

Victim assistance by helicopter results in less deaths



Using helicopter trauma teams for urgent medical treatment in the whole of the Netherlands can lead annually to 20 to 40 less fatalities as a result of an accident. The contribution of helicopter trauma teams can mainly be expressed in the reduction of mortality. Once a patient has reached a hospital, the chances of recovery of the quality of life are independent of the commitment of the trauma team. The costs involved in using helicopter trauma teams lie within the range of costs regarded as acceptable for all sorts of health provisions.

These conclusions are the result of a study commissioned by the National Health Insurance Council and carried out by SWOV together with Centre for Health Policy and Law (CGBR) of the Erasmus University Rotterdam. The report was presented and explained at a press conference on 17th July 1998.

Since 1st May 1995, an experiment is being conducted in the West of the Netherlands (where the population density is by far the highest). A helicopter trauma team is available 12 hours a day to bring aid to seriously injured accident victims. The experiment is being carried out by the Royal Dutch Tourist Association ANWB and the Amsterdam Free University Teaching Hospital. A trauma team consisting of a doctor, a nurse, and a pilot is being used.

Purpose of the study

The aim of the study was to evaluate the effect of the medical assistance given to the patient by the helicopter

trauma team. Also studied was the cost-effectiveness of the extra costs when compared with the costs of the traditional medical aid by ambulance. Finally, which conclusions could be drawn for extending helicopter trauma teams to the whole Netherlands.

Polytrauma patients

For the purposes of the study information was gathered about polytrauma patients who were victims of an accident between

May 1995 and December 1996. Additional information was gathered for the months of January to March 1997. Polytrauma patients are accident victims with multiple injuries; separately or together they are life threatening.

There were three groups in those admitted to hospital:

- 339 victims had injuries that did not need a helicopter to prevent death;
- 97 victims were so badly injured that helicopter aid would not have prevented death;
- 81 victims, for whom helicopter aid was very effective.

This result contradicts the idea that helicopter aid is especially effective for the most seriously injured victims.

Effect

A major methodological difficulty was caused by the selective use of the team for the more serious patients. A dedicated severity measure was developed in order to control for this severity.

In order to calculate how many deaths were prevented by actually using the helicopter, two models were used. The 'minimum model', in which the most conservative estimate was calculated, and the 'maximum' model.

In the minimal model it was calculated that during the test

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period, 6-7 extra patients would have died if the helicopter had not been used. This means 11% more deaths without using the trauma team. The maximal model resulted in 11-12 lives being saved; i.e. 17% less deaths.

Very effective for road accident victims

Those actually receiving helicopter aid were divided between road accident victims and victims of all other accidents. The positive effect was only found for road accident victims. For this group the helicopter was extremely effective.

Quality of life

432 patients were interviewed about their quality of life after the accident. A comparison was made between patients who had received helicopter aid and those with only ambulance aid. The general conclusion is that there was no significant difference. Once a patient has reached a hospital, the chances of recovery of the quality of life are the same for the helicopter group and for the control group. The contribution of helicopter trauma teams can mainly be expressed in the reduction of mortality.



S i e m

Oppe is 60 years old and graduated in Psychology at the University of Leyden and worked there from 1969 till 1972 on the area of experimental psychology. Since 1972 he has been working at SWOV. He is a research manager. His main fields of interests are: research methods and statistical analysis for traffic safety and mathematical modelling in general, and of traffic behaviour in particular.



Costs

The costs of one trauma helicopter was Dfl. 4.7 million (approximately \$2.4 million) per annum when in use 12 hours a day. These costs can be broken down as follows:

1.8 million medical team
1.4 million helicopter material costs
0.7 million insurance
0.6 million salary costs of pilots
0.2 million landing fees etc.

In order to calculate the costs for national application, the 12 hour variant was used for 4-5 teams; they totalled Dfl. 22 million. If their use is extended to 14 or 24 hours, the costs are then, in turn, 23.7 and 34.9 million guilders. The extra costs of helicopter trauma teams form a considerable part of the total costs now spent on aid for accident victims.

The costs of a trauma team sent by helicopter were compared with the costs of this aid by ambulance, assuming the same amount of readiness. The result is that the costs of aid by ambulance is a multiple of the costs of aid by helicopter.

This is because the costs of a trauma team are very high. In addition, when using helicopters, far fewer trauma teams are needed than in aid by ambulance.

The costs per polytrauma patient incurred by a hospital amount to an average of Dfl. 38,000. There is no

relationship between the costs per patient and whether or not a helicopter trauma team has been used. In this sense, the teams do not save money. Extra costs are made in the case of those patients whose lives have been saved by the trauma teams.

Costs per year of life saved

The costs of each year of life saved (by using helicopter trauma teams) is estimated at between Dfl. 33,000 and 63,000. This depends a) on the uncertainty concerning the actual number of polytrauma patients in the Netherlands, and b) on the probability of the helicopter trauma teams treating the victim. The costs per quality-corrected year of life saved are estimated between Dfl. 43,000 and 83,000. These costs lie within the range of costs regarded as acceptable for all sorts of health provisions.

The effect of introducing a helicopter trauma team to assist accident victims

A summary with conclusions and recommendations for further study

Dr. F.H. de Charro (CGBR) & S. Oppe (SWOV).

ISBN: 90-801008-8-9. 13 pp. Dfl. 15,-.

Policy information on road safety programmes in the Netherlands: to measure is to know

*Paper presented at the Conference on 'Russian Federal Targeted Road Safety Programme 1996-98', Sochi, Russia, May 28-29, 1997
Leonid Braimaister & Fred Wegman.
D-98-1. 24 pp. Dfl. 17.50.
(In English)*

The purpose of this paper is to elucidate Dutch policy in the field of road safety programmes. A lot of knowledge accumulated in the Netherlands could be very useful for the Russian situation as well. In view of the lack of road safety data and research from Russia in international issues, attention is focused in particular on the information aspect of road safety programmes.

European cooperation in road safety research

*Contribution to the 3rd ADAC/BAST Symposium 'Driving Safely in Europe', Baden-Baden, Germany, June 11-12, 1997
Matthijs J. Koornstra.
D-98-2. 20 pp. Dfl. 15.-.
(in English)*

In this report an overview of the cooperative activities of FERSI (representing fourteen European national road safety institutes with

respect to the 4th Research Framework Programme of the European Union (EU) and other by the EU-commissioned research is given. A resume of the mission of FERSI in the preparation of the 5th Research Framework Programme, in which a widening of cooperation with the research centres in the Central and Eastern European countries (CEE) is foreseen, is also given. Moreover, the possible contribution of cooperative research to an enhanced road safety policy of the EU is highlighted.

The need for European cooperation in safety research is discussed by comparing road safety levels of the countries of the EU with each other; and the EU with that of the USA, Australia, and Japan. European cooperation in innovative safety research and Europe-wide shared views on validated road safety measures can contribute to the effectiveness of national and European road safety policies.

