METHODOLOGIES FOR
IMPROVING UNEXCEPTIONAL DRIVERS

ANNOTATED AND CLASSIFIED BIBLIOGRAPHY

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The purpose of this bibliography is to provide a guide, and to a limited extent, an interpretation, of the literature which is pertinent to the design of instructional programs aimed at improving the unexceptional, "non-negligent" adult driver. Resources for such efforts are presently limited, as by far the greatest amount of both program development and evaluation, and other relevant research, has been directed towards "negligent" road-user groups. The relative contribution of negligent and non-negligent operators to the overall accident problem is by now too well known to require us to justify here the need for experimentation with training programs involving some personal contact with large numbers of non-negligent drivers.

A selection has been made from a sizeable international search of documents published in English. All items referenced have been individually reviewed. It is hoped that the ratings given to each will enable readers to quickly identify references of substantive interest to their efforts. Comments on the usefulness of the ratings and the subject-matter classifications are invited and will be considered in the preparation of updated editions. Correspondence should be addressed to:

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ACKNOWLEDGEMENTS

This bibliography would not have been possible without the assistance of a number of people who supplied literature and information for review. In particular, we would like to thank: Dr. John W. Eberhard of the Office of Driver and Pedestrian Research, National Highway Traffic Safety Administration, for access to the American University collection; and Ms. Kathleen Weber, Librarian of the Highway Safety Research Institute and her staff, for their painstaking assistance in pursuing references, often on very scanty information.
## CONTENTS

Foreword

Acknowledgements

How to Use this Bibliography

### 0.0 Behavioral and Educational Research

- 0.0.1 Evaluation Studies
- 0.0.2 Program Description/Recommendations
- 0.0.3 Instructional Materials

### 1.0 Road User Characteristics Research

- 1.1 Road User Background Characteristics and Capabilities
- 1.2 Road User Operational Performance Studies

### 2.0 Studies and Descriptions of Programs to Change Road User Behavior

- 2.0.1 Evaluation Studies
- 2.0.2 Program Description/Recommendations
- 2.0.3 Instructional Materials

- 2.1 Beginning Road User Education and Training
  - 2.1.1 Evaluation Studies
  - 2.1.2 Program Description/Recommendations
  - 2.1.3 Instructional Materials

- 2.2 Non-Negligent Road User Improvement
  - 2.2.1 Evaluation Studies
  - 2.2.2 Program Description/Recommendations
  - 2.2.3 Instructional Materials

- 2.3 Negligent Road User Improvement
  - 2.3.1 Evaluation Studies
  - 2.3.2 Program Description/Recommendations
  - 2.3.3 Instructional Materials

- 2.4 Road User Licensing and Control
  - 2.4.1 Evaluation Studies
  - 2.4.2 Program Description/Recommendations
  - 2.4.3 Instructional Materials

### 3.0 Bibliographies

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38.  
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HOW TO USE THIS BIBLIOGRAPHY

There are three aids to the identification of items of interest to readers:

1. An overall subject-matter classification.

2. Ratings on a five point scale of the quantity of information in six categories of critical relevance to the design of unexceptional driver programs.

3. Annotations specially written with the purpose of this bibliography in mind, where the item is of high relevance, or if needed to clarify content not readily identified through the title.

A discussion of each follows:

SUBJECT-MATTER CLASSIFICATION

This was devised to permit the logical organization of the bibliography into sections corresponding to major differences in overall subject matter. A listing of these categories will be found on the contents page. It is a hierarchical classification with up to three levels of grouping. The rationale can be summarized as follows:

0 Behavioral and Educational Research -- This covers research not especially directed toward road-users. It is intended as a sample of the large number of relevant items which might be sought by those designing unexceptional driver programs. By definition, this section cannot be rated for relevance on the six key categories.

1 Road User Characteristics, Research -- This section is similarly a sample, and in many cases the relevance ratings are omitted as inappropriate; it does, however, cover a number of areas of driver behavior research which should be considered in the design of programs, and has two second-level divisions approximating the
distribution between research focused on the background characteristics and capabilities of road users and that concerned more with performance.

