EARCH CTIVITIES 6

SWOV Institute for **Road Safety** Research

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Setting a new course in road safety policy

Various signals have indicated that the development of road safety in the Netherlands is not proceeding as well as had been expected. It has become uncertain whether the goals the Netherlands has set itself (25% fewer road deaths and injured in the year 2000, compared with the figures for 1985, and 50% fewer fatallties and 40% fewer injured in the year 2010, compared with 1986) will be reached.

Firstly, it appears that the annual number of traffic fatalities has hardly declined since 1991, since that year, this figure has wavered between 1,250 and 1,300.

In addition, it seems that the drop in risk that characterises the development of traffic on the road is stagnating. While in the 1970s and 1980s, this drop was about 9% per year, in the last ten years this figure has been roughly halved. In the last few years this rate is even lower -Because mobility is increasing by about the same percentage as the drop in risk, the number of road accident victims has in fact remained constant.

Stagnation

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It is interesting to note that in rec 9nt years, a number of important factors of influence on road safety (driving under

> the influence, wearing seat belts . speeding behaviour) have soon & tended towards deterioration . Father than improvement -

> In addition, no major succ esses have been registe led of late with regard to measure sthat have managed to redu & road ha ard to a considerabl edegree -

Finally social interest in road safety problems seems to have diminished somewhat as has (also in relation to this attitude) political and policy concern. This does not mean . however, that the disappointing developments in the field of road hazard are thereby easily explained -However all the & tend mores sem to point in the direction of stagnation -

Set a new course

When considered from various perspectives, road accidents still represent a considerable social problem. We are talking in terms of economic damage measuring about nine thousand million Dutch guilders a year, and about risks that are many times greater than those associated with other modes of transport -

This unfavourable development is therefore al so a reason to intensify and broaden efforts in thi sfield, or at least improve th 9m. In other words, if the wind change sdirection, it's time to set another course -

Road safety programme

This study, conducted by SWOV at the request of the Ministry of Transport and Public Works offer s recommendations con œrning su h a change of ourse, what direction do we move in and how do we do it? The knowledge offered by this report has been used by all those who play a role in the preparation of the Long Term Programme for Road Safety, issued in 1996 and are involved in the implementation of that programme -

With regard to this Long Term Programme for Road Safety -SWOV recommends that a





strategy be adopted consisting of three parts. Firstly, a number of effective measures should be taken in the short term, focusing particularly on the already formulated spearheads of policy that should result in the goals set for the year 2000 being accomplished.

Secondly, it should be ensured that road safety considerations are explicitly included and weighed at all levels of the decision making process affecting road safety - national, regional and local - particularly in the field of policy concerning mobility and the infrastructure.

Thirdly, the results and the success of implementation of the first and the second recommendation should be utilised to realise a sustainably safe road traffic system, step by step, over a longer period.

The recommendations included in this report consider what can be donenow and in the future, with respect to road safety, and how it can be done. In this context, SWOV has confined itself to those measures about which statements can be made with some clarity in terms of the safety effects to be anticipated. Based on the collected information, it is realistic to expect that the set largets are attainable - where it should be noted that the proposed measures will be particularly radical in nature if they are performed on the scale required to truly contribute towards reaching the targets.

Measures

In the short term, the most effective approach appears to be to strengthen police enforcement - placed in a context of large-scale information campaigns with the participation of the mass media - aimed at the spearheads of alcohol, speeding and seat belt use. In addition, attention could also be directed at the so called black spot approach and a new impulse with the construction of 30 km/hour areas. The two latter points could be further expanded in the long term. Furthermore, in the coming years it should be emphatically attempted to further implement the 'sustainably safe' traffic principles.

Characteristics

The following general characteristics can be given for the set of measures:

- Measures should be made clearly visible to the Dutch population
- Mcasures should be prepared carefully and knowledgeably and performed in order to be as effective and efficient as possible.
- Measures should be systematically monitored, evaluated and, if necessary, adjusted.
- The character of the measures

should be structural, rather than incidental, and pref^erably be of a preventative nature.

- It should be attempted to implement the measures in a sober fashion.
- Integration with other objectives (mobility and the environment) should be emphatically endeavoured.

It is recommended that in the coming years, a number of measures be taken that will considerably reduce the traffic risk within a short period of time. In this context, it is rational to consider national measures incorporating local and regional elements of implementation.

The Long Term Programme for Road Safety was published in May 1996, a discussion in Parliament about it is forseen for the autumn of 1996.



Setting a new course A discussion paper with proposals

for developing a policy in order to achieve the road salety targets R-96-5 - 128 pp - D11-40, --

(in Dutch)

Costs of road accidents in the Netherlands

This report describes the costs resulting from road hazard for the year 1993 as charted by SWOV. The model Used largely matches that drawn up by McKinsey & Company for the year 1983 and published in a report dating from 1985 entitled Towards an efficient road safety policy.

An important element of this report is the calculation of road hazard costs. Since then, the number of registered traffic fatalities and injuries has dropped. There have also been developments in the social perception of the negative external effects of road hazard. These factors' justify a new calculation of the social costs of road hazard.

The basis of the actualised calculation is offered by the McKinsey report-

Medical costs and loss of production

The following comparison applies the recalculated costs over 1983 at all times.

The medical costs between 1983 and 1993 rose from Dfl 349 million to Dfl 440 million, despite a reduction in the number of patients admitted to hospital (by 15%) and a reduction in the number of hospitalisation days (from 17 to 12).

The increase in cost is mainly due to the increased price of hospitalisation per day (doubled).



In order to offer a consistent comparison between the results for 1983 and 1993, SWOV has recalculated the costs for 1983. The costs of road hazard as calculated for both 1983 and 1993 have been classified into four main groups:

- I-medical costs,
- 2. loss of production,
- 3. property damage;
- 4 costs of handling and prevention-

The gross production loss has riscn from Dfl 3.3 thousand million in 1983 to Dil 4.3 thousand million in 1993 Also, the net production loss shows an increase, namely from Dfl 2 0 to Dll 3.2 thou and million -In this case, the McKinsey figures over 1983 had to be recalculated. due to the transition from the Labour Force Count (AKT) to the Working Population Survey (EBB) to measure the volume of labourAlso, SWOV's intention to make maximum use of public resources required recalculation of the figures.

The principal cause of the increase is not the method of recalculation adopted, but rather the great rise in production loss due to disability.

In 1983, 3.7% of those injured in traffic fell under the Disablement Insurance Act (WAO). In 1993, this percentage had risen by 70%, namely to 6.3%.

In comparison, the total number of people receiving disability insurance under the WAO rose from 1.5% in 1983 to 1.7% in 1993. an increase of 18%.

Furthermore, the number of road accident victims returning to work after receiving disability insurance has declined: the percentage no longer receiving WAO benefits after six years dropped from 47% in 1983 to 36% in 1993.

Property damage and handling and prevention costs

The costs of property damage have risen from Dfl 3.4 thousand million in 1983 to Dfl 4.2 thousand million in 1993 The greatest rise occurred with the registered damage and with the damage to passenger cars not compensated by an insurance company, each amounting to about Dfl 400 million. This is a conservative cstimate Recent SWOV research estimated the damage not compensated by an insurance company to be over Dfl I thousand million higher However, the research method used cannot be applied directly for a recalculation over 1983, since this study also calculated the damage caused by lorries buses and other motorised traffic-such as mopeds-

The total handling and prevention costs rose from Dfl 2.2 thousand million in 1983 to Dfl 3.3 thousand million in 1993. The costs of prevention have risen from Dfl 1.9 thousand million to Dfl 3.0 thousand million. The principal causes of this increase are the expenditures on driver education and the costs of safety equipment in and on passenger cars. The handling costs have remained virtually consistent

Total costs

The total costs of road Dazard have risen in the gross variant from Dfl 9.2 thousand million in 1983 to Dfl 12.3 thousand million in 1983. In the net variant they have risen from Dfl 8.0 to Dfl 11.1 thousand million. (Excluding the costs of prevention, the total costs of road accidents have risen in gross terms from Dfl 7.3 to 9.3 thousand million and in net terms from Dfl 6.0 to 8.1 thou and million).

It should be noted in this regard that these sums probably represent an underestimation of the true cost. As already noted, the costs of property damage for 1993 are probably over Dfl 1 thousand million higher than the costs arising from the model currently used.

