Annual Report for 1970

Institute for
Road Safety Research SWOV

Stichting
Wetenschappelijk Onderzoek
Verkeersveiligheid SWOV

P.O. Box 71
Deernsstraat 1
Voorburg 2119
The Netherlands

Contents Annual Report for 1971

Introductory

Practically all research projects in hand in 1970 were affected by the shortage of sufficiently reliable reference statistics. Some years ago the police announced that accident records were to be cut down. Subsequently this intention was partly withdrawn; but afterwards local authorities often took individual steps to reduce accident records. All this has brought about a situation in which it has indeed become impossible to base any policy or project whatsoever on the accident statistics officially available. This not only severely cramps and complicates SWOV's work, but it hampers the authorities themselves as well.
We therefore believe there is no need to stress the extreme urgency of obtaining a better functioning and preferably complete system of accident records. SWOV's contribution towards building such a system is reported on elsewhere in this review.

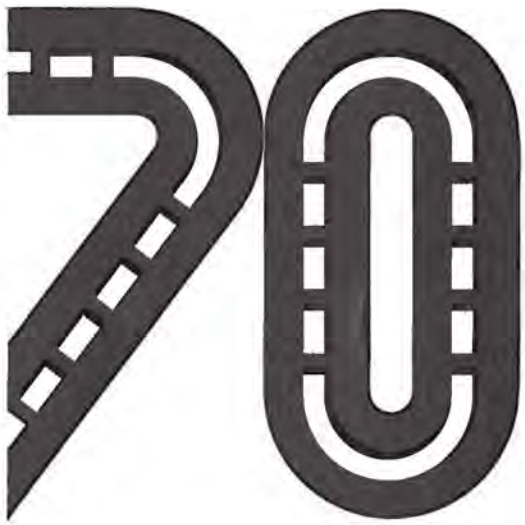
It sometimes happens in the course of research that temporary or permanent changes are made in conditions which when the research was planned were regarded as constant in view of arrangements having been made about them with the authorities.
Although such changes occasionally had a disturbing effect in practice, and sometimes rendered the interpretation of research results difficult, changes themselves by no means rule out research. These changes in situations and conditions in fact provide an opportunity to verify and clarify scientific theories and to gain more knowledge about the effect of such changes. They may therefore provide wider and fuller knowledge and information for SWOV and the authorities as well.
Hence, timely consultation between the authorities and SWOV on contemplated measures or proposed alterations in road and/or traffic conditions provides additional opportunities for research (and thus for information for the authorities too, while it will minimise the disturbing effect of interim changes on projects that are already under way. Good communication between the authorities and SWOV on such matters is therefore of prime importance. An endeavour to safeguard this communication is reflected, among other things, in the setting up of working parties by the authorities. Preliminary discussions were held in 1970 with a view to setting these up in consequence of several actual research projects.

Thanks to this form of co-operation it will be possible:
1. to formulate research problems and terms of reference more precisely;
2. to provide an opportunity for consultation and safeguards as regards the desirable and essential conditions in road and road-traffic situations;
3. to ensure closer co-ordination between research results and the original questions by the authorities;
4. to ensure that the results and conclusions of SWOV research projects are interpreted as correctly as possible in

formulating policy and adopting practical measures.

The authorities and SWOV are both convinced that this form of co-operation and consultation will make an important contribution to the effectiveness of scientific research for the purpose of road safety policy.

