an average of 0.65 registered crashes. This means that the number of conflicts is a factor 500 higher than the number of registered crashes.

## Statistical relationship

The most important finding was that, as we hoped, there was a statistical relationship between the calculated number of conflicts and the real number of crashes. This entails that the predicted number of conflicts is a good approximation of the real number of crashes. And that makes it possible to calculate the expected safety effects of measures which lead to a different distribution of traffic across the road network. However, the relationship is not equally strong for all types of intersections. Generally, the relationship is stronger at intersections with a priority regulation than at intersections with traffic signals. As the data in the *Table* illustrates, at intersections with traffic signals there specifically is a difference between the proportion of estimated lateral conflicts and the real proportion of crashes of that type. The proportion of estimated conflicts is lower than the proportion of real crashes. The estimated proportion of rear-end collisions, on the other hand, is higher than the real proportion of rear-end crashes.

*In January 2010, this study was presented at the 89th conference of the Transport Research Board. Under the title 'Are calculated conflicts in a microsimulation model predicting the number of crashes?' the paper will be published in the 2010 Transportation Research Record.*

| Type of control | No. arms | Frontal | | Rear-end | | Lateral | |
|---|---|---|---|---|---|---|---|
| | | Conflicts [%] | Crashes [%] | Conflicts [%] | Crashes [%] | Conflicts [%] | Crashes [%] |
| Priority | 3 | 0,34 | 0,36 | 0,28 | 0,25 | 0,37 | 0,39 |
| | 4 | 0,23 | 0,26 | 0,31 | 0,22 | 0,47 | 0,52 |
| Signalized | 3 | 0,21 | 0,15 | 0,61 | 0,44 | 0,18 | 0,41 |
| | 4 | 0,05 | 0,18 | 0,74 | 0,46 | 0,20 | 0,36 |

*Collision types for conflicts and crashes (in %) on different intersection types*

# Road safety expenditure investigated

**Recent SWOV research which was carried out in cooperation with the Dutch Institute for Research on Public Expenditure found that in the year 2007, a rough estimate of between two and three billion euro was spent on road safety improvements in the Netherlands.**

How much money is spent on improving road safety? Who spend that money, and what is it spent on? Until recently, the Netherlands did not have a clear answer to these questions, nor was there a sound method to make an estimate of the road safety expenditure. Information about this expenditure is useful as an indication of the road safety efforts that are made. Furthermore, this information can be used in cost-effectiveness and cost-benefit analyses of road safety measures.


### Total expenditure

In 2007, an estimated amount of 2.3 billion euro was spent in the Netherlands on measures that are aimed at improving road safety. In addition, money was spent on measures that are not exclusively aimed at road safety improvement, but also on, for example, accessibility or the environment. These expenditures are estimated at a minimum of 0.8 billion euro.

### What on and by whom?

A large proportion of the expenditures for road safety in 2007 (1.2 billion euro) was made on vehicle safety. These consisted of expenditures by consumers and companies for safety devices like airbags, seatbelts, child seats, et cetera. Approximately 600 million euro was spent on enforcement and dealing with offences, and approximately 360 million euro went to the construction and maintenance of the infrastructure. The expenditures for public information and education (exclusive of driver training) were relatively low (approximately 70 million euro), as were expenditures for research, advice and policy making (approximately 13 million euro). With approximately 1 billion euro, the major part of road safety expenditure is made by national and local governments; important items are enforcement and infrastructure. Consumers were responsible for expenditures amounting to 900 million euro and companies spent 400 million euro; these expenditures were mainly for vehicle safety.

| Expenditures on: | Amount |
|---|---|
| Infrastructure | |
| - National government | 110 |
| - Local governments | 250 |
| Public information and education | 70 |
| Enforcement | 600 |
| Vehicle safety | 1,200 |
| Policy, research and advice | |
| - National government | 13 |
| - Local governments | p.m. |
| Other (e.g. safety culture) | p.m. |
| **Total** | **2,300** |

*Expenditures exclusively for road safety improvement*

### Costs and benefits

In 2007, the costs as a consequence of road traffic crashes in the Netherlands amounted to approximately 12 billion euro. For a correct assessment of whether measures return more (in terms of savings on the costs of crashes) than they cost themselves, performing cost-benefit analyses (CBA) is required. CBAs in the Netherlands and in other countries indeed show frequently that the benefits of road safety measures are higher than the costs. A recent CBA of Sustainable Safety measures which were taken during the period 1998-2007, for example, indicates that the benefits were higher than the costs with a factor of 4. This CBA is discussed in SWOV report R-2009-14, *Ten years of Sustainable Safety*.