The costs of road hazard have been presented in current Dutch guilders. For the intertemporal comparison, SWOV calculated the totals for 1983 and 1993 as a percentage of the Gros Domestic Product (GDP). Although the registered number of fatalities and injured has declined, the costs of road hazard as a percentage of the GDP have remained virtually the same. The percentages of the gross and net variants for 1983 are 2.4% and 2.1% respectively: for 1993 they amount to 2.2% and 2.0%, respectively.



Costs of road hazard in the Netherlands, 1993 J. Muizelaar, M.P.M. Mathijssen & P. Wesemann -R-95-61. 69 pp - D11 - 25, - . (in Dutch)

	gross costs		net costs	
	1983	1993	1983	1993
modical costs	349	440	349	440
loss of production	3,281	4,346	2,007	3,109
property damage	3,404	4.188	3,404	4,185
handling costs	260	303	260	303
road accidents costs	7,294	9,277	6,020	8,121
prevention costs	1,939	3,007	1,939	3,007
total	9.233	12,284	7,959	11,128

Summary of the 1983 and 1993 costs in million guilders'

Telematics applications and the effects on

SWOV has written three reports on the subject telematics and foad safety. Report R-95-74 is intended to assist policy makers in designing a policy strategy on telematics and road safety. Based on a consideration of the existing knowledge and insights in the field of telematics, traffic and transport and safety, possible directions and alternatives are given to the policy to be formulated.

An inventory was made of constinues and developing telematic systems that are relevant to road safet y. Here the classification of the phase model for road safety was applied. In addition, a distinction was made between individual and collective systems, between the manner of traffic participation on which the system focuses and between the function or objective of the system.

Next the consequences of both directions of approach -policy/and t d'matris, -u cindicated for the formulation of a telematics policy for road safety. A distinction is made in this sate between autonomous developments and developments that would be desirable for safety and between short term and long term objectives. In addition, att safety and between short term and long term objectives. In addition, att safety and to international developments. Furthermore, for cash phase in the traffic process at is indicated which telematics system seculd off sa gain in safety and which systems should be assessed to determine possible negative effects on road safety-

road safety

Finally the possible points of departure for the formulation of a telematics policy are indicated per phase.

Test procedure and test criteria

Report R 96-15 describes the claboration of a test procedure and matching test criteria for assessing the intentional and unintentional effects of telematics applications on road safety. The report then describes a prospective analysis (an analysis carried out during the development process) and a retrospective analysis (analysis of systems being implemented in a test bed or already being implemented in practice) of telematics systems The phase model for the transport and displacement process was used in the retrospective analysis of the safety effects of systems.

This is followed by an account of a step-by-step process which can be used in the practical development of safety criteria for a wide range of telematics systems. The development of these steps defines the conditions which telematics applications must meet in order to en sure road safety, and also specifies the test criteria which must be used.

A number of applications have already been elaborated in literature on the subject. These examples are important in assessing the practical implementation of the approach. The report selects a number of practical examples to describe the test procedure and the accompanying test criteria in more detail.

The report then uses a highly relevant area of application for road safety, namely traffic management on non-motorway roads, to indicate which road safety problems telematics systems should target if





Oppe is 58 years old and studied psychology at the State University of Leyden and worked there fr om 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: telematics, research me hods and statistical analysis for traffic safety and mathematical modelling in general and of traffic behaviour in particular. they are to be developed to increase safety. It gives an example of a combined system of route mapping and speed regulation, and indicates how such a system can be evaluated. These examples include a prospective analysis of 'Intelligent Cruise Control' (ICC) systems, aimed at the development phase of the system, and retrospective



Safety effects

Report R-96-16 discusses which safety effects must be taken into account, at which stages of the development of the system they must be considered and in which phase of the traffic proces. The report identifies the following phases: systems development, experimental application and large scale application. It also distinguishes between safety effects relating to mobility traffic flow, traffic behaviour, the reasons for travel and ultimately the level of accidents.

The report gives brief accounts of the safety aspects to consider at each level of development, at each level of traffic and in the main areas of application for telematics. It also produces standard forms for the assessment of the road safety aspects of specific telematics systems, both during the development phase and during the experimental testing.

The annexes to the report contain various examples of the application of a road traffic safety analysis based on standard forms analyses, aimed at the experimental application of 'Incident Warning Systems' (IWS).

Finally, the report gives an example of a possible Traffic Management System for secondary road networks, and describes the positive and negative road safety effects of such a system.



Building blocks for a policy strategy on telematics and road safety

S. Oppe · R · Roszbach & T · Heijer-R ·95 ·74 · 61 pp · Dfl · 25 ·*-(in Dutch)

The testing of telematics applications for their road safety effects

J M J Bos & S Oppe-R 96-15-61 pp Dfl-25.--(in Dutch)

System to test the road safety effects of telematics applications A summary

S · Oppe & J ·M ·J · Bos · R ·96 ·16 · 34 pp · Dil · 1 20 · ·. (in Dutch)

Motor cycling is a *hazardous* form of transport

The purpose of this study was to offer points of departure for policy or measures to improve the safety of motor cycling, through the application of existing data and an in-depth study. The motivation for the study is the number of accidents - over 900 - registered in the period from July 1, 1993 to June 30, 1994 inclusive; these were accidents that involved at least one motor cyclist and where at least one severe injury or fatality was registered.

The variables contained in the accident databases were supplemented by a number of still unregistered or differently coded accident characteristics derived from the original accident registration form. Supplementary data about the collision partners involved, their driving and manoeuvring behaviour, the accident situation and circumstances and the consequences of the accidents were collected on the basis of a review of the accident reports (approximately 400) and a survey held amongst the motor cyclists involved (response approximately 400).

Long lasting consequences

The accidents studied registered about 1,000 severely or fatally injured motor cyclists (the latter representing approximately 10% of the total). The other road accident victims involved represented another 200 seriously injured persons. About 450 of the injured motor cyclists were admitted to hospital for over one week, 300 underwent a period of rehabilitation and 600 remained disabled for one month or longer. It is estimated that 30 to 50% of the injuries had lasting consequences. As the majority of road accident victims belong to the twenty to twenty-nine year-old age group. the costs to society should also be recognised.

Circumstances

Inside the built up area, the same number of serious accidents involving motor cyclists occur as outside the built up area: over 450 annually. In about one quarter of cases, these relate to one party only, while in 60% of cases, these concern collisions between motor cycle and car. Two situations can be distinguished in this regard:

- over 200 collisions involving a car on an uninterrupted stretch of road;
- over 300 collisions involving a car at an intersection.

Behaviour

Insofar this could be determined, half the motor cyclists exceeded the 50 km/hr limit shortly before an accident inside the built up area, in some 15% of cases even exceeding 100 km/hr, also with accidents registered at intersections. Outside the built up area, on 80 km/hr roads, some 40% had exceeded the speed limit. Doubtless, high speeds





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Vis, 57 years old, has been working at SWOV as a researcher for 30 years. Earlier, he was involved in research concerning safety barriers, submerging vehicles and the influence of the use of alcohol, medicines and drugs on traffic safety. Recently, he carried out research on street lighting, traffic calming and infrastructural aspects and the safety of motor riders.

played a role in a large number of single party ac idents. The collisions on an uninterrupted stretch of road included motor cycles and cars travelling both in the same direction and in the opposite direction, as well as collisions involving cars driving away from a parking space or leaving a driveway.

Most of the collisions at an intersection related to collisions with cars entering from a side road, where the car should have given right of way. In addition, a small proportion of collisions occurred at intersections where drivers turning left collided with the oncoming motor cyclist.

It is interesting to note that in most cases, the driver could have seen the motor cycle in advance, had reduced speed and looked around or had even come to a stop-In addition, almost all motor cyclists had their headlights on Even so. some 70% of drivers did not see the motor cycle or noticed it far too late.

Sometimes, although the motor cyclist was seen, his behaviour was wrongly anticipated. Furthe more, while some 70% of motor cyclists had seen the car, they had not foreseen any problem.

Safety measures

The safety of motor cycling could be enhanced by the following means:

- Improve both visibility and recognisability.

- Pay specific attention to the safety aspects of motor cycling as part of the driving education of both motor cyclists and motorists.
- Propagate follow-up driving courses where special attention is focused on anticipatory behaviour and on the performance of emergency manoeuvres.
- Develop and distribute a code of behaviour for both motor cyclists and motorists.