The speeding behaviour of moped and low-speed moped riders

*J.A.G. Mulder.
D-98-4. 24 pp. Dfl. 17.50.
(in Dutch)*

In 1992, SWOV conducted a limited study into the speeding behaviour of moped and low-speed moped riders. This study showed that the riders of both types of two-wheeled vehicles considerably exceeded the speed limits applicable to their type of vehicles. Since that time, agreements have been made between the sector in question and the Ministry of Transport and Public Works. These were intended to reduce the severity of the speeding behaviour exhibited by these road users, especially the low-speed moped riders. This small-scale study was intended to consider whether those agreements actually had an effect.

The study's findings indicate that both the moped and the low-

speed moped riders are exceeding the speed limits applicable to their vehicles to an even greater extent than was the case in 1992.

The agreements made, but more particularly their enforcement, appear not to have achieved the desired results.

Sustainable road safety in the Netherlands; An overview

*Contribution to the conference 'Traffic Safety in the Future', Aalborg, Denmark, August 24-25, 1998
Fred Wegman.
D-98-6. 22 pp. Dfl. 17.50.
(In English)*

The Dutch Government has set quantitative targets for road safety. Various indicators suggest that road safety in the Netherlands is not showing enough significant signs of improvement and it is no longer certain that the targets will be met, even if the traditional policy continued to be followed.

New, innovative road safety policy is required and, in 1990, SWOV was invited by the Dutch Government to develop a scientifically supported, long term concept of a considerably safer road traffic system.

In such a system the road infrastructure has been adapted to the limitations of human capacity through proper road design and vehicles are technically equipped to simplify driving and to give all possible protection to vulnerable human beings. Road users have been properly educated, informed, and, where necessary, deterred from undesirable or dangerous behaviour. Man should be the reference standard and road safety problems should be tackled at its roots. Safety principles were identified as keys to arrive at a sustainably safe system (functional use of the road network, homogeneous use and predictable use). Based on these principles as a basically theoretical perspective, the concept has been worked out.



The concept of sustainable road safety has been adopted by the Dutch Government as an official part of its policy. Many other stakeholders supported the concept, although some doubts have been heard about financing the implementation and about possible side-effects. Furthermore, some differences in how to translate the vision practically could be detected between road safety professionals.

Several major developments took place since the concept was launched. A special Steering Committee prepared a so-called Start-up Programme covering the first phase of implementation. Another important step was to implement different large scale demonstration projects in the Netherlands in order to enlarge our practical knowledge and experience on how sustainable road safety may be put into practice. These projects are key elements in a large scale research project covering many aspects of sustainable safety.

An 'Information Centre' has been established for disseminating knowledge and expertise. Dutch road design guidelines are connected to sustainable safety and to design practices of town planners. Finally, attempts are made to incorporate the vision on sustainable safety in transport and infrastructure policy.

Evaluation of the moped theory certificate

An evaluation of the short-term results of the introduction of the moped theory certificate

D.A.M. Twisk, F.D. Bijleveld & C.M. Gundy
R-98-5. 93 pp. Dfl. 30,-
(in Dutch)

Since 1996, every mopedist in the Netherlands has been required to possess a theory certificate. This measure is intended to better prepare riders of mopeds and low-speed mopeds (especially the younger ones) to participate in traffic.

An average of 6,500 theory

exams for prospective mopedists are administered every month. As expected, the introduction of the theory certificate has led to a considerable improvement in knowledge of, and insight into, traffic. During the period from June 1996 to May 1997, there has been a general improvement in the percentages of those who have passed the exams. An average of 47% of the exam candidates are passing the exams.

Candidates for the moped exams are primarily young people who have just had their 16th birthday and who are often involved in lower level courses of secondary education.

Of all the exam candidates, 25 to 29% have taken a theory course. Those with the lowest level of secondary education are more likely (38%) to have taken these theory courses; among those involved in pre-university education and higher general secondary education, only 17% have taken a theory course. The most frequently mentioned reason for taking a theory course is the expectation that it will then be easier to pass the exam; safety considerations play absolutely no role.

Sixty percent of the candidates arriving at the exam are coming for the first time. Candidates who have taken a theory course have a 14% better chance of passing the test than candidates who have not taken such a course. The outcome of the moped exams depends partially on a general factor: the level of education being followed by the candidate. Having taken a theory course, however, provides all groups of students - regardless of the number of times they have taken the exam, their gender, and their level of education - with added value. The current theory course does not appear to fit the abilities or fill the needs of students following lower levels of secondary education.

The contribution of licensing measures to the safety of novice drivers in Germany

D.A.M. Twisk
R-98-6. 63 pp. Dfl. 25,-
(in English)

SWOV was commissioned by BASt (Bundesanstalt für Strassenwesen) to review the literature on research into the effectiveness of post-qualification restrictive measures for novice drivers, and the effectiveness of accompanied driving, both as part of the driver training and as part of post-qualification restrictions. Despite the introduction of a point demerit system for young drivers and an extensive driver instruction, the accident involvement of young German drivers is still unacceptably high, and therefore further measures are called for. Measures that have recently raised much interest in Germany are post-qualification restrictions and accompanied driving.

Important issues in the German discussions are:

- how effective have several restrictions shown to be?
- what safety gains are to be expected if such measures are introduced in Germany?
- will these measures be acceptable to the public in general and the novice drivers in particular?
- and what kind of side effects can be expected?



The study gives a short description of the problems associated with young drivers and provides a theoretical framework on which the safety potential of measures such as post-licence restrictions and accompanied driving can be assessed. The study deals with four systems: driving licence on probation, driving licence with restrictions only, two phase driving licences, and accompanied driving. Of each system, first the prime features are presented, followed by a discussion as to which contributing factors to young driver accident involvement are influenced, and a discussion of the evaluation results of implemented systems.

Further investigation into exit constructions and major junctions

Recommendations for different types of junctions of residential roads with access roads

T. Hummel.

R-98-10. 22 pp. Dfl. 17,50.

(In Dutch)

An important starting point for obtaining a sustainably safe traffic system is the use of a consistent design for each road category. Transitions between the road categories as well as the right-of-way regulations used at these locations must be designed in a consistent (and therefore predictable) manner. For the manual to be used during the first phase of the Start-up Programme Sustainably Safe, a question that required examination was: What can be recommended for the junction of a residential road with an access road: a priority junction or an exit construction?

A previous study had noted that the use of an exit construction appeared to have a beneficial effect on both the number of road traffic accidents and the number of road casualties. An exception to this beneficial effect, however, was found at priority junctions which had been replaced by an exit construction. Although the number of road traffic accidents here had decreased,

the number of road casualties had increased. This exception makes it difficult to make a general recommendation when it comes to choosing between a major junction and an exit construction. For these reasons, the current study sought an explanation for this exception.

The study proved that the exception was caused by a number of locations with unfavourable designs for exit constructions in the group of locations where a priority junction was replaced by an exit construction. After correction for those design variations, it was concluded that there are no substantial differences in road safety between a priority junction and an exit construction. When making a choice between these junction solutions, arguments other than road traffic safety will thus be decisive factors.