### Method and data

Neither the Netherlands, nor other countries, have a standard method or guidelines for research into the expenditure for road safety. SWOV recommends to develop an internationally accepted 'standard' for research to estimate road safety expenditures. The results of SWOV studies are based on different methods or is taken from data sources that are used in the research of expenditure for other policy areas. For example, annual accounts and budgets of organizations, statistics, quotations, but also expert assessments of expenditures were used to come to an estimate. A point of special interest here is that the reliability is different for each type of data source. Some of the higher expenditures, especially those for vehicle safety, infrastructure under authority of local governments, and regular enforcement by the police, are (partly) based on expert assessments or on older studies. Therefore, these expenditures have been determined less accurately and we recommend further investigation of these expenditures. A second recommendation is to make future updates of the (other) data. This will show the development over time of the expenditures and the efforts to improve road safety.

*SWOV reports R-2009-17 'Expenditure for road safety; An estimate for 2007' and R-2009-14 'Ten years of Sustainable Safety; Road safety assessment 1998-2007' can both be consulted on www.swov.nl under Research/Publications. Both reports are in Dutch, but have an English summary.*

# Bicycle helmet reduces risk of brain damage

**Worldwide, the Netherlands is one of the countries with the most cyclists and at the same time it is a country where bicycle helmets are barely used; this despite the fact that most research indicates that bicycle helmets are very effective in the prevention of serious head and brain injury. This is one of the findings in a recent SWOV fact sheet about this issue.**

The bicycle is a very popular means of transport in the Netherlands and is used for, among others, commuter traffic, shopping, carrying children, and recreation. However, cycling has a relatively high risk. Still, very few cyclists in the Netherlands wear a bicycle helmet.

### Head and brain injury

Each year, approximately 67,000 casualties from bicycle crashes in the Netherlands get medical help in an accident and emergency department (A&E), 8,000 cyclists are admitted to hospital, and there are some 200 fatalities as a consequence of bicycle crashes. More than 25% of the inpatients are diagnosed with head or brain injury. This amounts to an annual total of more than 2,000 casualties. Head and brain injury is relatively most frequent with children and teenagers. More than 75% of these injuries are the consequence of a single bicycle or a bicycle-bicycle crash; for children under 8 years old the percentage even reaches 90%.

### Bicycle helmet

The bicycle helmet is intended to reduce the risk of head and brain injury. In a fall, the helmet absorbs the impact energy. In addition, the strength of the impact is spread over a larger area. For best possible effect it is important that the helmet is a good fit and is fastened correctly. It is also important that the helmet is undamaged and has not been subjected to a previous impact.

### Effect

A good indication of the (maximum) effect of a bicycle helmet can be obtained with case-control studies. This type of study compares the injuries of bicycle casualties who did wear a helmet with the injuries of bicycle casualties who did not. Corrections are made for differences in cyclist characteristics like gender and age and for the crash conditions. These studies indicate that the risk of head and brain injury decreases with approximately 45% when a good bicycle helmet is worn correctly.

### Effective device

The bicycle helmet does not prevent crashes, but is aimed at reducing the injury severity in crashes. To prevent crashes in which bicycles are involved many measures have been taken in the Netherlands and are still being taken. Examples are the construction of bicycle lanes and not allowing mopeds on bicycle lanes. The idea that all bicycle crashes can be prevented is not realistic. Especially bicycle-bicycle crashes and single vehicle crashes are hard to prevent. Unfortunately crash

data show that three quarters of the head and brain injury (90% even for young children) are the consequence of these crash types. Especially in those cases a bicycle helmet can limit the consequences of a crash. In its fact sheet SWOV comes to the conclusion that a bicycle helmet is an effective device to protect a cyclist from head and brain injury.

*The fact sheet 'Bicycle helmets' contains elaborate information on this subject and is to be found on www.swov.nl under Research/Fact sheets.*

# SARTRE 4 has started

At the end of January, the fourth SARTRE project had its official start in Tallinn, Estonia. The purpose of the SARTRE study is to obtain a broad picture of the road user's opinions in the area of road safety and their development over a period of time. The study is subsidized by the European Commission.

In the previous SARTRE projects approximately 1000 driving licence holders in each of the participating European countries were asked for their opinions on a large number of traffic issues like speed, driving while under the influence, and road safety measures. This time, motorcyclists and non-drivers will also be involved in SARTRE at the request of the EU.

Previous SARTRE studies were carried out in 1991, 1996 and 2002. SARTRE 4 will be executed in 2010 and 22 countries will participate.


## Colophon

Research Activities is published three times a year by SWOV Institute for Road Safety Research in the Netherlands. Research Activities contains articles about road safety research and scientific projects carried out by SWOV and by others.