In-depth study of the hazards of motor cycling A description of the problem A A Vis R-95-69. 49 pp. Dil. 22,50 -

Drink driving still *a problem* in the

Between September and December 1995, SWOV, in collaboration with 62 police control teams, conducted a roadside survey in order to establish the alcohol consumption of motorists in all twelve Dutch provinces. The study, which was carried out on Friday and Saturday nights between 10 p.m. and 4 a.m., represents a continuation of the nationwide studies into drink driving habits which were carried out between 1970 and 1994, to determine the trend in alcohol consumption. In the roadside surveys, motorists are stopped at random, and all are

subjected to a breath test. The 1995 sample included 18,334 motorists.

In order to gain an impression of the development in random breath testing in the Netherlands, SWOV in 1994 and 1995 asked the police coordinators of the roadside surveys to indicate whether changes had occurred in the previous 12 months. In 1995, about 40% reported that the enforcement level had increased, while about 30% reported a decrease, the remaining 30% reported no noticeable change. In 1994, only 20% had reported an increase, while half of the coordinators had reported a decrease.

Development of drink driving

The 1995 study showed that the number of motorists with a BAC over the legal limit of 0.5% had slightly decreased 4 6% in 1995 versus 4.9% in 1994.

In 1995, the highest percentages of drink driving were found.

- Saturday and Sunday morning between 2 and 4 a.m. (11.9% and 7.6% offenders, respectively),
- amongst male drivers aged 35-49 years (6.4% offenders);
- in municipalities with more than 100,000 inhabitants (5.8% offenders).

Relatively low percentages of drink driving were found:

- Friday and Saturday night between 10 and 12 p.m. (2.3% and 2.8% offenders, respectively);
- amongst female drivers (1.9% offenders);
- amongst male drivers aged 18-24 years (3.4% offenders);
- in the northern provinces of the Netherlands (3.0% offenders).

Netherlands

(in Dutch)



Ma hijssen, 47 years old was working as an editor for a publisher from 1973 till 1975. Since 1975 he has been employed by SWOV, at first as an scientific editor, later on as a researcher His main topics are epidemiology of drinking and driving. effects of police enforcement on road user behaviour, and analyses for road safety policy.

Those found to have been driving under the influence in 1995 stat ed they had just come from one of the following places."

· public trinking place	
(pub hot d, restaurant) :	55°6
i i la anno 11	21 0/

- 21 % - visit p hv tte party" 12% - homework:
- sporting club: 4%
- 8% - other hinknown:

Of the heavy drinkers with a BAC over 1.3%, 57% stated they had come from a public drinking place.

Development of alcoholrelated accidents

The stabilisation of drink driving in 1995 is reflected by a stabilisation of alcohol-related road accidents. The registered number of deaths in alcohol-related accidents was 87, the number of seriously injured was 1,123. The value of the registered numbers is relative, however, because the registration rate is rather low, and may fluctuate strongly depending on time and place. 2.3% of this age group was represented amongst the fatalities and hospital admissions for alcohol-related accidents, while only forming 5% of the Dutch population ov erall. This marked over-representation is even more striking because studies of drink driving habits have shown for years on end that young male drivers drink less than older ones. The most plausible explanation for their marked over-representation in the accident statistics is that young, inexperienced drivers already display a markedly enhanced accident risk, even after consuming a small amount of alcohol.



An estimate for 1995, based on a comparison with German data, gives a minimum of 265 fatalities and 2,000 hospital admissions as a result of alcohol related accidents in Dutch traffic. The associated economic damage is estimated at a sum of approximately two thousand million guilders

In comparison: is a result of all other crimes, 171 people died in the Netherlands in 1994.

Young male drivers

The greatest share in registered alcohol hazard in 1995 was assumed by young men aged 18 to 24 in line with the trend in previous years

Serious alcohol-related accidents

The serious alcohol-related accidents in the Netherlands are strongly concentrated on Friday and Saturday nights (10 p m. - 4 a m.). During these two nights, which represent only 7% of the week as a whole, no less than 26% of all registered seriously injured victims of alcoholrelated road accidents fell in 1995. Other periods of the week subject to a relatively large number of serious alcohol related accidents are Friday. Saturday and Sunday evenings (4 p.m. - 10 p m.) and Sunday nights: 30% of seriously injured victims of alcohol-related road accidents during 14% of the week. This means that in 1995, 56% of all seriously injured victims of alcohol related accidents fell during parts of the week that together only represent 21% of the week as a whole.

Recommendations

n order to combat driving under the influence, SWOV recommends a mixture of countermea sures. consisting of legal regulations, education and information campaigns, police enforcement and publicity These countermeasures should be aimed particularly at young drivers (lower legal BAC limit education and information campaigns) and on days and times of day where higher alcohol consumption and alcohol related accidents are known to occur (police enforcement and associated publicity).

Furthermore, it is important that a better understanding is promoted of the damage alcohol consumption causes in traffic on Dutch roads, than is presently feasible using the official data from the Road Accident Registration (VOR). The use of VOR data can too easily lead to the conclusion that the consequences of driving under the influence are not that serious in the Netherlands.

This can then lead to an inadequate political and social base of support to enable drastic measures to be taken against drink driving.



Drink driving in the Netherlands -1994 -1995

Development of alcohol use of motor ists in weekend nights

M ·P·M · Mathijssen · R ·96 ·17 · 61 pp · Dil · 25 · · · (in Dutch)

Social marketing: a new instrument to *i m p r o v e* traffic safety

Marketing is a strategy for changing behaviour. Social marketing focuses on social objectives, such as health, quality of ife and safety. This report argues that social marketing is a welcome additional method toward promoting safety. Marketing distinguishes itself from other approaches in that it is consumer oriented. Applied to road safety, the road users and organisations that may be involved in road safety policy, are the consumers policy refers to.

A consumer oriented approach means anticipating the needs and interests of the consumer. Hence, the development of policy measures is partly shaped by the way in which consumers experience problems and by their desire for change. This approach does not detract from the objectives of road safety. On the contrary, it offers more opportunities to realise them.

Usually, marketing is seen as an instrument for making a product or service attractive or acceptable. This definition, however, does not entirely cover the whole field of application - In order to discover what an attractive product is, we have to look at the problems, background and possible solutions through the eyes of the consumer.

Marketing then also has an important function in the preceding policy phases: exploring the problem, analysing the background, drawing up targets and exploring the options for attaining those targets. In a broad sense, the principles of marketing can be applied to traffic safety; through education and information, legislation and measures on infrastructure and vchicles. In order to make full use of the expertise and experiences of social marketing, a step-by-step plan is recommended.

In the study, four practical examples show how the social marketing approach is found in new forms of cooperation on behalf of traffic safety. A wider approach to the problems is shown. We see that social and commercial organisations are thoroughly involved in helping to develop policy, that the needs and interests of road users and organisations are brought more sharply into focus and that measures are adopted which are not only effective but which also receive much support.

A more systematic application of social marketing's step by-step plan can help to universalise these changes.

This report is a Dutch summary of the OECD report Marketing of



Roelof

Wittink is 48 years old and studied Psychology at the State University of Groningen He has been working at SWOV since 1979, firstly as a scientific editor, later as a researcher mainly involved with research concerning behaviour of road users and social marketing.

Road Safety, which was published in 1993. The OECD report has been written by an international group of researchers who are involved in road safety or in marketing. One of the authors of the OECD report is a SWOV researcher. In the SWOV report some Dutch traffic safety examples regarding the social marketing approach are discussed.



The social marketing of traffic safety A reflection on the possibilities to apply the principles of social marketing to road safety

R D - Wittink & dr. Ch. Goldenbeld. R-96-11 - 54 pp - DII. 22,50 -(in Dutch)

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If you want to receive a free copy of a list of all 1995 publications written in English G arman or French please ask for publication R 96-2.

A sustainably safe infrastructure: safe for the elderly too?

This research report investigates whether the manner in which the concept of 'sustainably safe' is curren ty being worked out for the traffic infrastructure can also offer the intended improvement in road safety for the oider pedestrian, cyclist and motorist, or whether special adaptations are perhaps required for this group.



Traffic hump with deflected cycle passage

The research method applied is based on the verification of theoretical knowledge about traffic and the functioning of ageing people through an experiment in which the elderly offer their own opinion about the quality and safety of 'Sustainably safe' traffic measures.

With regard to the 'sustainably safe' measures currently applied in practice, it is noted that these also offer a considerable improvement in safety for elderly road users when compared to the former situation.

However, some generally applicable comments should be made that are of particular relevance to elderly road users. Specifically, it was noted that for this category, regardless of their own manner of participation in traffic, the predictability of behaviour of other road users and/or the self-evidence of the code of behaviour they should practise themselves in certain traffic situations is crucial.