Th. J. Westerhout,
Chairman of the Council



Members of the Council

The Council was organised as follows at 31th December 1970:

Th. J. Westerhout, Chairman

Th. van der Meer, Deputy Chairman, on the recommendation of the Nederlandsche Vereeniging De Rijwiel- en Automobielindustrie RAI (Netherlands Association of Bicycle and Automobile Industry RAI)

J. Volmuller, Secretary
on the recommendation of the Minister van Onderwijs en Wetenschappen (Minister of Education and Sciences)

J. D. J. Idenburg, Treasurer
on the recommendation of the Nederlandse Vereniging van Automobiel Assuradeuren (NVVA) (Netherlands Association for Automobile Insurance NVVA)

C. A. Kuysten
on the recommendation of the Koninklijke Nederlandsche Toeristenbond ANWB (Royal Dutch Touring Club ANWB)

J. W. Tops
on the recommendation of the Minister van Verkeer en Waterstaat (Minister of Transport and Waterways)

O. P. F. M. Cremers
on the recommendation of the Nederlandse Wegverkeers- en vervoersfederatie Centraal Overleg (Netherlands Federation of Transport Organisations 'Centraal Overleg')

G. Dekker, surgeon
on the recommendation of the Koninklijke Nederlandsche Maatschappij tot Bevordering der Geneeskunst (Royal Netherlands Medical Association)

W. J. van Eijkern
on the recommendation of the Minister van Justitie (Minister of Justice)

Th. M. J. de Graaf
on the recommendation of the Vereniging van Nederlandse Gemeenten (Netherlands Association of Local Authorities)

F. R. Mijnlieff
on the recommendation of the Minister van Binnenlandse Zaken (Minister of Home Affairs)

P. Siderius
on the recommendation of the Minister van Sociale Zaken en Volksgezondheid (Minister of Welfare and Public Health)

H. Zandvoort
on the recommendation of the Vergadering van Hoofden van Provinciale Waterstaatsdiensten (Joint Directors of the Provincial Bureaus of Public Works)

In personal quality:

J. Kreisel
Hoofdbestuurslid van de Bond van Automobiel-, Garage- en Aanverwante Bedrijven en Voorzitter van de Stichting Vakopleiding Automobielbedrijven (Councillor of the Association of Motor-Car Trades, Garages and Related Industries and Chairman of the Foundation for Professional Training in the Automobile, Motorcycle and Allied Trades (VAM)

P. Muntendam
Hoogleraar in de Sociale Geneeskunde aan de Rijksuniversiteit te Leiden en oud-Directeur-Generaal van het Ministerie van Sociale Zaken en Volksgezondheid (Professor of Social Medicine in the Leyden State University and formerly Under Secretary of State)

H. A. W. Nijveld
Hoofd van de Economisch-Technische Afdeling van de Centrale Organisatie TNO (Head of the Economic-Technical Department of the Central Organisation for Applied Research TNO)

The six members first mentioned are forming the Executive Committee.

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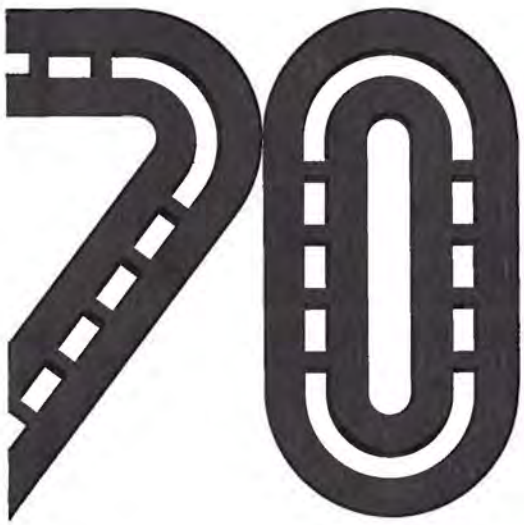

The bureau

The bureau was organised as follows at 31th December 1970

Management
E. Asmussen, Director
K. W. de Bruijn, Administrative Management advisor
Mrs. H. M. E. van Iperen-Heidekamp, Secretary
Miss J .W. Huijsen, Assistant

Research advisors
J. H. Aarts, Medical advisor
M. J. Koornstra, Statistical advisor

Scientific worker at large
F. C. Flury, Scientific Management advisor

Basic Research Department
D. A. Schreuder, Head
H. Botma, Scientific worker
H. L. Oei, Scientific worker
P. I. J. Wouters, Scientific worker
Mrs. T. C. Meerkerk-Schoonbrood, Research assistant
Miss W. M. Frielink, Secretary