Target group segmentation

Comparing how companies and those dealing with road safety policy approach their target groups

P.C. Noordzij.

R-98-15. 38 pp. Dfl. 20,-.

(In Dutch)

This report compares how companies and those dealing with road safety policy determine their target groups. The objective of this comparison is to examine whether road safety policy can be improved by utilising practical knowledge gained in companies. Specifically, this report focuses on target group segmentation which, in companies, is a marketing component.

According to marketing principles, what a company offers to a group of customers consists of a mix (the marketing mix) composed of the Four Ps: product, price, place (of distribution) and promotion. All four of these elements must be geared to a group of customers in order to increase the chances that the product will be purchased.

Marketing principles can also be applied to road safety (road safety being the 'product' in this case).

but this is rarely done. When implementing the principles, certain details must be kept in mind, namely that road users are not very concerned with safety and that few possibilities exist for making this 'product' attractive to the target group.

Road safety audits in the Netherlands

Backgrounds of the development of a tentative protocol and recommendations for implementation, management and evaluation

I.N.L.G. van Schagen.

R-98-8. 32 pp. Dfl. 20,-.

(In Dutch)

Making a start towards an audit protocol

I.N.L.G. van Schagen.

R-98-19. 30 pp. Dfl. 17,50.

(In Dutch)

One of the supplementary measures in the Start-up Programme Sustainably Safe is the development of a road safety audit: a formal, standard procedure in the different stadia of design and construction of the road infrastructure, in order to come to an independent judgement of the possible consequences of the design for the road safety. The audit is intended to signal and to indicate how potential road safety problems can be avoided during the design phase and the construction period. In this manner accidents can be prevented and the chances reduced that a dangerous situation is discovered afterwards.

The Netherlands Transport Research Centre (AVV) has commissioned SWOV to set up an audit protocol that is suitable in practice and is assured of a wide acceptance among the road authorities. The tentative protocol is extensively described in SWOV report R-98-19. The report contains a general explanation of road safety audits that includes a description of the audits as well as methods and reasons for conducting them. It also contains a proposal for an audit

protocol which would describe the various steps to be followed by the road authority and the auditor. This protocol would form the basis for actually applying the auditing instrument.

The protocol presented is largely based on the guidelines and experiences of countries where audits have been implemented for some time now such as Great Britain, Denmark, Australia, and New Zealand. An attempt is being made to adapt the protocol as closely as possible to the Dutch situation.

Report R-98-8 describes the background that has led to the tentative protocol and it gives a summary of the protocol itself. Furthermore the most important results are given of a small-scale case study of the practical application of the protocol, that was carried out in the framework of the project by the company Grontmij, Traffic and Infrastructure Division.

Finally, recommendations on the implementation, the management, and the evaluation of the instrument are given.

Drug and alcohol use by motorists in the Netherlands

A pilot study carried out in the weekend nights in the Autumn of 1997
M.P.M. Mathijssen
R-98-14, 65 pp. Dfl. 25,-
(in Dutch)

In the Autumn of 1997, SWOV, in co-operation with Traffic Test and Deltalab, carried out a pilot study investigating the drug and alcohol use of motorists in the Netherlands.

The main objective of the study was to obtain insight into the possibilities for reliably determining the use of drugs among motorists. In particular, the nature and volume of non-response are determining factors. A total of 402 motorists were asked to participate in the study. Of them, 47 (11.7%) refused. From 62 subjects (15.4%), it was not possible to obtain a urine sample although these subjects were inter-

viewed and underwent a sweat test.

A second objective of the study was to obtain indications about the reliability and practical usefulness of testers for the rapid screening of drug use. Sweat samples from the armpit were taken from motorists who had been stopped at random along the road. The sweat of all co-operating motorists was tested by means of a Drugwipe® for the detection of amphetamines. Motorists suspected of the use of cannabis were also tested by means of a Drugwipe® for the detection of this substance. Subsequently, urine samples were taken to be tested afterwards by means of the Triage® and Accusign® systems for the detection of amphetamines, methamphetamines, cannabis, cocaine, opiates, methadone, benzodiazepines, barbiturates, and tricyclic antidepressives. Confirmative analyses were conducted by Deltalab with GC-MS, or, in the case of cannabis, with HPLC-DAD.

The Drugwipe® for the rapid detection of amphetamines in sweat turned out to be an extremely insensitive test; none of the subjects who tested positive as a result of the urine analysis were detected with the Drugwipe®. Based on research results, no clear conclusions could be drawn regarding the reliability of the Drugwipe® for the detection of cannabis. Triage® and Accusign®, however, do appear to be reasonably reliable screeners.

The third objective of the study was to obtain indications about the degree to which motorists are driving under the influence of drugs, whether or not in combination with alcohol.

The outcomes of the pilot study indicate that illegal drug use is no longer a marginal phenomenon among those making use of Dutch roads. Among the motorists tested, 8.1% tested positive for taking drugs, with five out of six cases involving illegal drugs. Especially among male drivers in the age of 18 to 25,

the prevalence of illegal drugs was found to be high: 17.5% tested positive. The vast majority of these involved cannabis, while an occasional subject also tested positive for cocaine or amphetamine. SWOV recommends a roadside survey based on a representative sample of motorists.

Norms and requirements for bicycle lighting, bicycle seats and front reflectors

A proposal to improve the requirements for bicycle lighting and bicycle accessories and an opinion poll among the bicycle branch and its interest groups
C.C. Schoon & dr. P.H. Polak
R-98-25, 53pp. Dfl. 22,50
(in Dutch)

SWOV was asked to determine what activities could be undertaken to be able to introduce quality requirements for newly marketed bicycles within a period of five years. With regard to any quality requirements which might be instituted, insight into cost effectiveness was needed.

A previous SWOV study conducted in 1996 showed that the lighting on 45% of the bicycles being used during the hours of darkness was not in working order. A common excuse for the fact that the front and back lights were not working properly was the poor quality of the bicycle lights.

The study consisted of the following components: an inventory of standards and requirements for bicycle lighting and bicycle child seats (commissioned by SWOV and conducted by the TNO Road-Vehicles Research Institute), an inventory of practical data, a written survey conducted among the bicycle branch and its interest groups, and an accident analysis. The inventory of practical data was intended to determine the availability of approved or unapproved bicycle parts. Currently, products without a required mark of quality can be sold but cannot be used on the public

Lack of safety exhibited by young car drivers during the 1985-1994 period

The accident involvement of young car drivers during the 1985-1994 period
D.A.M. Twisk.

R-98-18. 52 pp. Dfl. 22,50.
(In Dutch)

This study examines how the accident involvement of young car drivers in the Netherlands developed during the 1985-1994 period.

As of 1994, young drivers were still a risk group; their involvement in serious accidents for every kilometre they drove was shown to be relatively high. This applied especially to young male drivers.

Nevertheless, the absolute number of young drivers involved in serious accidents during these ten years decreased considerably.