It also appears that partly in relation to these factors, the elderly encounter problems under certain circumstances with regard to their perception of the course of the road, and in relation to steering activities. In relation to this, some engineering solutions like the 'drawing pin', the traffic hump with deflected cycle passage, the axis deviation and the intersection plateau should be critically re-evaluated. In contrast, the roundabout seems to be positively rated with respect to the above criteria.

Conclusion

The general conclusion is that with the current strategy for a sustainably safe infrastructure, no 'separate' measures for the elderly need be applied although cortain forms of application may require some adaptation to better suit the elderly road user.



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Wouters, 55 years old, studied Mathematics and Physics at the University of Amsterdam. He is a senior researcher employed by SWOV since 1969. His main fields of interest are: manual control, man-machine systems, human factors engineering and system theory, integrated traffic safety management, specific (i.c. elderly and young) traffic participants, the safety of freight transport, and advanced telematics in transport.



Need for 'separate' measures for the elderly?

Report of a study on opinions of experts and elderly people

P.I.J. Wouters, M. Slop, J.E. Lindeijer, M.J. Kuiken & R. Loendersloot R-95-70. 63 pp. Dfl. 30,-. (in Dutch).

D rawing pin

Developments towards a <u>sustainable</u> vehicular safety

With in the concept of a sustainably safe traffic system, vehicles (passenger cars, lorries, vans, buses, motor cycles, mopeds and bicycles) should be equipped with instruments which simplify the tasks of the driver as much as possible. In addition, vehicles should be constructed such that the drivers and any passengers are protected as well as possible. This report describes all the current technical developments in the field of vehicular safety, relating both to facilities which promote *active safety* (i.e. contribute to the prevention of accidents) and to facilities which benefit *passive safety* (i.e. help to reduce the severity of injuries).





NE OF HE

Boudewijn

van Kampen, 54 years old studied Mechanical Engineering at the University of Delft He has been working at SWOV since 1970, firstly a s a researcher in the field of vehicle safety, later as a project manager in the same field as well as in the field of accident reg¹⁹ration. His main field of interest is crash safety of vehicle s. Developments in the field of active safety include such aspects as the road behaviour of four-wheel vehicles, vehicle lighting and various telematics applications. With regard to passive safety, attention is paid to developments in the field of the collision durability of passenger cars' and various safety devices such as seat belts, airbags child seats, headrests and so-called intelligent security devices

In addition the development of the (compact) car is considered more parti ularly the related developments in the field of material choice mass, a grodynamics and emissions. The developments in standard production line cars are also considered



Chrii

Schoon, 50 years old, is an engineer specialised in car engineering

He is 25 years employed by SWOV as a researcher. He carried out research on the following subjects: injury prevention related to vehicles as to safety barriers, evaluation studies concerning vehicle specifications.

Each of the developm ents discussed focuses attention on a number of aspect s: the effect of the cited facilities on road safety and human behaviour, the presence or absence of a base of support for these developments in the community and their political feasibility.

Government policy

To assist government policy it is shown how active and passive safety should evolve in order to realise the concept of a sustainably safe traffic system. This guideline is necessary in order to specifically stimulate or discourage certain developments.

To determine the position of the 'vehicular' component within the concept of 'sustainably safe' this report has also investigated studies on three other traffic components (infrastructure, human behaviour and legislation/enforcement) with respect to their interaction with the vehicle and vehicular safety

Finally, an inventory has been made of all Dutch and European agents which influence passive and active vehicular safety and their inter-relationships. We can distinguish here between government, industry, organised interest groups, research, standardisation institutes and consumer organisations.

The government is responsible for various tasks, for example to assess whether certain developments affecting vehicles have a consequence for safety. There is a guiding role for the government concerning the regulation of safety measures, to ensure that a minimum level of vehicular (safety) requirements is met

Also within an international framework, the role of the Dutch government is regarded as important. In view of its strong international position in the field of goods transport, the Netherlands could take the lead, together with European industry, to promot e lorry and bus safety.



Developments towards sustainable vehicular safety

Final report

E.G. Janssen, J.P. Pauwelussen & dr. J.S.H.M. Wismans (TNO), L.T.B. van Kampen & C.C. Schoon (SWOV) R-95-76. 138 pp. Dfl. 40,--(in Dutch)

Trial with Interim Assessment in driving instruction

consumer groups and the dilvers' examination institute CBR all want to see an improvement in the quality of basic driving instruction, both for commercial reasons and in the interests of general road safety. The quality of driving instruction will improve if customers are eventually persuaded to choose their driving school on the basis of *quality*. Consequently, one of the requirements is that this quality should be *recognisable* to the customer, thereby linking 'inherent quality' with commercial gain.

The instrument chosen to achieve this goal is the 'Interim Assessment'. At the request of the driving instructor, candidate drivers are tested on what they have learned during the course while at the same time being prepared for their 'real' driving test. The Interim Assessment is carried out when candidate drivers are nearing the end of their course of instruction.

Aim

The aim of the Interim Assessment is to increase pass rates by creating a better match between driving instruction and test requirements. Once this has been achieved, test requirements can be tightened to obtain a more valid driving test.

Trial

The Interim Assessment was introduced and evaluated on a trial basis in the two southernmost provinces of the Netherlands. The purpose of the evaluation was to assess the scheme's impact on pass rate's and to examine the expectations, motivation and experiences of candidate drivers, instructors and examiners who had or had not decided to take part in the scheme. The study also examined the extent of selective participation in the scheme among candidate drivers and driving school's.

Participation

The study yielded the following conclusions with regard to participation in the scheme: - only a small number of candidate drivers took part in the scheme, namely between 0.5 and 1 per cent of the total number of test candidates during the trial period;

- only a small number of driving schools took part, namely some
 5 per cent of driving schools submitting candidate drivers for the motorcycle driving test (A) and
 8 per cent of driving schools submitting candidate drivers for the passenger car driving test (B);
- candidate drivers who took part in the scheme were on average slightly older than those who did not take part;
- most of those taking part were candidate drivers who were taking their test for the first time;
- 45 per cent of candidates for the B (passenger car) driving license who took part in the scheme were from driving schools with an above average pass rate. These candidates were consequently from the better driving schools.

Pass rates

The study yielded the following conclusion s with regard to pass rates:

 the pass rate was higher after the scheme had been applied;

- this applied to both men and women:
- the pass rate after the sight me had been applied was higher for all age groups;
- the improvement in pass rates' occurred in driving schools of all levels of quality. This means that the Interim Assessment scheme involves a general added value, regardless of the quality of the driving school in which it may be applied.

Expectations, motivations & experiences

The study yielded the following conclusions with regard to the *expectations, motivation and experiences* of the various participants:

- the candidate drivers who chose to take part in the scheme were usually quality-convicious and more often tended to opt for a compact course of instruction (in other words, they opted for efficiency);
- the costs associated with the Interim Assessment were the main reason why candidate drivers decided not to take part;

- participation in the scheme appears to shorten the length of driving instruction;
- driving instructors regard the scheme as a useful tool in achieving a more efficient and targeted course of instruction,
- the results of the Interim A sessment have little influence on the judgement of the examiner during the a qual driving test.

Based on the findings of the study, it was recommended that the Interim Assessment should be introduced throughout the rest of the country on a trial basis, but that its effects should continue to be registered due to the fact that only a limited number of candidate drivers took part in the trial scheme in the south of the country. The conclusions of this study are therefore of only limited universal applicability, and it is quite possible that there may be deviations from the conclusions drawn here once the Interim Assessment is in more general use. In the mean time the Ministry of Transport decided to continue the trial for the period of one year. throughout the country.



Divera

Twisk, 44 years old studied at the Keele University in England. Got her bachelor degree in Social sciences in Sociology and Psychology. She continued her study Psychology at the University in Groningen, the Netherlands. Since 1986 site is a researcher at SWOV, working on research on influencing human behaviour in traffic, ergonomic research and infrastructural aspects.