Human Factors Department
D. J. Griep, Head
P. C. Noordzij, Scientific worker
R. Roszbach, Scientific worker
J. A. G. Mulder, Research assistant
Miss I. Piller, Secretary

Road and Vehicle Department
H. G. Paar, Head
L. T. B. van Kampen, Scientific worker
W. H. M. van de Pol, Research assistant
A. A. Vis, Research assistant
Mrs. M. Vis-Bakker, Secretary

Road Traffic Department
J. van Minnen, Head
J. Kraay, Scientific work
A. van Deth, Research assistant

Statistics and Documentation Department
J. C. A. Carlquist, Head
Miss Th. H. Brons, Scientific worker
J. M. J. Bos, Research assistant
J. van 't Hoogerhuijs, Project co-ordinator
Miss A. C. den Hartog, Secretary

Section Analysis
P. J. G. Verhoef, Deputy section head
Mrs. Th. Boers-van der Tas, Assistant
Mrs. J. G. van de Pol-Lindeijer, Assistant

Section Perception and processing
J. G. Arnoldus, Section head
V. B. M. van den Akker, Assistant
A. F. Lans, Assistant
W. P. H. Metselaar, Assistant
H. P. Scholtens, Assistant

Section Collection of reference data
A. Blokpoel, Section head
J. F. de Bruin, Assistant
Mrs. A. Vroklage-Lantinga, Assistant

Section Literature research and documentation
J. F. Demmenie, Section head
A. Sourek, Assistant
F. P. G. van IJsensijk, Assistant

Library
Mrs. G. Teeuw-Jongsma, Librarian
Miss P. van den Berg, Assistant
Miss J. van der Zwan, Assistant

Public Relations/Editorial-Production Department
R. Maas, Head
G. C. Ederveen, Editor
Miss A. D. Kant, Secretary

International Co-operation Department
E. Thöenes, Head

Planning and Progress Control
M. Lamers
H. C. A. P. van Drunen, Assistant

Personnel
C. Kablau
Miss G. J. van Gaalen, Secretary

Accountancy
J. C. Balten
Miss M. J. C. van der Meer, Assistant

Records
J. A. Willemse
J. van den Beuken, Assistant
J. E. Hornung, Assistant

Domestic affairs
Mrs. M. Rusche-Vieveen, Waitress

Telephone/Information
Miss M. Neefe, Operator
Miss C. C. M. Bos, Operator/typist

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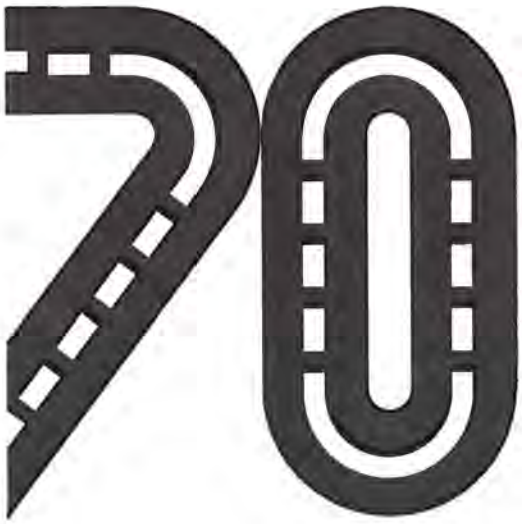

Traffic flow models for traffic arteries

In order to be able to check mathematical models of car-following in traffic flow under actual conditions, films of traffic flows were made in 1969. Processing of the resulting data by means of a computer programme was commenced in co-operation with the Central Technical Institute TNO-TH. The first computer programme, however, did not work accurately enough.
A different mathematical approach was applied in order to avoid these inaccuracies. Meanwhile the possibilities of alternative filming methods have been investigated. The general exploratory research by the Institute of Applied Physics TNO-TH into the use of lasers was completed. It was found that lasers could be used for car-following research if a new aiming system was developed. This would not be a drawback, except that the use of directional controlled laserbeams will be very expensive. Meanwhile a specification has been drawn up for Doppler radar equipment suitable for use in traffic-flow research.