### 2 Studies and Descriptions of Programs Designed to Change Road User Behavior

This is the major part of the bibliography, and has been divided into four second-level divisions covering beginning road user education, both non-negligent and negligent road user improvement, and road user licensing and control; each of these and the overall (2.0) category have third level divisions as follows:

1. **Evaluation Studies**, which includes both evaluations of actual programs and discussions of techniques.
2. **Program Descriptions and Recommendations**, including administrative guidelines.
3. **Instructional Materials**, signifying that the item is itself some form of instructional publication, or is solely concerned with their design or production.

All items in this section have relevance ratings.

### 3 Bibliographies

A small number of these useful for further study in this area; no relevance ratings are given.

It should be noted that items are listed at the first or second levels if they cover more than one of the second or third level areas. For example, research comparing driver background characteristics to driving record are listed under 1.0. The 2.0 section has third level divisions (2.0.1, 2.0.2, 2.0.3), as there are a number of studies covering several types of programs (for example, driver control and improvement).

At the third level of division in section 2, the groupings represent the dominant nature of the item. Thus evaluation studies usually include...
brief program descriptions, and both of these frequently include learning materials in appendices.

In the overall criteria for inclusion, we would note that in view of the intensive literature on the special topic of alcohol, we feel justified in omitting all but a couple of items classifying the definition of drunk driving for countermeasure programs. Also excluded is literature on programs and efforts designed to change professional bus and truck drivers; however, we have included material on fleet programs for automobile and light commercial vehicle drivers, as they are one of the few sources of experience on large-scale non-negligent driver training.

Finally, there is difficulty classifying studies on the effectiveness of instructional techniques. Our policy is to place them in section 1 if they involve only small scale laboratory investigation of learning, and section 2 (especially 2.0.1) if they describe an operational training program for road users, even if it was operated solely for evaluation/piloting purposes.

RELEVANCE RATINGS

The columns to the right of pages in sections 1 and 2 give our subject rating of the quantity (as opposed to quality) of information relevant to six categories of critical importance to unexceptional driver programs. The ratings are on a five point scale, A high and E low. The six categories may be summarized thus:

I. INSTRUCTIONAL CONTENT:
The content of actual training programs, or information useful for developing content.

II. INSTRUCTIONAL SITUATION:
Methods of teaching or persuading road users, including technical descriptions of educational/psychological settings.

III. TESTING AND EVALUATION METHODS:
Criterion testing appropriate to content and/or institutional situations.
IV. Assignment and Screening for Instructional Situations:

Any techniques used to match personal or driving history characteristics to different instructional situations; also used if study has information on the characteristics of road users self-selecting themselves into defined instructional situations, with or without inferences on acceptability of different situations.

V. Methods of Identifying "Good" and/or "Poor" Drivers:

Information on the instruments or a posteriori analytical technique used.

VI. Characteristics of "Good" and/or "Poor" Drivers:

As with V, relative to actual driving record or some definition of "good" performance.

We would emphasize the importance of categories I, II, III, and IV over V and VI. The last two are clearly more relevant to negligent driver programs, but not exclusively so. Even studies exclusively focused on those road users classified a priori as negligent contain useful findings and insights which may be applied to the design of non-negligent driver programs, especially in the difficult task of developing instruction for drivers with widely differing personal and performance characteristics.

Annotations

Annotations in this bibliography are not intended to abstract the findings of studies. Rather, they provide some additional information on the content of items, relative to the purpose of this bibliography where:

(a) An item has received at least one "A" or two "B" ratings on categories I through IV, or

(b) Some notes are necessary to identify useful content not evident from the title of the document.

Concerned with type of instructional objectives that are stated in terms of actions expected of students upon completion of instruction.


A brief tabular review of 73 studies using secondary task techniques. Primary tasks include actual and simulated vehicle driving and a variety of visual and auditory tasks in laboratory settings.

Barrett, G. V. and Thornton, C. L. "Relationship between perceptual style and simulator sickness," *Journal of Applied Psychology,* vol. 52, no. 4, 1968, pp. 304-308. Refs. 25

"Simulator sickness" used to denote the symptoms which occur in fixed-based simulators having a moving visual scene. Sickness caused by conflict between the visual presentation of apparent motion and the lack of corresponding body sensation of motion. Field independent person more aware of cues which are in conflict and thus he becomes ill.