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The SWOV website contains a wealth of information about a variety of road safety topics. SWOV fact sheets are all available in English. The library has extensive possibilities to search for international road safety literature and publications.

# New factsheets

*In the past period some new SWOV fact sheets have been published and some have been thoroughly updated. Some of these fact sheets are introduced below.*

### Subjective safety in traffic

In recent years, subjective safety in traffic has gained a renewed interest in the Netherlands, not only with regard to (municipal) policy, but also regarding traffic law enforcement and traffic education. This fact sheet defines the term subjective safety in traffic. We also describe the relationship between feeling unsafe and the risk of being involved in a crash. The term subjective safety in traffic is closely related to many other terms such as risk perception, risk awareness, and risk acceptance. Some of these terms will be dealt with in brief.

### Mobility on Dutch roads

Almost everyone participates in traffic on a daily basis. The distances travelled, the reason why

and the means of transport are the subject of mobility research. Given that mobility has a major influence on the number of road crashes and therefore on the number of road casualties, mobility is an important factor in road safety research. The fact sheet *Mobility on Dutch roads* discusses the developments in mobility in the Netherlands and factors of influence in that regard. In addition, a brief discussion is devoted to how and what mobility data is collected in the Netherlands.

### Speed cameras: how they work and what effect they have

Speed cameras are cameras which register speeding offences and the identity of vehicle owners based on the vehicle registration number. Speed cameras can be installed in pole-mounted roadside cases (fixed position speed cameras), or in police cars (mobile speed cameras). They can also be mounted above the road or on tripods by the roadside. Speed cameras can perform measurements at a fixed position or average speed measurements. Cameras with Automatic Number Plate Recognition (ANPR) are used for average speed measurements. The fact sheet *Speed cameras: how they work and what effect they have* focuses on fixed and mobile speed cameras taking fixed-speed measurements.

# Publications

Below is a selection of reports that have recently been published by SWOV. Most SWOV reports are written in Dutch, but they all include an English summary. Reports that were published in or after the year 2000 can be found on our website (www.swov.nl) and may be downloaded free of charge. Fact sheets are also placed on our website under Research.

### VVR-GIS 3.0; Description and justification of the calculation kernel

M. Reurings, W. Wijnen, M. Vis. R-2009-10. 56 + 35 pp. € 15.- (Dutch).
The purpose of the software module VVR-GIS 3.0 is to assist road authorities and policy makers in drawing up and substantiating traffic and transport plans from a road safety perspective. With VVR-GIS 3.0 it is possible to estimate the effects of regional and local road safety measures. These estimates can then be compared among themselves or with road safety targets. This can be the basis on which a region can determine whether a plan is feasible and whether it meets the regional target. VVR-GIS 3.0 also performs a cost-benefit calculation.

### Expenditure for road safety; An estimate for 2007

W. Wijnen, N.E. Stroeker. R-2009-17. 76 + 2 pp. € 12.50 (Dutch).
Improving road safety means that money needs to be spent on the prevention of road crashes and injuries. This expenditure indicates how many efforts are spent on improving road safety. In addition, information about expenditure on road safety is required for cost-effectiveness and cost-benefit analyses and for comparison with the expenditure in other policy areas. Because so far no complete and current information has been available, this study is a first attempt to determine how much money is annually spent on road safety, by which parties, and which means or methods of prevention the money is spent on.

### State awareness, risk awareness of and calibration by road users: A literature study

R. Davidse, W. Vlakveld, M. Doumen & S. de Craen, R-2010-02. 84 pp. € 15.- (Dutch) .
In addition to the three original principles for a sustainably safe traffic system, two new principles were introduced in Advancing Sustainable Safety in 2005: (social) forgivingness and state awareness. In the following years, these principles have been defined in more detail. This report provides a comprehensive introduction to the term state awareness and the role it plays in safe traffic participation.

### The X-factor; A longitudinal study of calibration in young novice drivers

S. de Craen. SWOV dissertation series, SWOV, Leidschendam (English).
The PhD thesis reports on young novice drivers and calibration, the process of balancing task demands and capabilities. The research focussed on three questions: To what extent is poor calibration a contributing factor in the high crash rate of young novice drivers; How can calibration be measured; How does calibration develop over time?

### Fact sheets

*New*
- Mobility on Dutch roads
- Road crash casualties in the Netherlands
- Speed cameras: how they work and what effect they have
- Subjective safety in traffic
- Risk in traffic

*Updated*
- Network management and Sustainable Safety
- Road crash costs
- Road safety effect of obligatory eye test for 45 year olds and older
- The valuation of human losses of road deaths
- Vulnerable road users

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