Mathematical model of vehicle and driver

The object of a mathematical model of the vehicle and the driver is to verify hypotheses regarding vehicle behaviour.

This research will be carried out in conjunction with the project Analysis of the driving task. In 1970 a study of the literature on physics, mathematics and cybernetics was started.

General characteristics of retroflectors
Research was carried out in 1970 to determine general optical and luminotechnical properties of reflectorised materials and the effects of dirt, moisture, etc. on these. As part of this, the University of Karlsruhe was asked to make experimental studies. SWOV carried out network planning in co-operation with the university for this work.
The project leader's illness and unrest at the university, however, delayed the construction of measuring equipment.

Road safety in dusk and darkness
Work was done in 1970 on a state-of-the-art review of aspects that might play a part in road safety and traffic hazards in dusk and darkness.

Colour of headlights
Outside scientific circles discussions are quite frequent on the advantages of white motor-vehicle headlights over yellow, and vice versa. The demand for scientific data on this subject led to a start being made on scheduling the available know-how and literature. The work was completed in 1970. A report is under preparation.

Fog
The study of scientific literature on fog which commenced in 1969 – for which the Royal Meteorological Institute KNMI was contacted regarding frequency and local distribution of fog and the British Atomic Energy Research Establishment, inter alia on dropletsize distributions – will be finalised in the form of a report.

Road-surface reflection
The working party on Lighting and Road-surface Textures of the Road Construction Study Centre is investigating, under SWOV's chairmanship, whether there is any general correlation between road-surface friction, light reflection and texture. This is being done on the basis of measurements made by KEMA, the State Road Laboratory and Philips' Lighting Laboratory. The work made good progress in 1970.

Human Factors Department

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Analysis of the driving task
In this research project, driving is split up into a number of part tasks, in order to understand the processes governing driver behaviour. Theoretical studies on system-analytical, perception and decision aspects of driving behaviour were completed at the bureau of the SWOV.
Contract research on the effects of alcohol on human performance parameters in a laboratory situation and the effects of alcohol on driver behaviour variables was completed in 1970 by the Institute for Perception RVO-TNO.
The Institute was subsequently given two new projects: a) research into perception aspects of manoeuvering behaviour, b) research into the effect of stress on information processing.

Standards for driving: driving instruction
Two lines of research are being carried on to find reference data for standards for taking part in motorised traffic.
Firstly, this concerns research into effectiveness of simple simulators for driving instruction. The performance of a group of persons taught by a 'Drivotrainer' owned by the Dutch Road Safety Association was compared with the performance of a matched group taught by conventional methods. The contract research was done by Intagon, The Institute for Applied Behavioral and Agological Research at the University of Amsterdam. The results indicated a low efficiency of the Drivotrainer. A report on the tests with this device was already passed on to the sponsor and to their initiator, the Dutch Road Safety Association, in 1969.
Efforts were subsequently made to contract out research aimed at developing a system of assessing driving performance. This work would precede a study project for the development of alternative methods of improving driving instruction. Discussions with various institutes disclosed little interest in doing research in this field.
The second part of the research related to the accident rate in relation to driving test performance, driving instruction and biographical variables. Statistical processing of the information involves complications that are delaying progress.

Breath analysis methods
Research relating to the calibration and mechanical reliability of breath analysers was done by the Analytical Centre of the Central Laboratory TNO, Delft. This was necessary because such analysers had to be used for the driving and drinking survey in September 1970.

Habitual offenders (drinkers)
Contract research by the Criminological Institute of Groningen State University into the identification of habitual offenders could not be completed owing to complications in the statistical analysis of the material.