Procedures for continuous assessment of safety performance in the industrial plant setting, using critical incident technique, and environmental and behavioral sampling.


A review of the Weiss and Rein paper "The evaluation of broad-aim programs: experimental design, its difficulties and an alternative" (reference in this section). Campbell examines four of Weiss and Rein's major criticisms of experimental methods in terms of alternative formulations of the experimental approach.

Comprehensive and definitive review of major experimental and quasi-experimental design techniques for evaluating innovations in complex social settings. Sensitive to political realities.


A broad collection of papers on theoretical issues in risk-taking behavior together with research reviews and appraisals of several programs designed to modify risky behavior.


An introductory discussion on four conceptual levels of safety measurement. Favors a dynamic systemic approach, but recognizes that safety management has yet to achieve decisive measurement.


Analysis of lengthy participation by five S's in a decision-making game using financial payoffs and penalties supports the notion that levels of risk taking are maintained largely independent of the severity of hazards. (NOTE: See Taylor, D.H.)


A basic study indicating that different aptitudes became prominent in the successful performance of complex psychomotor tasks at different stages of the learning of such tasks.

0.0 BEHAVIORAL AND EDUCATIONAL RESEARCH (contd.)


Broad discussion of the problems associated with the evaluation of attempts to prevent or ameliorate accidents in the pre-crash and crash phases.


SACC attempts to measure the quality of classroom communication using categorical ratings of teacher and pupil behaviors and their interaction. This paper includes some background to the system as well as SACC Form Revision V (Short Form). The technique was adapted for use in the California Driver Training Evaluation Study reported by the same author (see Section 2.1.1 of this bibliography).


A comprehensive basic discussion of traffic safety program coordination problems. Emphasizes errors of omission in published evaluations; in driver program studies; lack of content for exposure is noted in particular. Comprehensive community-wide measurement of program impact is favored.


Discussed deficiencies of work in research relating to accident causation and prevention.
0.0 BEHAVIORAL AND EDUCATIONAL RESEARCH


A discussion of the use of activity-situations and social nature (whether victim was alone or with a group) as well as culpability in the classification of accidents.


Development and application of critical incident technique; methodology generalizable to "any situation where the operators are equally committed to safety objectives as well as task performance."

Sheppard, D. Classifying and coding answers in questionnaire surveys, Unpublished paper, RRL Technical Note TN 604, Road User Characteristics Section, Road Research Laboratory, Department of the Environment, Crowthorne, Berkshire, England, April 1971. 14p. Figs. Refs. 4

Useful discussion of this problem with examples drawn from driver surveys.


Methodology for the qualitative study of development and change is discussed as an alternative to experimental design in the evaluation of broad social innovations. (See Campbell, D.T. "Considering the case against experimental evaluations of social innovations," in this section, for a review of this paper.)

1.0 ROAD USER CHARACTERISTICS RESEARCH

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Title</th>
<th>Publication Details</th>
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<tr>
<td>Aaron, J. E.</td>
<td>A correlational study between self concept and driver performance in post driver education male and female students in selected southern Illinois high schools (using a highway systems research car).</td>
<td>September 1972. 73 p. Prepared under Project no. 02-01-24 for Office of Superintendent of Public Instruction Safety Education Section, Springfield, Illinois.</td>
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<tr>
<td>Asher, W. and Dodson, B.</td>
<td>Social, psychological, and educational characteristics of adolescents and young adults killed in Indiana accidents.</td>
<td>Purdue University, Joint Highway Research Project, October 1970, no. 26.</td>
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</table>
1.0 ROAD USER CHARACTERISTICS RESEARCH (contd.)


Barrett, G. V. and Thornton, C. L. "Relationship between perceptual style and driver reaction to an emergency situation," *Journal of Applied Psychology*, vol. 52, no. 2, pp. 196-176.


Burg, A. The relationship between vision tests scores and driving record--general findings. Institute of Transportation and Traffic Engineering, Department of Engineering, University of California, Report no. 67-24, 1967.