Among young men, this number was reduced by almost 50%. About one third of this reduction was the result of increased safety exhibited by this group; the majority (two thirds) of the reduction can be attributed to a sharp decrease in their number of kilometres driven.

The difference in risk (accident involvement per kilometre driven) between men and women remained fairly constant over this ten-year period. During the 1990-1992 period, a sharp reduction occurred in the number of kilometres driven by young car drivers. Car ownership seemed to be the greatest influence on the development of kilometres driven. During the ten years studied, the possession of driving licenses among young men decreased and remained almost unchanged among young women.

It was concluded that the number of young drivers involved in serious accidents in the 1985-1994 period decreased considerably, chiefly as a result of a sharp decrease in the number of kilometres driven. The decline in kilometres driven by this group was partially a result of the Student Pass for public transport being introduced which led to less students owning their own car.

It was also partially a result of a social process in which less young non-students owned their own car and also less frequently appeared to have a driving licence.

Follow-up study into accidents involving motorcyclists

A step-by-step, in-depth study
A.A. Vis.

R-98-22. 109 pp. Dfl. 35,-
(In Dutch)

In 1995 SWOV conducted a study which based its findings on existing data and in-depth studies of almost 1,000 accidents involving motorcyclists in order to offer possibilities for creating policies or measures to make the riding of motorcycles safer.

The findings have led to results that include the development of resolutions for measures regarding:

- the visibility, perceptibility and recognisability of motorcycles;
- combatting unsafe behaviour, improving how emergency manoeuvres are performed;
- improving both the road education courses required for obtaining a driving licence as well as any supplementary driver training;
- and improving ways to protect motorcyclists from injury.

The findings also showed, however, the need for additional exploration of the material and for comparing the data from the accident study with corresponding data involving the entire population of Dutch motorcyclists. These additional research activities are dealt with in this follow up study.

Traffic enforcement in the Province of Friesland for 1998-2001

A trial measuring and evaluation project
Dr. Ch. Goldenbeld.

R-98-26. 72 pp. Dfl. 32,50.
(In Dutch)

An ambitious traffic enforcement project was launched in the Province of Friesland in February 1998. This project includes an intensification of enforcement of speeding on

roads. This is an undesirable situation, but what makes it worse is that this information is not passed on to the customer. Also found in shops were products which had a mark of quality but which nevertheless did not satisfy the standards.

The survey with questionnaires showed that there is widespread support for arriving at standards and legal requirements and for checking products having a required mark of quality. Most respondents were in favour of banning the sale of products not having the legally required mark of quality.

From the accident analysis it was determined that if every bicycle were equipped with a front reflector then the annual numbers of deaths, injuries requiring hospital care, and other injuries could be reduced by more than 400. In terms of costs and benefits, the required mounting of a front reflector on new bicycles scored positively. A front reflector assures that approaching bicycle traffic is more visible at night.



provincial roads as well as intensified enforcement of seat belt use and driving while intoxicated. SWOV drew up the starting plans for this project and is currently evaluating progress and results of the project. This report recounts a preliminary study that was conducted to determine the kind of data available or needed to conduct the evaluation.

Passive safety of passenger cars: Part 1

Rear-end collisions and neck injuries
J.P.M. Tromp
R-98-27. 53 pp. Dfl. 22.50.
(In Dutch)

The number of rear-end and multiple collisions involving passenger cars and delivery vans has increased dramatically in recent years. This study analysed the extent, nature, and development of rear-end collisions. The percentage of rear-end collisions occurring on motorways is high: about 30% of all accidents on this type of road. There is a strong relationship between this type of accident and the development of traffic jams. On other roads, the percentage of these types of accidents is lower, but the number of them is greater than on motorways.

Women are more likely to be involved in rear-end collisions than men. This seems to be explained by the greater risk for accidents inside urban areas where women make relatively more trips. The greater risk for women to suffer injury can be

linked to anatomical characteristics of the neck; women are more vulnerable in this regard than are men.

Furthermore, since women are more likely to drive smaller cars than are men, they have a greater risk of becoming a casualty than do men.

It was also shown that of the casualties suffering neck injuries, only a small percentage (3%) had been admitted to hospital as opposed to an average 14% for all road casualties. This indicates the relatively low degree of life-threatening risk involved in this type of injury.

The number of casualties suffering whiplash as a result of road accidents is estimated to range between 14,000 and 26,000 (the higher figure including not only whiplash but other types of neck injuries as well).

Traffic engineering measures intended to prevent rear-end collisions include: traffic jam detection and control, traffic management and supervision systems, and maintaining sufficient sight distances. To limit the consequences of rear-end collisions, the design of the crush zone, the seat and the head rest must be coordinated. In any case, the design of the seat and its head rest in preventing neck injury is extremely important (to minimise improper use).

Legal requirements should also be made with regard to vehicles' characteristics intended to enhance passive safety in the event of rear-end collisions, and the protection these

characteristics offer for preventing neck injuries. Vehicles with a short rear-end deserve special attention in this regard.

Passive safety of passenger cars: part II

A pilot-study into the development of a ranking list of passenger cars
L.T.B. van Kampen
R-98-28E. 58 pp. Dfl. 22.50.
(In English)

SWOV investigated the feasibility of constructing a list of individual or grouped types of cars which could be ranked according to passive safety. In so doing, differences in passive safety among these types of cars could be described.

The report includes a consideration of the existing and the intended vehicular regulations in the area of passive safety. It also examines the complex issue of making vehicles compatible with one another and the often conflicting vehicle requirements, especially in regard to the safety of occupants as opposed to the safety of third parties.

A rank list was produced and two measures for expressing the passive safety of individual vehicles were developed. One of these provides an indication of the occupant safety for a certain vehicle model, while the other expresses the degree of injury caused by a certain vehicle model in relationship to other road users. To make the ranked listing more complete and reliable, further analysis, both of the previously studied material and of data yet to be gathered, is recommended.

Drink-driving in the Netherlands, 1996-1997

Development of alcohol use of motorists in weekend nights
M.P.M. Mathijssen
R-98-37. 65 pp. Dfl. 25.-.
(In Dutch)

In 1997, SWOV, in collaboration with 73 police control teams, conducted a roadside survey in order to establish the alcohol consumption of motorists



in the Netherlands. The roadside surveys were carried out between September and December, on Friday and Saturday nights between 10 p.m. and 4 a.m.

Motorists were stopped at random, and all were subjected to a breath test. The 1997 sample contained 22,614 motorists. The 1997 study showed that the number of motorists with a blood alcohol concentration (BAC) over the legal limit of 0.05% had stabilised, when compared with 1996. In 1997 4.3% exceeded the legal limit versus 4.4% in 1996. The 1997 figure is not significantly different from the 1995 and 1996 figures, but it is from the 1994 figure. In the latter year, 4.9% of motorists had a BAC over the legal limit.