Road side survey into drinking and driving
A road side survey was made into motorists' driving and drinking habits on weekend-nights from 11th September to 15th November.

Crash helmets for moped riders
In the middle of 1970 research started into the standards a crash helmet for moped riders should satisfy.
At the Minister's request, special attention is being paid to an acceptable helmet.
The aim is a lightweight, inexpensive helmet as attractive as possible in design and wear.

Perception of vehicles
In 1970 the sponsor, the Ministry of Transport and Waterways, was given a report on the research into the categorisation of vehicles by rear lighting systems. Work has meanwhile commenced on a study into time-related vehicle characteristics, such as position, and change in speed and direction.

Ergonomics and traffic
The purpose of this research is to obtain more information on the relationship between motor-car interiors and anthropometric characteristics, such as drivers' stature and physical abilities, fo instance the application of force to the pedals and the reach of the arms.
Discussions with appropriate institutes and/or laboratories with a view to their undertaking part of the research, however, have not produced any results to date. The possibility is now being examined of including the study as a part project in other research.

Roadside safety structures
Although the research was officially closed in Spring 1970 by publication of the Roadside Safety Structures report, the Ministry of Transport and Waterways still required some further information. Thus, a small number of impact tests were made with a raisable barrier intended to allow a passage through crash barriers in central reservations. An existing barrier proved unsuitable though in use in Western Germany. In collaboration with the manufacturer, modifications were made which produced a partial improvement when tested. Further improvement is envisaged by building the barrier of steel instead of aluminium.

A project for developing a mathematical model to simulate impact tests with roadside safety structures was completed in 1970. The model was developed at SWOV's request by Prof. Dr. Ing. V. Giavotto, of the Technological University, Milan. Comparative tests have shown that the model works well. Owing to a simulation method using this model, impact tests with crash barriers, as these are likely to develop in the years ahead, can be minimised, with a big saving in costs.

Obstacles
The further work required by the Ministry of Transport and Waterways on roadside safety barriers meant that after a small number of tests the further research programme on obstacle had to be deferred for the time being.

Safety structures for bridges
As a logical consequence of the roadside safety structure research, the Ministry of Transport and Waterways asked for a number of tests to be made with safety structures for flyovers and underpasses. These tests grew into systematic research during which various structures were developed that can be applied in the different conditions occurring in practice.
Tests with these structures at expansion joints in bridges led to further research for more satisfactory solutions. Following an idea put forward by SWOV, Koni N.V. are now developing special shock absorbers for this purpose. It seemed advisable to ask Professor Giavotto, who had already made the succesful mathematical model for roadside barriers, to devise a similar model for bridges. This could represent a big saving on a full-scale impact programme which may be required in view of the further wishes of the Ministry of Transport and Waterways and which will be necessary if new industrial developments emerge regarding safety structures for bridges. For determining some details of this mathematical model the Institute TNO for Mechanical Constructions (IWECO-TNO) made a number of tests with various types of posts in 1970.

Vehicle characteristics – safety belts
The object of this research is to find a basis for means of modifying as yet unspecified vehicle characteristics in such a way that the number and severity of injuries can be reduced. It focuses primarily on safety belts. At the end of 1970, the collection of information on personal details of persons involved in road accidents, their injuries and the damage to their vehicles was completed as planned. Information relating to over 15,000 drivers involved in accidents was obtained, including that for 1200 safety belt users. This information will be processed in 1971 and 1972. The nature, scope and conduct of this research drew the attention of NATO-CCMS for its Accident Investigation Project. The information to be collected in an international pilot study is almost the same as has been collected in the SWOV research.
The information from an enquiry needed for research into the fitting and use of safety belts outside built-up areas – a similar enquiry was made in 1968 – plus that from an enquiry now also made inside built-up areas was processed during 1970. Work has meanwhile been

done on a detailed study of the literature on research into safety precautions and possibilities.

Tyres, road surfaces and skidding

The by no means simple objective of this research – to determine the extent of skidding and to examine the influence of various possible contributory factors – already led in 1969 to the working party for this project being split up into several sub-parties.