1.0 ROAD USER CHARACTERISTICS RESEARCH (contd.)


(Summary of instrument available from the Instructional Research Laboratories, University of Wisconsin, 305 Education Building, Madison, Wisconsin 53706).


Presents two differing viewpoints on the potential for influencing drivers and other demerits of the road accident problem. Cohen emphasizes some novel approaches to improving vigilance and communication. Preston favors a more conventional set of countermeasures which he calculates, could save about 70% of fatalities in the United Kingdom. A useful primer when considering the "operating philosophy" of driver programs.


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1.0 ROAD USER CHARACTERISTICS RESEARCH (contd.)

Cumming, R. W. "The analysis of skills in driving," Australian Road Research, vol. 1, no. 9, March 1964, pp. 4-14. Figs. Refs. 14

Findings on human performance used to build a conceptual model of the operator as a decision, transmitter and processor of information and in turn this is used to derive principles to be followed in the design of transport systems. Mentions basic characteristics of people and then discusses difference in the way young and old perform "skilled" tasks.


Dunn, L. "The development of an instrument to measure knowledge of traffic safety concepts found to differentiate between violators and non violators," Ph.D. dissertation, Michigan State University, 1963. 71p. Figs. Refs. 42


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1.0 ROAD USER CHARACTERISTICS RESEARCH (contd.)


Statistical summary of relevant research published through the summer of 1957.


1.0 ROAD USER CHARACTERISTICS RESEARCH (contd.)


1.0 ROAD USER CHARACTERISTICS RESEARCH (contd.)


Results are presented which demonstrate that various groups of subjects with different levels of driving experience can reliably be discriminated on the basis of a battery of psychomotor performance measures.


Interesting speculative discussion of a study (N-7) suggesting that drivers with low level of autonomic activity perform better on three actual driving tasks measured under controlled conditions.


(Two page English summary of the findings of a study of the relationship between an observer rating from a test drive, various psychological tests, and the accident record for 91 drivers; the study was closely replicated after three years with 182 additional drivers. All were male Volkswagen drivers who volunteered.)

1.0 ROAD USER CHARACTERISTICS RESEARCH (contd.)


1.0 ROAD USER CHARACTERISTICS RESEARCH


1.0 ROAD USER CHARACTERISTICS RESEARCH (contd.)


1.0 ROAD USER CHARACTERISTICS RESEARCH (contd.)


Preliminary findings from the Vermont ABETS study, which uses individual assignment of key psychological test items as well as biographical questions on a series of DWI and non-DWI groups.

Quenault, S. W., Golby, C. W. and Pryer, P. M. Age group and accident rate--driving behaviour and attitudes, 1968, RRL Report LR 167, Road Research Laboratory, Ministry of Transport, Crowthorne, Berkshire, England, 76p. Figs. Photo. Refs. 5


1.0 ROAD USER CHARACTERISTICS RESEARCH (contd.)

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<td>Schlesinger, L. E. and Safren, M. A.</td>
<td><em>Perceptual analysis of the driving task,</em> <em>Highway Research Record,</em> No. 84, pp. 54-61.</td>
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1.0 ROAD USER CHARACTERISTICS RESEARCH (contd.)

Road Research Laboratory, Department of the Environment, Road User Characteristics Section, Crowthorne, Berkshire, England.


A landmark study suggesting that drivers pace themselves in order to keep consistent an acceptable level of anxiety. Major implications for re-education and training efforts.


1.0 ROAD USER CHARACTERISTICS RESEARCH (contd.)


An important analysis of the potential for injury accident reduction through countermeasure programs.

Zylman, R. "Drivers' records: are they a valid measure of driving behavior?" Accident Analysis and Prevention, vol. 4, no. 4, December 1972, pp. 333-349.

Refs. 18
1.1 BACKGROUND ROAD USER CHARACTERISTICS AND CAPABILITIES

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<td>Ferguson, W.S., and Cook, K.E. Phase I: a theory of driver motivation: The results of structured group interviews with selected high school students: Virginia youth and traffic safety, Virginia Highway Research Council, Charlottesville, Virginia, 1968.</td>
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<td>The George Washington University, Attitude scale on driving behavior, Driver Behavior Project, Washington, D.C., n.d., 8 pp.</td>
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1.1 BACKGROUND ROAD USER CHARACTERISTICS AND CAPABILITIES (contd.)