The stabilisation of drink driving in 1997 was reflected by official accident statistics. The number of registered alcohol-related road fatalities has increased slightly, from 97 in 1996 to 103 in 1997, while the number of severe injuries has slightly dropped, from 1,200 in 1996 to 1,176 in 1997. Also as a percentage of the total road toll, alcohol-related road fatalities and severe injuries hardly changed between 1996 and 1997.

The real number of alcohol-related accident victims, however, are considerably higher than shown by official statistics, since the registration rate of alcohol-intoxicated drivers involved in accidents is rather low. A rough estimate for 1997, based on a comparison with German data, gives a minimum of 235 fatalities and 2,000 serious injuries as a result of alcohol-related accidents in Dutch traffic. The associated economic damage is estimated at a sum of approximately two billion guilders.

The relatively greatest share in alcohol-related fatalities and serious injuries have young men aged 18-24, namely 22%, while forming only 5% of the Dutch population. The explanation for their marked over-representation is that even when



sober, they have a higher accident risk than older men, which increases stronger after alcohol consumption.

In this perspective, the development of drink-driving by male motorists under the age of 25 is thus rather alarming: in the period 1991-1993, 3.1% exceeded the legal limit; in the period 1994-1996, 3.5%; and in 1997 3.9%.

Influencing unsafe automatisms and habits in traffic

A literature study including ten examples and twenty factors affecting success and failure

Dr. P.B.M. Levelt.
R-98-38. 55 pp. Dfl. 22.50.
(In Dutch)

The Netherlands Agency for Energy and the Environment (NOVEM) is seeking new ways to encourage efficient energy use by focusing on applying technological measures to affect habitual behaviour. As part of these endeavours, SWOV conducted a study into the factors affecting the success and failure of various road safety measures.

The ten measures investigated were vehicular measures (anti brake-lock devices, daytime running lights, safety belts, black boxes, tutors, and intelligent speed adapters), infrastructural measures (roundabouts, Pussycats, 30 km/h areas) and one measure focused directly on behaviour (skid prevention courses).

The behaviour being addressed by a measure can occur on three levels: skill-based, rule-based and

knowledge-based. Indicated for each measure is the level (or the combination of the behaviour levels) at which the measure was being aimed. Also listed for each measure are certain mechanisms which could encourage or counteract success.

Ten of these are behaviour mechanisms such as reactance, learning by observing, and risk compensation. Six mechanisms involved the role that policy plays in the interpreting or developing of measures. An example would be exaggerated expectations caused by a lack of consideration for the fact that road safety measures can reduce each other's effectiveness or that problems can shift. Four mechanisms involved measuring problems such as selective recruitment and regression to the mean.

The report formulates a checklist that indicates what should be considered in each case when taking measures. In conclusion, suggestions are made that apply to measures for encouraging efficient energy consumption.

Wrong-way drivers on motorways: Part I

The extent and development of the number of wrong-way drivers and the road accidents and road casualties involving wrong-way drivers prior to the end of 1996

A. Blokpoel, dr. L. Braimaister
& J.P.M. Tromp.
R-98-33 I. 65 pp. Dfl. 25.-.
(In Dutch)

Wrong-way drivers on motorways: Part II

Literature study

A. Blokpoel & dr. L. Braimaister.
R-98-33 II. 20 pp. Dfl. 17.50.
(In Dutch)

In 1997 a wrong way driver was the cause of a serious road accident in the Netherlands. In the Dutch Parliament, the Minister of Transport and Public Works was asked for further information on this issue. SWOV was asked to conduct a study into wrong way driving.

The assignment involved two parts:

- 1 *Conducting a study into the extent, nature and development of wrong-way driving in the Netherlands since 1980, following up an earlier wrong-way driving study conducted in 1981 (R-98-33 I).*
- 2 *Conducting a limited literature study into the state of affairs concerning wrong-way driving in other countries (R-98-33 II).*

During the period 1991 to 1996, about 0.1% of all registered road accidents on motorways resulted from wrong-way driving. This percentage indicates that an annual average of 22 wrong-way accidents occurred during this period. As a result of these accidents (including those involving only material damage) there was an annual average of four fatalities, five persons with injuries serious enough to be admitted to hospital, and fifteen slightly injured persons.

Accidents involving wrong-way driving are serious in nature; of the fatal road accidents occurring on motorways, 2.5% are wrong-way driving accidents. Approximately 3.5% of fatalities occurring during the investigated period was the victim of a wrong-way driving accident.

About 45% of wrong-way driving accidents occur during daylight hours. During the dark, the percentage of wrong-way driving accidents of the total number of accidents on motorways is greater than during the day (0.2% versus 0.1%). Of the wrong-way drivers whose age is known (excluding hit-and-runs), around 33% is in the age group 18 to 39, 36% is in the 40 to 69 group, and 30% is 70 years of age or older. Starting at age 55, the percentage of wrong-way drivers involved in road accidents on motorways increases. The use of alcohol occurs relatively often among wrong-way drivers. The exception to this is the group of drivers aged 70 and older, among whom alcohol use is rare.

Road safety and road works

An introductory investigation into road accidents and the behaviour of road workers and road users
M.P. Hagenzieker.
R-98-35. 37 pp. Dfl 20.-.
(in Dutch)

In the Netherlands, about 1,000 victims per year are involved in accidents that take place within the vicinity of road works. 25 to 30 of these victims die and more than 200 of them require hospital admission. Every year, about fifteen victims are registered as being 'persons who are conducting work'. These victims are not only road workers, however; they can also be refuse collectors, landscaping personnel, or surveyors.

Accidents involving road workers occur relatively frequently on a closed traffic lane or closed section of road: on an emergency lane, next to a guard rail, on a shoulder, or on a merge lane.

While of all the investigated injury accidents in which persons who were carrying out work became victims, about 60% occurred within urban areas, the majority (two thirds) of accidents in the group classified as 'road workers' occurred, however, in rural areas. Conspicuous was the relatively high number of refuse collectors who became accident victims. Other groups that can be distinguished are accidents involving mowing or landscaping activities, and accidents involving surveying activities. The vast majority of accidents involving these groups occurred in urban areas.

Recent Road Safety Data in the Netherlands

Background Document for the fourth World Conference 'Injury prevention and control', Amsterdam, May 1998
P. Weßemann & J.M.J. Bos.
R-98-16E. 25 pp. Dfl. 17.50.
(in English)

In May 1998, the Fourth World Conference 'Injury prevention and control' was organised in Amsterdam. During this conference, ideas have been exchanged concerning the

dangers of various social activities: sport, at home, in traffic, and at work. Besides injuries suffered as a result of an accident, attention has also been paid to injuries inflicted deliberately (violence and suicide). As a background paper for this conference, SWOV has made an overview of that data which can be considered indicative of the size and severity of road safety in the Netherlands at this moment in time, and for the developments of this problem during (approximately) the last ten years:

- the absolute numbers of victims, subdivided by severity (deaths, seriously injured, and slightly injured);
- the mortality: deaths per 100,000 population;
- the injury rates per kilometre or per hour;
- the number of Years of Life Lost (YLL);
- the costs of injuries.

Also a comparison was made between member countries of the European Union.