Sub-party I started in 1970 with preparatory work on experimental multi-factor research into the relationship between road and tyre factors and the coefficient of friction between tyres and road surfaces. This research is being done in collaboration with Prof. J. W. Sieben and the Institute TNO for Mathematics, Information Processing and Statistics (IWIS-TNO).
Sub-party II has almost completed initial literature research into the relationship between braking-power distribution, deceleration and vehicle stability.
Sub-party V has begun investigations into the relationship between road-surface friction and accident hazards. This work is based on the results of exploratory investigations earlier in 1970.
Sub-party VII has investigated the literature on the influence of tread depths and the coefficient of friction between tyres and road surfaces. This work was completed in 1970; the results were passed on to the working party.

Sub-parties III, IV and VI exist for administrative purposes only. They will start functioning on the basis of the investigations by the above sub-groups made within the working party.

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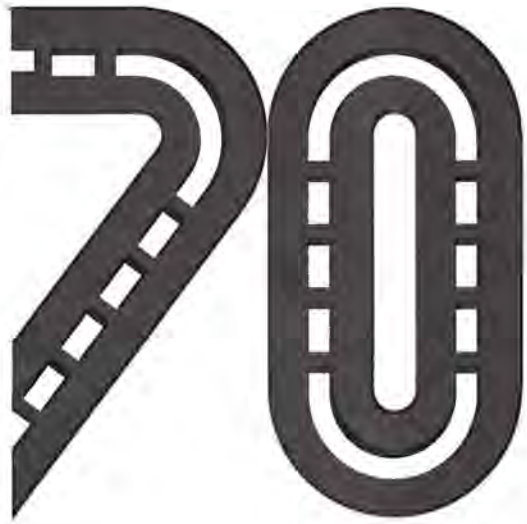

Submerging vehicles
After completion of the test programme at the end of 1969, some further tests were found to be necessary when the information was being collated. Like those a year earlier, these tests attracted considerable attention from organisations and publicity media. This created a big demand (and hence a 'need') for provisional test results. This interrupted the compilation of the report. A statement of the provisional findings was drawn up and supplied, inter alia, to the Royal Dutch Life-saving Association. Meanwhile provisional plans were made for an instructional film on escaping from submerged vehicles. This had become possible with the films made of the tests by the Foundation for Film and Science for analysing the results.

Railway level crossings
For the purpose of statistical research into accidents on railway level crossings, the scheduling of crossing characteristics continued, though not all the 2800 crossings already recorded were examined again. It was sufficient to make a random check spread over seven districts. This work went according to plan.
The initial analysis of accident statistics and a literature study were also commenced. Information now available will be embodied in an interim report in 1971.

Speed limits
The basic data of 15,000 accidents occuring on research and control roads while the investigations were proceeding were passed on in 1970 for initial processing by the Institute TNO for Mathematics, Information Processing and Statistics (IWIS-TNO). The same was done with speed-limit measurements. After completion of the work by IWIS-TNO the resulting information was processed further by SWOV. The amount of work involved, however, has proved bigger and more difficult than was envisaged, because the effects of the reconstruction of roads used for the researach have to be traced and isolated. As part of these investigations, the relationship was studied between speed distributions and overtaking, use being made of speed-distribution data collected during the investigations.
Research in other countries into the effect of speed limits was also scheduled, in order to make comparison possible with SWOV's research. As there was a great need for this in the Economic Commission for Europe (the ECE) the work, in collaboration with Statens Trafiksäkerhetsverk, Sweden, was speeded up. It was used as the basis for a Swedish-Dutch report in the ECE. The effect of police enforcement on compliance with speed limits was also examined, with reference to measurement data obtained in the investigations.