Newsome, L.R. A perceptual factor that could contribute to road accidents, 1967, RRL Report LR 135, Road Research Laboratory, Department of the Environment, Crowthorne, Berkshire, England.

1.1 BACKGROUND ROAD USER CHARACTERISTICS AND CAPABILITIES (contd.)


Speaks of tasks for research and future research trends, quotes other studies. Briefly mentions Conover attitude scale and Siebrecht attitude scale.


1.1 BACKGROUND ROAD USER CHARACTERISTICS AND CAPABILITIES (contd.)

1.2 ROAD USER OPERATIONAL PERFORMANCE STUDIES

Aaron, J.E., A multivariate study of objectively measured driver performance factors of high school students (using a highway systems research car). Prepared under project number 02-01-24 for Office of Superintendent of Public Instruction Safety Education Section, Springfield, Illinois, September 1972, 89 pp.


Baker, J.S. and Carnichael, G.V. Giving and scoring driver road tests, Traffic Institute, North-western University, 1960, 21 pp.


Brody, L., "A study of the learning of selected driving skills through exposure to a specially produced motion picture film," Traffic Safety, April 1960, Refs. 15.
1.2 ROAD USER OPERATIONAL PERFORMANCE STUDIES (cont.)


Purpose of experiment - to study a group of trainee drivers during their course of instruction in order to investigate the relationship between final driving ability and
1. previous driving experience;
2. performance on intermediate, weekly progress checks,
3. objective measurements made on the trainees' use of the vehicle's controls at weekly intervals,
4. reserve capacity.
Object was to assess the possibility of using one or more of these tests early in training in order to select potential drivers validly and reliably for a course of limited duration.


A study (N=7841) of six years of records demonstrated that within a representative sample of California drivers, the vast majority of accidents were experienced by previously accident-free drivers. Conviction experience was more stable over time than accident experience, and more stable for males than females. Record information became more reliable as the period of time of which it was accumulated increased.

1.2 ROAD USER OPERATIONAL PERFORMANCE STUDIES (contd.)


Chesapeake Systems Corporation (company no longer in existence). *Drivermeter, CSC/HSR can* n.d. 4p. (Equipment descriptions only.)


Motion pictures from a following vehicle.


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1.2 ROAD USER OPERATIONAL PERFORMANCE STUDIES (cont.)


A discussion of measurement models taking on a variety of approaches to the exposure problem. Evidence for the existence of a widely believed accident-experience learning curve phenomenon.

1.2 ROAD USER OPERATIONAL PERFORMANCE STUDIES (cont.)


Detailed description of initial development of a research program featuring the Drivemeter equipment developed by F.N. Platt of Ford Motor Company and the author.


1.2 ROAD USER OPERATIONAL PERFORMANCE STUDIES (cont.)


Study deals with the feasibility of designing a digitally computer-generated image system for a research driving simulator. Suggests applications and benefits of using simulator in order to study interactions of drivers.


1.2 ROAD USER OPERATIONAL PERFORMANCE STUDIES (cont.)

Life Technology, Inc., The ITI - driver valuator, pamphlet--Life Technology, Inc., California, 2 pp.
Brief description of equipment only.


Purpose: to devise techniques for the development of a road test, to develop a road test through application of these techniques, and to assess the validity and reliability of the techniques and road test through experimental employment of the road test with groups of drivers.


Examines eye movement patterns of novice and experienced drivers in order to determine the nature of some of the components of visual skill in auto driving.
1.2 ROAD USER OPERATIONAL PERFORMANCE STUDIES (cont.)


Neyhart, A.E., *Road test check list for passenger car drivers (also taxis, small panel trucks, station wagons, and other vehicles of approximately six feet in width)*, Instruction Sheet, American Automobile Association, Washington, D.C. and Institute of Public Safety, University Park, Pennsylvania, 4 pp., 1955.