Road work zone accident studies

ARROWS Task 2.2 Internal Report
C.M. Gundy.
R-98-17. 118 pp. Dfl. 35.-.



ARROWS is an acronym for the European research project: Advanced Research on Road Work Zone Safety Standards in Europe. The ultimate goal of ARROWS is to improve the safety of work zones, by reducing the frequency and severity of collisions involving road users. A logical prerequisite for such a task is the review of research concerning work zone traffic accidents. To that end SWOV,



in co-operation with other ARROWS partners, collected and reviewed existing empirical studies concerning work zone traffic accidents as well as literature reviews of such.

Literature study into rear-light units

An overview of the literature on rear lights and rear-light units
C.C. Schoon.
R-98-39. 28 pp. Dfl 17,50.
(In Dutch)

Modifications to rear-light units of passenger cars are only permitted if European regulations allow them. The result is that many new, and sometimes useful, inventions cannot be used. Within the European framework, this is now a point of issue.

Within these discussions, the Netherlands needs to make its position clear concerning possible future changes. For this reason, SWOV was asked to draw up a criteria document on the relation between rear-light units and road safety.

For a driver to correctly handle the situation when travelling behind another vehicle, the rear-light unit needs to be given major consideration. Good signalling goes a long way towards preventing rear-end collisions. This is a subject that deserves attention because of the recent increase in the number of such accidents: in the Netherlands alone, a doubling has occurred during the last ten years.

Concerning visual warning, the following aspects, among others, are significant: the separating or grouping of functions; coding with colours; levels of light intensity; and continuous or interval illumination. Matching the light intensity of the different lamps (particularly the brake lamps) to surrounding lighting conditions (fog, daytime versus nighttime) is important. Besides variation in the light intensity, variation in the surface area of lamps also offers the possibility to improve visual

alertness (for example, through the use of a light bar).

The report considers different technological developments concerning brake lights.

In the long term, the possibilities offered by information technology will need to be considered (automatic distance guidance, monitoring systems, and the like).

Given the number of subjects and innovations, it is recommended to begin with a problem analysis. This report provides the basic material for such an analysis.

Telematics and the sustainably safe concept I

Possibilities for application
Oei Hway-liem.
R-98-32 I. 20 pp. Dfl. 15,-.
(In Dutch)

Telematics and the sustainably safe concept II

Discussion document for elaborating measures to be considered for realisation
Oei Hway-liem.
R-98-32 II. 25 pp. Dfl. 17,50.
(In Dutch)

Two reports were published on the subject: telematics and the sustainably safe concept. The first report describes the results of an investigation into the application possibilities of telematics systems within the sustainably safe concept. The telematics systems were classified according to phase: the pre-phase (before commencing the journey), the traffic phase (during the journey), and the accident phase.

The expected qualitative effect (positive, neutral or negative) of the telematics application on road safety was indicated for each of the systems. In the second report five systems were selected for additional elaboration:

- The ones to be used in traffic phase which would:**
- provide control on a major road;
 - monitor traffic;
 - provide an intelligent speed adapter.

The ones to be used in the accident phase which would:

- summon emergency services;
- provide a data recorder.

Automation of the driving task

Final report
T. Heijer et al.
R-98-9. 66 pp. Dfl 25,-.

In co-operation with TNO Human Factor Research Institute and the Centre for Environmental and Traffic Psychology, SWOV has published a report of the final results of a three year project commissioned by the Dutch Ministry of Transport. The project was aimed at the development of criteria to assess the effects on road safety of various applications of Advanced Traffic Telematics (ATT) intended to support the driver in different aspects of the driving task. Such ATT systems are being developed or already on the market e.g. to provide up to date route information, to maintain a constant speed and headway, to adapt the maximum speed to the local limit or to prevent collisions.

Although many of those support systems are intended to make driving easier or safer, they can also interfere with or modify the driver's tasks in such a way that safety is impaired. This leads to the conclusion that acceptability of ATT systems should be determined by careful consideration of both the intended beneficial and the unintended detrimental effects on safety before any application is given 'the green light' by the government.

Preferably, such a consideration should be conducted by way of standardised procedures and criteria, but these do not yet exist. This project has been initiated to provide at least a preliminary set of guidelines and methods to identify potential safety hazards that single or multiple applications of these ATT systems may produce.

Dutch pedestrian research reviewed

SWOV has prepared a summary of the main recent pedestrian facility research, development and implementation in the Netherlands. The research review covers Dutch pedestrian safety research in the period 1984-1997. Some of the research described is produced jointly with other European countries, under authority of the European Community. This compilation of the Dutch Research Review was made under authority of The University of North Carolina, Highway Safety Research Centre (HSRC).



The number of pedestrians killed in a traffic accident in the Netherlands has decreased strongly in the eighties. This decrease came to an end in the nineties. The year 1996 however, shows a remarkably positive development.

The stagnation in the decrease can hardly be explained by an increase in pedestrian mobility, for this has remained relatively unchanged between 1980 and 1994 (5-5.5 billion kilometres per year). In recent years the level of pedestrian mobility is somewhat higher.

Pedestrians are mainly killed in accidents with cars. Pedestrian safety therefore is also determined by the mobility of motorised traffic. This mobility of motorised traffic is still growing every year.

Children and elderly pedestrians prove to be the most vulnerable. Nearly 50% of the total number of killed pedestrians is older than 65 years. Their risk, expressed as the number of deaths per kilometre,

is also found to be very high: more than 100 deaths per billion kilometres, compared to 27 on average for all age groups.

Next to the elderly, children to the age of 14 are the second most vulnerable age group. The number of children killed in a traffic accident has, however, decreased more than in other age groups.

Other subjects

In the report, several studies on pedestrian crossings are discussed. Attention is paid to both safety aspects of signalised and unsignalised pedestrian crossings, as well as to innovative measures in order to improve signalised pedestrian crossings.

Attention is also paid to studies in which the effect of infrastructural measures (with an emphasis on traffic calming) on pedestrian safety are described. A comparison is made between a 'sustainably safe' layout from the perspective of motorised traffic and a 'sustainably safe' layout from the perspective of pedestrian and cycle traffic. Other studies describe analyses of traffic accidents with pedestrians before and after the construction of infrastructural traffic calming measures.

Children and the elderly

A summary is given of two studies that describe the mobility and freedom of movement of children in relation to traffic safety. In the first study the authors try to explain the decrease in the number of accidents with children by the supposed decrease in the freedom of movement. The second study consists of school surveys on traffic safety in

school zones and in school routes.

Results show that the freedom of movement of the children has decreased over the last years. This decrease is explained by the negative judgement of traffic safety on school routes both parents and teachers give. Parents no longer let their children go to school independently, but bring their children themselves.

The problems of elderly traffic participants are described by analysing traffic accident data and mobility data. The defined problems are then explained by cognitive and physio-functional changes bound up with aging. Possible measures to reduce the problems are given.

Disabled persons

The two publications reviewed in the next chapter both describe measures and provisions for disabled persons. Neither of the publications describe research on those measures.