Evaluation of the Interim Assessment

Evaluation of a trial in the two southernmost provinces with the Interim Assessment in the driving instruction, in preparation for the driving test

R.C. Nagele(Traffic Test), D A M · Twisk (SWOV) & J.A M.M. Vissers (Traffic Test). R-96-19. 106 pp · Dfl. 35 ~. (in Dutch)



WOV REPORTS

SWOV RESE ARCH & CIV ITES 6 OCTOBER 1996

IN BRIEF

SWOV carries out research concerning road safety. Our main client is the Dutch Ministry of Transport. Therefore, most reports are written in Dutch. Sometimes however when research is carried out e.g. for the EU or other international bodies reports are written in English. SWOV researchers also participate in international conferences, workshops and seminars and contribute to international journals. These contributions are normally written in English, sometimes in German or French. Some of those are published by SWOV. In this magazine the available reports in English, German or French are mentioned and a summary of the contents is given. Also some Dutch reports are summarised. The complete reports can be obtained by sending an order form to Sandra Rietveld of the public information department of SWOV. The price of each report (in Dutch guilders) is mentioned in this magazine, as well as the language in which it is written. You can pay by credit card After SWOV has received your payment, the reports will be sent to you.

The steel RWS crash barrier applied to the testing ground of the Department of Road Transport

A simulation study W-H.M. van de Pol R 95-64 - 76 pp - Dfl - 78 -50 -(în Dutch)

Two collision trials on the slipform STEP barrier

Report on two crash tests one with a passenger car at 100 km/hour an one with a bus at 70 km/hour conducted by the test institute LIER in France W.H.M. van de Pol. R-95-66 11 pp DII 15, -(in Dutch)

Verification study of simulation results for the RWS barrier

Using the results of full scale tests W.H.M. van de Pol-R 96-6-70 pp-Dfl-47-50-(in Dutch) SWOV has conducted several studies concerning road side safety barriers. The Construction Department of the Ministry of Public Works has recommended that a certain section of the test course of the Department of Road Transport (near the Dutch town Lelystad) be fitted with the steel RWS barrier to serve as a protective shield. The section of road to be screened off is about 170 m in length. The RWS barrier divides two test facilities.

SWOV has assessed the practicability of the proposed solution by performing a number of simulations utilising the computer programme VEDYAC. Simulations were conducted with a passenger car and with two lorries weighing 10 ton and 30 ton, respectively.

The computer simulations show that the RWS barrier is well able to withstand the collisions performed, also under the most favourable angle of approach.

A collision with the passenger car occurs sedately; the distortion of the barrier is minor and the ASI value remains below the standard value.

With the lorry collisions, it is clear that the end anchor plays an important role in deflecting the vehicle. With the 10 ton lorry, there is no question of breakage, either in the barrier itself or in the anchoring of the barrier. A collision with the 30 ton lorry does lead to fracture.both in the anchoring and in the barrier, at approx 50 m from the end anchor.

It is concluded that the proposed facility (which anchors the 170 m long RWS barrier only at the extremities) has a limited effective length. The degree of distortion of the barrier restricts the practicability of the test facility behind the barrier.

A collision with a 30 ton lorry indicated that if the RWS barrier is anchored at each element, this offers a better and more satisfactory solution since the influence of the collision on the adjacent elements is reduced the effective working length of the barrier therefore becomes much longer. It is therefore recommended to anchor each element of the RWS barrier so that it may meet the specified requirements, even under the most unfavourable collision conditions.

Another report concerning crash tests is on trials on actual scale.

In 1993, SWOV was asked by the Netherlands Transport Research Centre AVV of the Department of Public Works to perform a simulation study in order to investigate how the profile of *concrete* vehicle barriers could be further optimised. The results of this simulation study were so encouraging (e.g. there were no cases of 'roll-over' with light passenger cars during simulation) that the Department decided to perform the trials on actual scale.

There are three different version of the STEP barrier: the slipform, the prefab and the version of steel. In this study the slipform version was tested. The STEP barrier should satisfy the 'higher containment level' H2. Two collision trials were conducted: one with a light passenger car with a mass of 900 kg, travelling at a speed of 100 km/hour and colliding at an angle of 20 degrees. In the other test a bus was used with a mass of 13,000 kg, travelling at a speed of 70 km/hour and colliding at an angle of 20 degrees.

Both collision tests show satisfactory results. The collision with the passenger car is very stable; there is no rolling movement. The angle of exit remains within the accepted values, here 7 degrees. The ASI value of the passenger car barely meets level B, since the measured value is equivalent to 1.4 of level B.

The collision with the bus also proceeds well with a small angle of exit of maximally 1 degree, the barrier is not ruptured. The maximal rolling angle is greatest during the 'r carend' effect: about 20 degrees. It was concluded that the slipform STEP barrier meets the 'higher containment level' H2. Comparison of results, achieved by computer simulation and the results from full scale crash tests learns you if the computer simulation program gives an actual description of real life.

In 1990, SWOV performed a number of simulated collisions, using a passenger car and a lorry, versus the steel RWS barrier.

In 1993, the German Institute BASt performed two trials versus the steel RWS barrier at actual scale, one using a passenger car and one using a lorry.

The Construction Department of the Ministry of Public Works has asked SWOV to verify and perhaps further optimise the mathematical translation of the steel RWS barrier in the computer programme VEDYAC, based on the tests conducted at actual scale.

It was found out that the distortion shown with the passenger car in the computer simulation is equivalent to the distortion measured with the trial at actual scale. The location where this maximal distortion is measured is the same in both cases. The ends of the barrier do not change position.

In the computer simulation , the passenger car exhibit sa skidding movement towards the barrier as it moves away from the barrier. With the trial at actual scale, this movement is not registered on film. The ASI value taken from the computer simulation is virtually the same in the simulation as with the trial at true scale, namely 0.35 versus 0.31.

The simulated distortion with the impact of the 10 ton lorry is 2 cm less than the distortion measured with the trial at actual scale viz 124 cm versus 126 cm

The point at which this maximal distortion is measured is equivalent for both collisions. The first element of the barrier moves about 3 cm. With the trial at actual scale, the same degree of displacement is measured.

The behaviour of the 10 ton lorry in the simulation is comparable to the behaviour of the lorry with the t fal at actual scale.

The conclusion, ther fore, is that the data set of the steel RWS barr'er used in the computer simulation for both types of collision enables an accurate description of what actually occurred, so that no further adaptations to this data set are required.

Preliminary study regarding the introduction of a moped certificate

A study on the introduction of a theory exam to obtain a moped certificate D.M. Wijnolst. R-95-65. 33 pp. Dfl. 20, -. (in Dutch)

On June 1, 1996 the moped certificate was introduced in the Netherlands. Person s who from that date attain the age of sixteen and wish to ride a moped or a low speed moped will have to pass a theor y exam in order to obtain this certificate.

In order to gain an impression of the level of knowledge among a current moped riders, in 1995 an exploration was performed amongst 300 young moped riders using a slide series developed by the Driver and Vehicle Licensing Centre CBR.

The knowledge measurement showed that most youngsters' understanding of the traffic process is inadequate to pass the theory exam. Questions based on insight offer fewer problems than those requiring knowledge of road signs and priority rules.

The results will be compared with a knowledge measurement performed one year after introduction of the theory exam for the moped and for the low speed moped.

Based on current voluntary moped courses, the possibilities have been investigated for expansion of the theory exam with a practical section.

Knowledge about what the practical exam entails is already present, and most of the preliminary conditions are also understood. It would therefore be possible to include a practical section in the moped exam. However, there is some uncertainty about the costs of such a practical exam, both with respe q to the organisation and for the consumer In addition, if the potential moped rider can already commence the course and ther efore



drive on the public highway prior to reaching the age of sixteen, the implications for the relevant regulations as they currently apply should be considered.

To assess the potential effect of the introduction of a practical exam for the moped, the situation in Germany was considered where the practical exam for the moped has been in operation for many years. The accident involvement of moped riders around the time when the practical exam was first introduced in Germany was examined. Also in duded in the study are recent accident figure s which show that the situation for moped ride rs in Germany is far safer than the situation in the Netherlands. These data would seem to support the desirability of incorporating a practical section in the moped exam.

Category, design and use of roads

Literature study (part 1:80 km/hour roads) P.C · Noordzij · R-96-1437 pp · D fl · 20,--(in Dutch)

In the study *Category, design and use* of roads, knowledge is collected about the apparent characteristics of roads that are needed to ensure that:

- road users have little or no difficulty in recognising the type of road and the associated traffic situations;
- they have the correct expectations in that regard concerning the course of the road and the presence and behaviour of other road users;
- they understand what behaviour is expected of them and behave as intended, preferably automatically.

The study consists of experiments and a literature study. This report concerns the literature study-

A selection has been made of specific studies of 80 km hour roads and general research has been conducted into the influence of road characteristics and road types on behaviour through observation



The literature shows that one element is shared amongst the studies: the road structure is of great importance - specifically the width, the organisation into carriageways and lanes and the cour se of the road. Also, the surroundings and the type of land us e along the road represents a factor of importance.