Pedestrian safety
A laborious study of the literature – there proved to be a vast amount of it, mainly from other countries, which was not up to standard – resulted in a descriptive report that will be presented to the Minister of Transport and Waterways in 1971. It (again) reveals how defective road- and accident records are and how this obstructs research.
Meanwhile further plans have been made for international comparative research into pedestrian safety for the OECD Research Group in Pedestrian Safety. These plans have been accepted. Preparations have been made for a simple enquiry in a number of Dutch municipalities for the purposes of this OECD research.

Priority rules
Study of the literature on scientific research elsewhere into the functioning of priority rules continued in 1970.
The results, together with information obtained in exploratory SWOV investigations in 1968 and 1969, will be put in the form of a descriptive report in 1971.
The information collected for the forthcoming descriptive report has been incorporated in a report by the OECD Research Group on Road Safety at Junctions in Urban Areas, which contained a number of sections prepared by SWOV.

Collection of reference data
Each quarter in 1970 a full week's observations were made of the number of persons travelling per car. These were made at three measuring points, two of them in built-up areas. They not only provided car utilisation degree data for weekdays and weekends, but it has now also become possible to estimate the total mileage per occupant.

An enquiry made by Shell covering some 2000 moped riders had a series of extra questions by SWOV included, which provided information on the possession and use of mopeds, accidents and possession of crash helmets. This information will be analysed in two stages. The first is for the Crash helmets for moped riders research project, the second for a general review on mopeds in road traffic which will appear in due course.

For the Complete accident records project, inter alia, an analysis was made, based on data from the Central Bureau of Statistics in the Netherlands (CBS) of the effect of the limited accident records in this country. It is being examined how this effect has developed with the passage of time. The provisional information obtained is not very promising about the reliability of the present official statistics.

Complete accident records

1. The Steering Group on Statistical Traffic Accident Analysis (SAVO). Although, in order to gain more insight into this subject, a report was contemplated on the problem of the present road accident records and their implications, inter alia, for scientific research other work had to be given priority; the enquiry into driving and drinking by motorists which SWOV had wanted for many years but which was delayed by extraneous factors was at last able to proceed. Besides this, the absence of the report was not an obstacle to the further work mentioned in 2 and 3.

2. Insurance companies' accident records. In order to ascertain to what extent insurance companies' claims records could be processed to obtain differentiated statistics of accident data, vehicles and road characteristics, about 10,000 claim forms from eight different insurance companies were coded and put in punched card form. 'Pairs' of accidents are now being sought for, which are known both to insurance companies and the police. A quick glance had already shown that by no means all accidents known to insurance companies also appear in police records and from there in official accident records.

3. Medical records of road-traffic casualties. In 1969, in co-operation with the Rotterdam Municipal Medical & Health Department, the Rotterdam police and a number of hospitals, a project for obtaining medical data of road-traffic casualties was launched. The first particulars, totalling 2,000, were received in 1970. They relate solely to medical aspects, so that the persons concerned have an absolute guarantee of anonimity.
Punched-card processing has begun in the meantime.

Reports, publications and papers

In 1970 the following reports, publications and papers have been published:

Enkele medische aspecten van het vraagstuk der bejaarden in het verkeer. Dr. C. R. N. F. van Joost, medisch adviseur SWOV. Metamedica 49 (1970) 3: 100 t/m 107.*

Analyse van de rijtaak hoogst noodzakelijk. Ir. E. Asmussen. RAI-bijlage Algemeen Handelsblad/Nieuwe Rotterdamse Courant/Het Vaderland, 3 februari 1970, blz. 2.*

Enkele criteria voor de vormgeving van voertuigen en weg. D. J. Griep, psychol. drs. Wegen 44 (1970) 3: 58 t/m 62.*

Weerwoord op de 'dupliek' van drs. A. van der Burgh en de 'Erwiderung' van dr. D. von Klebelsberg. D. J. Griep, psychol. drs. Ned. Tijdschr. Psychol. 25 (1970) 2: 119 t/m 122.*

Alcohol en Verkeer. Ir. E. Asmussen. Verkeerstechniek 21 (1970) 1: 37 t/m 41.*

In 1969 minder doden verwacht? J. van Minnen, Verkeerstechniek 21 (1970) 4: 206 t/m 207.*

Bermbeveiliging. Een beschrijving van de ontwikkelde geleiderailconstructies. SWOV (ir. M. Slop). Rapport 1970-1. SWOV, 1970. 60 + 33 uitsl. blz. geïll.