The first publication is a manual for infrastructural measures for safe and independent traffic participation by disabled persons.

The second publication describes a device with which pedestrians can double the duration of green light for pedestrians at signalised crossings. This device is used by elderly and disabled pedestrians in the municipality of Enschede.

Car front impact requirements

The three studies described in this chapter discuss two different aspects of car front impact requirements. The first study concerns a comparison of both costs and benefits of the implementation of car front impact requirements in the Netherlands.



T o n

Hummel is 34 years old and graduated in Traffic Engineering and Human Geography. After he graduated he was employed by the Ministry of Transport. Since 1997 he has been a researcher at SWOV. He is mainly involved in projects concerning the development of a sustainably safe road traffic system.

The benefits have been calculated by determining the value of average costs of killed and injured victims, combined with the estimated casualties spared by car front impact requirements.

The other two publications relate to the same study (part I and part II). The publications describe

the development of test methods for evaluating pedestrian protection for passenger cars. The main result of the study is the development and calibration of computer models to describe the severity of injuries of pedestrians being hit by a passenger car, under different circumstances and with different car designs.

Dutch pedestrian research review

A review of the main traffic safety research on pedestrians in the Netherlands, 1984-1997

T. Hummel.

*R-98-7. 40 pp. Dfl. 20,-.
(In English)*

Roundabouts in a sustainably safe

infrastructure

SVOV published a report in which a number of topical subjects involving the use and realisation of roundabouts are discussed. Sparking the report was the need to include these roundabouts in a system of sustainably safe infrastructure whilst taking the desired consistency in right-of-way regulations and lay-out into consideration.

The results of this study will also form a basis for the new publication about roundabouts being prepared by a study group in the Netherlands Centre for Research and Contract Standardisation in Civil and Traffic Engineering CROW.

Right-of-way at older roundabouts

The first subject concerns regulating the right-of-way at older roundabouts where the rule of 'traffic from the right has priority' is still being applied, this rule being unlike the regulation applied to the newer roundabouts. Making the right-of-way regulations for all roundabouts consistent is deemed important since such a uniform regulation would be expected to contribute positively to road safety.

Modifying the regulation for the older roundabouts should preferably be coupled with a reconstruction that causes motorised traffic to approach and drive through the roundabout at a low speed. Suitable measures are needed to ensure the safety and comfort of cyclists. A minimal

requirement would be to create separate cycle tracks; in the case of high-volume motorised traffic and multi-lane carriageways, split level solutions could be used.

Right-of-way regulation and the lay-out of roundabouts with separate cycle tracks

The next part of the report discusses the right-of-way regulation and the lay-out of roundabouts in built up areas with separate cycle tracks. Based on an extensive study of the accidents at more than twenty roundabouts where cyclists have the right-of-way, an attempt was made to discover which lay-out characteristics contributed positively to safety. Behaviour observations at some of these roundabouts were included in this part of the study.

The study provided important information, including data about the numbers of casualties among cyclists and moped riders, as well as the effect of riding mopeds and bicycles in the unexpected direction. This study also provided the following points to consider for lay-out:

- *The lay-out of the cycle track must stimulate cyclists to pay attention to the situation.*
- *The location where cyclists cross the carriageway must be sufficiently visible and conspicuous.*

- *Cyclists must be easily visible when in the vicinity of the location where they cross the carriageway.*

A perfectly circular cycle track appears to be more favourable than other shapes for the safety of cyclists, but just the opposite is true for moped riders. This information will be important to know when moped riders start riding on the carriageway in built up areas in future. Applying a consistent regulation for the right-of-way of cyclists around a roundabout is essential. The regulations will also have to be consistent by using pedestrian zebra paths at the locations where cyclists have the right-of-way. To provide information for other studies involving intersecting cycle traffic, this study also examined the degree of discomfort experienced by cyclists in having to lend the right-of-way to motorised traffic when crossing the carriageway. To accomplish this, observations at several locations were used to develop and verify a calculation model.

The probability that a cyclist would have to stop to lend the right-of-way, as well as the average lengths of time lost due to waiting were calculated as functions of the motorised traffic volume. The results of the calculations usually agreed well with the observations. Under certain conditions, however (e.g., when the motorised traffic is standing in a

queue), the actual situation benefits cyclists considerably more than what the model suggests.

Capacity and safety of two-lane roundabouts

The last part of this report concerns a study into the capacity and safety of two-lane roundabouts. Both data concerning the safety as well as observations made at roundabouts in the Netherlands were supplemented with information from foreign literature, in so far as it would be relevant to the Dutch situation. A complicating factor here is the fact that both the carriageway on the roundabout as well as that of the entries and exits can contain either one or two lanes. The capacity of a completely two-lane roundabout can be put at 3,500 to 4,000 cars per hour.



J a a p

van Minnen, 61 years old, graduated in Mechanics and Physics and has been working at the SWOV Institute for Road Safety Research as a researcher since 1965. His main fields of interest are in infrastructure and the development of a sustainably safe traffic system.

One-lane exits have little effect on decreasing this capacity, but one-lane entries can diminish it to a much greater degree.

The safety of two-lane roundabouts is somewhat less than that of one-lane roundabouts, but amply sufficient when certain requirements are met. With a suitable lay-out, including radially oriented entries,

the speed of motorised traffic remains sufficiently low, with a level of safety equal to or better than that achieved at signalised junctions. Once again, there was overriding evidence in favour of a solution for cycle traffic in which a minimum requirement would be the creation of separate cycle tracks, or the creation of grade-separated interchanges in the case of higher volumes of motorised traffic and multi-lane carriageways.

Roundabouts and right-of-way regulations II

Standardising right-of-way regulations on older roundabouts, the safety of cycling facilities, and two-lane roundabouts

J. van Minnen.
R-98-12. 60 pp. Dfl. 22,50.
(In Dutch)

Strips and flexible bollards: new measures to prevent overtaking

As part of the demonstration project for implementing a sustainably safe traffic system in West-Zeeuwsch-Vlaanderen, a part of the province Zeeland, a safe design was sought for the ring road in the town Oostburg. Initially, it was decided to separate the directions by applying two continuous white paint stripes, 10 cm wide and 90 cm apart, in the middle of the carriageway. This was done because the ring road had been the scene of dangerous high-speed overtaking manoeuvres. The SWOV was then asked to conduct a study into the overtaking behaviour. The study concluded that almost one percent of the passing vehicles was overtaking. The average speed of the vehicles (84 km/h) exceeded the 80 km/h speed limit, and the percentage of speed violators was 57.4%. Then two measures were proposed for providing a more physical separation.

The first measure was the application of strips on the northern part of the ring road (the location at which the preliminary study had been conducted). These strips, 70 cm long, 17 cm wide and 4.5 cm high, were

attached to the asphalt between the continuous white paint stripes in the middle of the carriageway. The second measure was to use flexible bollards on the southern part of the ring road. These bollards are trapezium-shaped, being 14 cm thick at the bottom and 8 cm thick at the top, and 28 cm tall. The distance between the strips and the bollards for the first 100 metres

leading to the roundabout was five metres, and 10 metres thereafter. Once these measures were taken, SWOV conducted another study into the overtaking behaviour on both sections of the ring road.