Most of the research related to driving speed. How driving speeds can be reduced per road type using visible measures is still not certain. It does seem possible to use warnings signs to draw attention where ne cessary. In more general terms, ribbed lines and surfaces could be tested to establish whether these can enhance the alertness of motorists or cause discomfort in case of undesirable behaviour.

From the literature quoted, it also appears that observation of the road and surroundings can have an effect on the behaviour of the road users in different ways. As a consequence, there are also different ways to influence behaviour.

Three possibilities are distinguished: 1. Using easily visible parts of the

road and immediate surroundings, the road user is assisted in his task and his behaviour is directly controlled

- 2 Parts of the road and immediate surroundings offer an impression of what liss ahead, helping to influence the behaviour of the road users 'via a detour'.
- 3 The impression the road gives elicits a state of mind (e.g. a level of alertness or excitation, or a feeling of danger); this mood affects the behaviour of the road user.

Research into the classification of roads by road users is relatively new-Although it is not yet certain what classification road users would make themselves, it seems advisable to take the identification of the road type as point of departure with the selection of visible measures. More on this subject is found in the next article.

Developments in the field of simulated road images make it increasingly feasible to perform preliminary studies of the effect of visible measures in the laboratory. Nevertheles the actual consequences for behaviour and safety will only become apparent following their application in practice.

To be certain that the intentions of a measure are understood it is necessary to support that measure with information campaigns for road users as well as rules and signs.

Cognitive organisation of road way scenes, part Il

An empirical study of roads inside built up areas C.M. Gundy . R-95-75E . 43 pp . Df l. 25 .-

(in English) (also available in Dutch R 95-75, 43 pp Dfl 22,50)

In Research Activities Number 4 of October 1995, an article was published on the cognitive organisation of rural roadway scenes. In 1995, an identical study was held of roads inside built-up areas. The report describes two experimental studies designed to elucidate road users' cognitive organisation of urban roadway scenes. A sample of urban road locations was stratified by seven road class es, three levels of urbanisation, and by the presence (or absence) of a intersection nearby. These locations were then photographed from the viewpoint of a driver, and road ide characteristics were registered.

The presence of oth & traffic was avoided as much as possible. A selection of 94 photographs were presented to approximately 25 volunteer subjects per experimental task.

In the first experiment, subjects were asked to sort these photographs onto 'piles' of photograph s, placing 'similar' photographs togeth er. and placing 'dissimilar 'photographs' apart. These piles were intended to

be 'meaningful' and 'useful' to the subjects (as determined by the subjects themselves) in their role as automobile drivers.

The sorting data was collected into similarity matrices and analysed by mean sof Multi Dimensional Scaling and Analysis of Variance. The findings were quite clear. Nam dy, subjective similarity judgements were almost entirely 'explained' by the seven road classes.

In a following study other subject swere asked to estimate a safe driving speed and the chance of encountering 'slow' tra fic for each of the 94 photographs investigated in the previous study.

The results were again analysed by means of Analysis of Variance, with results clearly mirroring those of the first study: when drivers view a road scene, the following factors are of primary importance:

- the number (and breadth) of carriageways;

- the presence of a curve. Surprisingly, in contrast to the findings of the investigation of rural roads, the presence (or absence) of inters ections played only a rather negligibl e role in the subjects' judgement.

Traffic safety implications and possibilities for future research are also considered . More concret & y,



it is tentatively indicated that there should be essentially three types of urban roads:

- high-speed arteries where slow traffic is prohibited,
- specially designed residential areas, where all forms of traffic are allowed, yet only (very) low speeds are possible,
- and roads intermediate to the previous two types.

Annual analysis VIPORS 1994; Final report concerning the results of road accident victim registration at hospital emergency departments

L.T.B. van Kampen, J.P.M. Tromp & A · Blokpoel R-95-77 71 pp Dfl. 25,-. (in Dutch)

Assessment of the comprehensiveness and representativeness of VIPORS over the year 1994

L.T.B. van Kampen, & A. Blokpoel. R-95 78. 60 pp. Dfl 22,50 (in Dutch)

Quality Control for VIPORS 1994

A Blokpoel & L.T.B Van Kampen R 95-79 39 pp Dfl. 20 --(in Dutch)

SWOV has published three reports on the subject VIPORS, concerning the year 1994. VIPORS (Road Accidents in the Private Accident Registration System) is a registration system for data concerning (victims of) road accidents reporting for treatment to hospital emergency departments.

One report (R 95-77) describes VIPORS as a registration system and sets out the organisation of the database -

The unique quality of VIPORS is that, apart from a basic set of accident data, injury data are al so registered Furthermore, the individual victims can be approached afterwards by mean s of a follow up study to obtain any required supplementary information concerning the accidents. In addition, the rapid processing of data ensures that VIPORS can be

reported on a quarterly basis.more or less simultaneously with the data supplied by the Road Accident Registration (VOR).

The report illustrates the added value of VIPORS using the cyclist category: their injury data are combined with accident data. In addition, it is demonstrated with respect to car occupants what can be achieved using this registration. For this purpose, the subject of 'whiplash' was chosen, a form of injury which mainly occurs with rear end collisions.

Finally, the VIPORS data were used to correct the representativeness and comprehensiveness of the VOR data.

Report R -95-78 describes an assessment of the degree of representativeness and comprehensiveness of VIPORS 1994, the first operational year of registration.

It was first determined whether victims in the thirteen hospitals that formed the VIPORS sample are a good reflection of victims throughout hospitals in the Netherlands. The degree of correspondence was very high, despite the fact that the VIPORS hospitals do not show a nationwide distribution across the Netherlands.

Next, VIPORS data from 1994 were compared with similar databases

and it was concluded that the VIPORS database gives a sufficiently representative impression of the actual nature of road accident victims who report for treatment to the First Aid departments of hospitals in the Netherlands. The total number of this type of victim is estimated at between 110.000 and 140.000.

Finally, report R-95-79 describes the quality control with respect to the process operations at VIPORS. The final assessment concerning the quality of VIPORS 1994 offers a positive conclusion. The system has also met expectation^s in a quantitative sense. It ¹⁸ anticipated that, in future the quality of the system and the data should improve even further.

Traffic signs, road markings and road safety

P.C. Noordzi) & M.P. Hagenzieker R-96-9. 19 pp. Dfl.15,--(in Dutch)

SWOV has carried out a literature survey of behavioural and accident studies on the relation between traffic signs, road markings and road safety. The conclusions of this study are as follows. The importance of traffic signs for road safety depends on the message they convey; in other words,



the traffic rule relating to that particular spot. Road markings convey a more obvious message, so that their importance for road safety is also more self-evident. They warn of impending danger such as a sharp bend or narrowing of the road. Traffic signs and road markings are intended to convey these messages as effectively as possible.

Experienced drivers seem to prefer to gather information from natural indicators on and around the road, without needing to rely heavily on traffic signs. Yet traffic signs are vital for toad safety - certainly when it comes to giving information about important traffic rules such as speed limits, open or closed carriageways, direction of traffic, lane discipline and priority. These rules are so crucial in preventing hazardous situations that everything must be done to convey their message to all road users (both experienced and inexperienced) in all conditions (good and poor visibility).

The road environment is of major influence in a road users' ability to register traffic signs quickly. Environmental factors include the volume of traffic the number of traffic signs or markings on a particular stretch of road, the presence of distracting images in the background or other indicators in the immediate vicinity which may reinforce or detract from the message on the sign.

These distracting influences can be reduced by following a few general pointers on the design and placement of traffic signs and on the planning of the general road environment (for example, where to place advertising hoardings) in relation to both day and night-time use.

The following measures can be applied to improve the contribution of traffic signs to road safety:

- making a distinction between important and less important traffic signs,
- improving the design of these signs to make them more noticeable.



recognisable and understandable (for example, introducing new signs to indicate what type of road a user is on);

- placing speed limit signs everywhere at the entrance to a (section of) carriageway or to an area, and repeating them where n evessary;
- reinforcing the massage on the sign by means of other, more natural indicators;
- replacing some of the road signs by variable message signs.

Road markings can also contribute to road safety, provided they are restricted to special situations and integrated into a package of various local measures. Special situations' can include warnings of special restrictions in residential areas, entry into a lower speed limit area, the approach to sharp bends on a road with an 80 km hear speed limit.