Reflectorized registration plates and alternative means. Function, design and application. (Vehicle perceptibility 2). SWOV (D. J. Griep and E. Thoënes). Report 1970-2. Institute for Road Safety Research SWOV, 1970. 62 pp, ill.

Safety clothing for work on the road. SWOV (D. J. Griep). Report 1970-3. Institute for Road Safety Research SWOV, 1970. 32 pp., ill.

Aanwezigheid en gebruik van autogordels. Enquête 1968/1969. SWOV (Th. P. M. de Grefte en ir. H. G. Paar). Publikatie 1970-1. SWOV, 1970. 48 blz.

Road lighting and traffic safety. A functional approach. Dr. ir. D. A. Schreuder. Proc. Premier congrès européen de la lumière, Strasbourg, 1969. Lux No. 57 (1970) pp. 146-147 and 256-263.

A simple method for the appraisal of glare in street lighting. W. Adrian & D. A. Schreuder. Lighting Research and Technology 2 (1970) 2: 61-73.

Bermbeveiliging (sconstructies). Ir. E. Asmussen. Verkeerstechniek 21 (1970) 6: 301 t/m 305.*

Pedestrian safety. A report by an OECD Road Research Group. B. M. Biehl in co-operation with S. J. Older and D. J. Griep. Organisation for Economic Co-operation and Development, Paris, 1970. 72 pp.

Skidding accidents. Considerations on road surface and vehicle characteristics. First interim report of the SWOV Working Group on Tyres, Road Surfaces and Skidding Accidents. Report 1970-4. Institute for Road Safety Research SWOV, 1970. 58 pp., ill.

A crude framework for bypassing exposure. F. A. Haight. J. Safety Research 2 (1970) 1:26–29

Jaaroverzicht 1969. Stichting Wetenschappelijk Onderzoek Verkeersveiligheid SWOV, 1970. 36 blz., geïll.

Annual report for 1969. Institute for Road Safety Research SWOV, 1970. 32 pp., ill.

Red warning triangles. Function, design and application. (Vehicle perceptibility 3). SWOV (D. J. Griep and F. C. Flury). Report 1970-5. Institute for Road Safety Research SWOV, 1970. 58 pp., ill.

A functional approach to lighting research. Dr. ir. D. A. Schreuder. Proc. Tenth International study week in traffic and safety engineering 7–11 september 1970, Rotterdam. Theme III: Recent developments in methods of improving night visibility. 5 pp. World Touring and Automobile Organisation (OTA), London, 1970.

Roadside safety structures. A description of the crash barriers developed in the Netherlands. SWOV (M. Slop). Report 1970-6. Institute for Road Safety Research SWOV, 1970. 60 pp., ill + 33 drawings.

Institute for Road Safety Research SWOV, its work and its progress. Verkeerstechniek 21 (1970) 9:456.

Auto's te water. A. A. Vis. Verkeerstechniek 21 (1970) 9:457 t/m 462.*

Analyse van het rijgedrag. Enkele begrippen. D. J. Griep, psychol. drs. Verkeerstechniek 21 (1970) 9:463 t/m 468.*

Een methode voor de kwalificatie van het voorrangsgedrag op kruisingen. J. van Minnen. Verkeerstechniek 21 (1970) 9:469 t/m 475.*

Verkeers(on)veiligheid als multidisciplinair verschijnsel. Ir. E. Asmussen. In: Stichting Postakademiale Vorming Verkeerskunde. Cursus Verkeersveiligheid 1969/1970. Syllabus I.1 19 blz + 6 blz. ill.*

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