Beneficial effect

The strips in the middle of the carriageway proved to have a beneficial effect on the overtaking behaviour. In the study, which was conducted on four workdays and lasted nine hours each day, no overtaking manoeuvres were observed. The average speed has been reduced to 80 km/h, and the percentage of speed violators has been reduced to 40.4%. Both of these reductions were more evident in the case of passenger cars and motorcycles than in lorries.

No overtaking manoeuvres were observed during the 36-hour



Reflecting strips between the continuous white paint stripes in the middle of the carriageway



Flexible bollards between the continuous white paint stripes

study period at the location where the flexible bollards had been placed. Since no test loops were present, the driving speed at the bollard location could not be established quantitatively. Nevertheless, a rough comparison of the videos shot at both locations yielded no obvious differences in the driving behaviour at the strip and at the bollard locations. This lack of difference in behaviour was especially obvious when it came to the distance road

users maintained between their vehicle and the physical separation.

Recommendations

It would be advisable, when providing facilities for separating the directions on distributor roads located outside built-up areas, to apply them on busier roads than the ring road. Since the speed reductions obtained by the measures tested here were only slight, more attention could be devoted to this speeding effect when designing new facilities. The effect of the

measures on the driving behaviour of motorcycle riders will also have to be studied before introducing these facilities on a large scale.

Separation of directions on the Oostburg ring road

A research into the influence of strips and flexible bollards on overtaking behaviour

W.H.M. van de Pol
& S.T.M.C. Janssen.
R-98-21. 96 pp. Dfl 30,-.
(in Dutch)

SARTRE project shows trends in behaviour and attitudes in Europe

Car drivers in Europe still regard an active government road safety policy as important. However, they have become more reserved about new laws. Within Europe, the opinions about measures that should be taken to increase road safety, are in general, not very much divided. Therefore, gearing to one another is therefore possible. With regards to drunk driving, however, one has to take considerable cultural differences into account. There are also considerable differences between the opinions of car drivers in the various countries as far as other policy subjects are concerned.

These are some of the results of the second SARTRE survey of car drivers carried out in 1996 in nineteen European countries. SARTRE stands for Social Attitude to Road Traffic Risk in Europe. The research project was completed in May with three reports. The French institute INRETS was project manager.

SWOV coordinated the project for the EU, that paid 50% of the research costs.

The surveys carried out in the nineteen countries were identical. The wording of the questions was to a large extent the same as in the first survey which was conducted late 1991. The data was controlled by INRETS and processed into a database. Three reports were made. The first report is descriptive and summarizes the most important results. The second report contains a secondary analysis of some of the

results. The third report is a policy document. These reports can be ordered from SWOV.

Seat belt usage

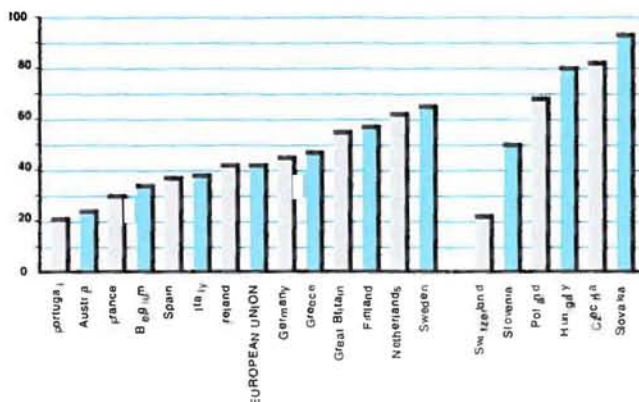
Using the results of the surveys of late 1991, early 1992, late 1996, and early 1997, a comparison can be made of car drivers' behaviour,



Roelof Witink

Witink is 50 years old and graduated in Psychology at the University of Groningen. He has been working at SWOV as a researcher since 1979. At the moment he is a project manager in the field of behaviour, especially in the field of traffic education and social marketing. He was a member of the steering committee of the SARTRE 1 and 2 projects. In SARTRE 2 he was responsible for the coordination of the arrangements between the European Union and the consortium.

Percentage of car drivers that think that alcohol consumption is completely to be blamed in traffic



attitudes, and opinions. This can be done for fifteen countries, of which eleven are EU member states.

The repeat of the survey makes it possible to make a deeper analysis of behaviour, attitudes, and opinions. The influence of legal measures is illustrated by the considerable increase in seat belt wearing in Spain and Portugal, where it has also become mandatory (on rear seats as well as front seats). Portugal has immediately sprung to above the European Union average. Although the use in Spain is also large, it lags behind Portugal. It is assumed that this is the result of differences in supportive policy, such as the extent of police surveillance. In those countries with the highest usage figures, the percentages have slightly declined. From deeper analysis it appeared that the (in the survey) reported seat belt usage agrees well with the actual usage figures. Furthermore, quite a large proportion of car drivers (about one fifth) thinks that seat belts are not really necessary if one drives

carefully. Seeing as that still only two thirds wear a seat belt in urban areas, there are still a great many opportunities to reduce the numbers of road deaths and seriously injured.

Drinking and driving

Reported drinking while driving has improved in almost all countries. There is a distinct difference in the opinions of North and South Europe. In southern countries, the problem is seen as being limited to certain groups that are drunk and drive carelessly. In northern countries, far more car drivers are strict about the combination of drinking and driving. Policy should be geared to these cultural differences.

In general, however, the national alcohol limits before driving are endorsed. Europe has various limits. Only in Italy are opinions divided about what the limit should be. According to the Italian representative, this is because hardly anybody in Italy knows the legal limit (0.8 percent).

The greatest road safety threat comes from the number of car drivers that drive above the limit. Those countries who score the highest are not distributed according to the north-south line; they are not just the southern countries.

The attitude and behaviour of European car drivers to road safety

Part 1, Report on principal results

J.P. Cauzard, INRETS, France, et al. SARTRE 2 report, 156 pp. f 45,-. (in English)

The attitude and behaviour of European car drivers to road safety

Part 2, Report on in-depth analyses

J.P. Cauzard, INRETS, France, et al. SARTRE 2 report, 108 pp. f 40,-. (in English)

The attitude and behaviour of European car drivers to road safety

Part 3, Results, discussion and recommendations for road safety policies drawn from SARTRE project Report to the EU commission DG VII and High level group for Road Safety

J.P. Cauzard, INRETS, et al. SARTRE 2 report, 36 pp. f 35,-. (in English/French)

European car drivers' opinions about road safety measures and in-car devices

Analysis of SARTRE 2 survey results in terms of how European car drivers differ in their preferences for road safety measures

Dr. Ch. Goldenfeld. R-98-36. 69 pp. Dfl. 25,-. (in English)

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newly published reports are mentioned and a summary of the contents is given.

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