A stronger position for traffic education

A proposal to Supp Off primary schools for the purpose of trafficedu Cation R.D. Wittink, R. 96-13,53 pp. Dfl. 2250 (in Dutch)

This report discusses how support of schools for the purpos & of traffic education should be organized The que tion relates specifically to primary education. For secondary education, recommendations are made in a more restricted sense.

The situation at present in the Netherlands is that schools do not place a high priority on road safety education themselves since they consider the task a burden. Nevertheless they are prepared to devote more attention to the matter.

The greatest deficien by at the moment is the lack of *practical exercises* for children in traffic. The schools request support for lessons that can actually influence behaviour in traffic Current teaching methods do not seem to adequately meet the schools 'requirements.

A number of school sreceive support with their use of teaching methods and other aids, within the framework of municipal road safety policy; how over this support is not given everywhere. It has been shown that the availability of support represents an important stimulus for schools to become more active in the field of traffic education. In addition, the decentralisation of educational policy offers points of action to lend new impetus to traffic education.

Parents the municipality, the police and the school each bear a responsibility for the road safet y of children. It is necessary to share the tasks and to work together. Stimulating traffic education at school should therefore be linked to stimula ing parents to teach their children saie behaviour in traffic. Furthermore, traffic education should be adapted to suit the infrastructural measures used to promote road safety.

Recent developments in road hazard

Anal Ysis of the road a ^cCident d^ata of 1994 and 1995 M · Brouwer · A · Blokpoel, L.T.B. Van Kampen · R. Roszbach & D.A.M · TWisk · R-96-18 · 62 pp. Dfl · 25,-(in Dutch)

Recent accident figures indicate that road safety in the Netherlands is not progressing as it should. If considerable additional effort is not invested, the objectives specified by policy will not be reached. This is the conclusion drawn in this report, following extensive analysis of the available accident figures up to and including 1995, in combination with explanatory factors such as exposure data, population data, figures regarding the number of cars on Dutch roads, etc.

The analysis al so concerns developments in the number of road accident victims and the risks (in terms of victim s per vehicle kilometre) run by the various categories of road user. The aim of the analysis is to pinpoint those modes of transport, age groups or other relevant categories where extra problems are encountered. The available data are used to illustrate the situation for all groups-

A special analysis is devoted to explanations of long and medium term developments. Although no express statements can be made because the relevant theories have not been fully evaluated at islikely that the reduction in the risk of road accident victim shas for the moment. come to an end The ever in easing (mainly motorised) participation in traffic, linked to a plateau in the level of risk, unfortunately heralds a new period of growing road hazard. If considerable extra effort is not invested, the road safety objective (25% fewer fatalities and injured in the year 2000 with respect to 1985) will probably not be realised. At the end of 1995, a reduction of only 7% with respect to the year of comparison, 1985, was achieved.

The short term developments are considered separately. It is probable that, due to the rise in the total level of road hazard for two years consecutively, this can no longer be viewed as an accidental fluctuation, although the year 1994 does seem to be a negative exception in a number of respects.

Driver support systems and traffic safety

Theoretical considerations M.J. Kuiken & T. Heijer. R-95-68. 24 pp Dfl. 17.50 (in English)

This report provides an overview of possible approaches when considering driver support and traffic safety. One of the main problems when attempting to understand traffic safety is the interaction between a large number of factors. A considerable number of models of driver behaviour and traffic safety have been developed, based in different theories of human behaviour, and focusing on different aspects of the driving task.

The assessment of driver support systems should address potential problems in relation to the environment, the driver and the task. Assessment procedures should focus on potential errors in relation to each of the above mentioned components. The reports summarises different theories of task performance and human error and recommends areas for research.

Incident Warning Systems: The Analysis of Traffic Behaviour

J.E. Lindeifer, S. Opp@& J.G. Arnoldus. R-95-63-56 pp. Dfl- 22,50. (in English)

Incident Warning Systems: Analysis of Traffic Behaviour from loop-detector data

T-Heijer & S. Oppe. R-95-72-44 pp. Dfl. 57,50-(in English)

SWOV-Contributions to the Annual Report concerning WP 31.2, WP 31.3 and WP 31.4.

T. Heijer, J.E. Lindeijer & S. Oppe-D-95-18. 37 pp. Dfl 20,-. (in English)

Part of the DRIVE II Project HOPES is a traffic safety evaluation study regarding Incident Warning Systems (IWS). The major aim of the study is to evaluate the safety effects of different IWS-applications and to compare the outcomes. A se condary aim was to demonstrate how a full scale safety evaluation of a telematics system could be carried out, using all safety relevant events in traffic, ranging from accidents to conflicts, behavioural disturbances and undisturbed passages.

Three systems were selected from DRIVE II projects.

- the PORTICO system, to be implemented at the A1 motorway near Lisbon and at the 1P5, a mountain road also in Portugal;
- the EURO-TRIANG LE system, to be implemented at the Antwerp motorway ring road in Belgium,
- the MELYSSA sy stem, at the A6 motorway' near Lyon in France.

In this frame SWOV has recently published three reports. D-95-18 describes the three Incident Warning Systems that are part of the HOPES Evaluation study R-95-72 regards a retrospective safety evaluation. In R-95-63 an analysis of the traffic process with and with out the system installed gives information on the strong and we ak points of the systems.

Safety effects of road design standards in Europe

Contribution to the international Symposium on Highway Geometric Design Practices, Boston, August 30 - September 1, 1995 F.C.M. Wegman & M. Slop D-95-12-23 pp Dfl-15,-(in English)

This contribution deals with the results of a study on safety effects of road design standards, published in 1994. In this report the conclusions are summarised. As a follow-up a new study will start: SAFESTAR (Safety standards for road design and redesign). The aim is to develop safety standards for highway design and redesign on all classes of road, including tunnels and bridges. A short description is given of the different so-called work packages in this study.

Automatic speed management in the Netherlands

Oei Hway-liem D-95-17. 24 pp. Dfl 17,50. (in English)

Speed warning and enforcement can be applied locally, on a road stretch and on a road network. In this paper, presented at the TRB Conference 1996 in Washington D.C., examples are give of Dutch experiments with the systems mentioned above. It is concluded that greater priority for speed enforcement is needed, also automating the enforcement and processing to increase the efficiency, in combination with information campaigns and feed back signs.

Towards sustainably safe road transport in the Netherlands

Contribution to the Conference Eurotralfic '95: The development of the traffic sector in a deregulated Europe. 22-24 November 1995. Aalborg. Denmark Fred Wegman. D-95-20. 16 pp. Dfl 15.-. (in English)

The recent stagnation in further reduction of road accidents, insufficient results of existing policies to improve road safety and its rather curative nature of these policies induced the wish to renew and to improve road safety policy in the Netherlands. This new approach is called: a sustainably safe road transport system. In this paper, the characteristics of this system are described.

Police Enforcement: Theory and Practice

Contribution to The 23rd European Transport Forum', 11-15 September 1995, Warwick, Eng and Dr. Ch. Goldenbeld D-95-22, 20 pp. Dfl 15, -. (in English)

The general ground rules for effective police enforcement are known: publicity preceding and during enforcement operations; unpredictability of controls, a selective mix of visible and less visible controls, continuity over time. Based on Dutch research in the last fifteen years, an overview is presented of how these ground rules have been operationalised in optimal strategies of enforcement. In respect of four spearheads of national traffic policy (drinking and driving, speeding, seat belt use and behaviour of young moped riders). exemplary strategies of enforcement are described.

The development of these strategies has been done on the assumption that these strategies should not require a police input that is above the conventional input planned for enforcement projects.

The strategy of enforcement of drinking and driving is based on a carefully selected mix of general and specific deterren œ activities. The strategy of enforcement of speeding relies on automated enforcement operations on specially selected stretches of road, preferably within a larger network of inter connected roads: The speed checkpoints themselves are rotated among different locations, and each passing motorist is given feed back that his speed has been checked. An alternative to this automated strategy makes use of the tactic of obtrusively stopping motorists in combination with radar controls. The notion underlying the alterna tive strategy is to make the level of intensity of poli @ enforcement dependent upon the proportion of speeding vehicles The strategies of enforcement of seat belt use and the control of traffic violations by young moped riders emphasise persuasive and educative activities of police as a complement to the direct enforce ment operations:

The described strategies represent a model of how police ideally should operate, but they cannot be taken as a general description of actual enforcement strategies. There are some important barriers between ideal and actual police operations. A number of these barriers derive from the professional culture of the police, and have to do with how policemen - at both upper and lower levels - view their profession and their own identity.

Several recommendations have been given on how police enforcement could be better arranged.

Current statistical tools, systems and bodies concerned with safety and accident statistics

Contribution to the OECD Seminar International Road Traffic and Accident Databases' on 19 September 1995, Helsinki, Finland M.J. Koornstra D 95-24, 17 pp. Dfl 15, -(in English)

Accident and exposure data and statistical analysis methods are a prerequisite for an effective road safety policy. The knowledge on risks and the effectiveness of road safety measures can only be obtained by research with these methods and data soures. Road safety research, the stock of knowledge on road



safety and the knowledge on effectiveness of measures are nowadays an international affair. The knowledge in the field of road safety is based on the accumulation of national research results over more than thirty years. However, the knowledge is still far from complete and on many issues there is no international agreement. For further progress the comparability of national results is a main problem. One big problem is that the variables which describe the national accident data generally are differently defined for each country. Another problem is the accident registration itself. Many accidents, if not most accidents including relative serious ones, are not reported and or not registered. The selectivity in the registered accidents is partially unknown and for so far as it is researched it shows marked differences per country. Not withstanding the progress made, thereby, a meaningful exchange of national results and knowledge progress in the field of road safety are seriously hampered. The use of modern information technology in the registration and processing of accident data and international research cooperation are needed for an improved situation.

The current use of road safety information systems and the few systems for international use are discussed in this paper-Recommendations are formulated for a more efficient, less costly and improved registration of accidents on the local national and international levels. It is argued that cooperation in the use of state of the art tools from modern information and communication technology for accident registration can open new possibilities for unobtrusive international registration harmonisation and cooperative international road safety research. In this report some possible misunderstandings on the level of international organisations are

clarified The needs and possibilities for international accident databases and information systems with different levels of data aggregation and information services are reviewed. It is concluded that an improvement towards a meaningful use of multinational accident and transport data and progress in road safety knowledge are very well feasible by further international cooperation and application of modern information and communication technology.

Progress in the field of urban traffic law enforcement

Contribution to 'The International Conference Strategic Highway Research Program (SHRP) and Traffic Safety on Two Continents', 22 September 1995, Prague, The Czech Republic P.C. Noordzii D-95-26 12 pp. Dfl 15,-(in English)

On the basis of two reviews of studies on police enforcement, recently published, some more general conclusions are drawn on the effectiveness of enforcement strategies.

The elements of effective police enforcement are rather well known: publicity, visibility, target times and places, otherwise random. If actual enforcement of a traffic rule is necessary depends on earlier steps to inform and convince the public of the safety benefits of the traffic rule. Increasing the level of enforcement is not very effective if it has not been made unpredictable.

In urban areas, priority can be given to enforcement on drinking and driving, seat belt wearing, speeding and -in the Netherlandspriority to cyclists at intersections.

Informing and motivating police personnel and communication between all parties involved inside and outside the police organisation, are essential for the realisation of large scale enforcement projects.

Evaluation of legislation on seat belt use on rear seats

Social persuasion as a new measure to promote seat belt Use Oei Hway liem. D-95-27-11 pp. Dfl 15, --(in English)

In the Netherlands, the use of seat belts for front seat passengers was made compulsory in 1975, and on April 1st 1992 the use of rear seat belts if fitted, became a legal requirement. Since 1968, an annual survey of the presence and use of seat belts on front seats - extended in 1989 to include fear seats - has been conducted in the Netherlands. An evaluation of compliante with the law stipulating the use of rear seat



belts was conducted by comparing the observation and surveys carried out in October 1992 and 1991. A significant rise in the use of rear seat belts, when fitted, was foundfrom 15 to 31% in built-up areas and from 12 to 37% on rural roads. For front seat belts, a small increase was found on town roads, from 62% to 66%, while on rural roads the percentage was around 80% in both years. It was calculated that the use of front and rear seat belts has a great growth potential. It is recommended that information campaigns should promote 'social persuasion', with emphasis on the increased risk of injury sustained by a non-belted occupant and the risk of having a proportion of the damage compensation withheld by the insurance company. In addition, the non-user can inflict injury on other belted occupants, and can therefore be sued for damages either by the victims or by their insurance company. Intensive police enforcement combined with public information sustained over several weeks, followed by a period of enforcement at a lower level of intensity can lead to an increased use of seat belts through habituation -

The Road Safety Information Systems RIS: A Tool for Decision Makers

Lecture for the Russian-Swedish Seminar on Traffic Safety Moscow June 18, 1996 P. Wesemann & M. Brouwer-D 96-2. 10 pp Dfl 12,50 (in English)

In this paper the subject is the use of knowledge in the preparation and evaluation of road safety policy-The Netherlands has quite a long and rich tradition of road saf qy re earch -As a result, a large volume of policy relevant information is available -For example :

- accident data,"
- mobility data,
- b havioural measurements (alcohol, seat belts, speed)."
- analyses of the above data:

effect measurements of policy implemented, prognoses;

 knowledge about effective measures, based on research reports.

Some time ago, it was confirmed that all this knowledge was insufficiently exploited by policy organisations. This was partly because of the large amount and the complexity of the data. Another reason was the decentralisation of major tasks from the national level to the regional and local level. To improve this situation, the Dutch Ministry of Transport then asked SWOV to develop the RIS (Road Safety Information System), in cooperation with automation experts.

The RIS is an instrument used to monitor road safety policy. RIS provides access to policy information via a PC application and the so-called RIS help desk, where users can put their questions. From time to time, road safety data are collected, accumulated and interpreted. The PC application was developed at the request of the Ministry of Transport and Public Works for the use of their own civil servants who include road safety within their scope of work, both centrally and regionally.

Now that the policy of the Ministry have become increasingly de entralised and delegated to pro vinces and municipalities, and private industry is also held to ta & for its responsibilities, the group of potential RIS users is growing -A decision about possible expansion of the user group will probably be made soon It could be considered to also make the RIS acc ssible to users outside the Netherlands SWOV has a positive attitude towards such a distribution of knowledge thowev &, the final authority on this subject rests with the Ministry of Transport as owner of the system - While the PC application in principle does not represent an obstacle to the export of the RIS the a vailability of suitable

data is much mor e of a p toblem . Most information with which the system must be fill ed should, after all, r date to the country in question. General knowledge about effective measures, however .can be derived in part from international literature on the subject.

Just recently SWOV has sent in an interesting proposal to the European Road Safety Federation. The project alms at developing a prototype of a RIS for Hungary. The Dutch Ministry of Transport has approved the use of their RIS for the development of such a foreign prototype -

Whiplash injury in relation to insurance claims

A SWOV contribution to research on the scope and severity of the whiplash problem T. Heijer & L T.B. van Kampen-R 95-59. 20 pp . Dfl . 15 - . (in Dutch)

The whiplash problem in the Netherlands

Inventory of activities in the Netherlands in 1994 and 1995 and a description of the problem based on SWOV kno Medge L T B van Kampen R-96-10. 48 pp. Dfl 22 50 (in Dutch)

SWOV has conducted a written questionnaire in ord er to survey the type of whiplash research being conducted in the Netherlands-Report R 95 59 outlines the results, differentiat d according to research on injury prevention medical diagnostic research and case studies-A research approach is proposed to further define the scope and severity of the whiplash problem, seen from the perspective of the insurer.

In report R 96-10 the principal activities in the Netherlands ov er 1994 and 1995 in the field of whiplash are dealt with in brief. It seems that various institutes and persons are involved in aspect s of this neck injury problem -

Based on two contribution sto the whiplash literature by SWOV

staff members, whiplash as an injury mechanism and the related factors are considered in greater detail.

Whiplash and its consequences represent a complex phenomenon involving medical, technical and legal disciplines. This immediately explains why a fairly large number of different institutes and persons have developed activities that generally show little relationship to each other. There is question of a lag in knowledge on all fronts.

Meantime, it seems that Dutch insurers, for whom whiplash injuries represent a large proportion of the total damage claims, have realised a certain degree of coordination with respect to research and other activities.

The role of SWOV as research institute, gatherer of knowledge and advisor is further described and it is indicated by which means the current lag in knowledge can be caught up.

Children's accidents, accident causation, and remedy

Examples from OECD-countries. P.B.M. Levelt D-95-15. 22 pp. Dfl 17,50 (in English)

In this paper childrens' accident data drawn from the IRTAD database are presented, completed with data on separate countries drawn from other sources. Analysis of differences between girls and boys reveal a number of accident causing factors. Finally, some successful safety measures are presented.

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