Parker, P.M., *Driving behaviour during the first three years after passing the driving test*, TRRL Technical Note No. 750, Transport and Road Research Laboratory, Department of the Environment, Crowthorne, Berkshire, England, January 1973, Not for Publication.

### 1.2 ROAD USER OPERATIONAL PERFORMANCE STUDIES (cont.)


A very comprehensive review of the large numbered California driver record study, (1964) in relation to other driver research published through 1969.


Influence of temperature on accidents and driving efficiency (sensory motor tasks)


Describes the development of the method of systematic observation of driver behavior. The composition and training of teams of observers to carry out 3 versions of the method are described as is the equipment used.

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<td>Quenault, S.W., Development of the method of systematic observation of driver behaviour</td>
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1.2 ROAD USER OPERATIONAL PERFORMANCE STUDIES (cont.)


Use of a projective driving situation test, and intelligence test and a personality inventory together with a structured subjective road test to derive a tentative four-class typology of drivers. Includes instruments, date and procedures.


Four methods of obtaining information on driver behavior are described. Evaluation of the methods is based on practical experience. Emphasis is on description and evaluation of methods.


1.2 ROAD USER OPERATIONAL PERFORMANCE STUDIES (cont.)


1.2 ROAD USER OPERATIONAL PERFORMANCE STUDIES (cont.)


A broad discussion of the rationale for "physical," "behavioral," and "results" standards for driver learning devices such as simulators.


1.2 ROAD USER OPERATIONAL PERFORMANCE STUDIES (cont.)


Results indicated that young female drivers of different ages may differ in their patterns of danger perception. Older drivers concerned about roadway and traffic hazards; younger drivers more concerned about roadway hazards. Exposure difference but no difference in driving skill.


An assembly of 12 techniques for emergency maneuver training together with rationale, and summaries of performance measures/criteria, and instructional facilities required.
1.2 ROAD USER OPERATIONAL PERFORMANCE STUDIES (cont.)


A statistical argument applying the Greenwood-Yule (poisson) model to the 1964 California Driver Record Study data (referred to in this section). Adds evidence that previous accident record alone is not a useful predictor of subsequent accident experience.

White, W.J., Memorandum to W.F. Millikin, Jr., Cornell Aeronautical Laboratory, Inc., Vehicle Dynamics Department, n.d., 6 pp.


An experiment (N=25) on a highway not open to traffic showed: (a) under experimental conditions, subjects instructed to drive with maximum safety, maintain similar following distances to those under
1.2 ROAD USER OPERATIONAL PERFORMANCE STUDIES (cont.)

instructions to drive normally; following distances under instructions to drive as in an emergency were much shorter; (b) optical aids and trained time judgment significantly and substantially reduced following distance judgment error.


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2.0 STUDIES AND DESCRIPTIONS OF PROGRAMS TO CHANGE ROAD USER BEHAVIOR


(Summary of thirteen individual studies performed under this project.)


Fig. Presents a framework for a broad "systems" approach to driver improvement. Includes an exhibit of negligent driver target groups by type of driver improvement technique.

Risk, A. W. *An examination of the relevance of current educational research for driver education*. University of Salford, Road Safety Research Unit, Department of Civil Engineering, August 1973. 48p. AA/CVM Road Safety Research Project. Refs. 76

2.0.1 EVALUATION STUDIES


2.0 STUDIES AND DESCRIPTIONS OF PROGRAMS TO CHANGE ROAD USER BEHAVIOR

2.0.1 EVALUATION STUDIES (contd.)


Two matched groups of young British soldiers (N=35, 29) receiving initial instruction to drive three ton trucks were used to compare massed and spaced training regimes. The "spaced" group took longer to pass a driving test, but did not significantly differ in success rate or errors on the test.


2.0.2 PROGRAM DESCRIPTION/RECOMMENDATIONS


A brainstorming of the possible implications of the NHSB (now NHTSA) Standard on Driver Education and Training with respect to program design and evaluation.


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2.0 STUDIES AND DESCRIPTIONS OF PROGRAMS TO CHANGE ROAD USER BEHAVIOR

2.0.2 PROGRAM DESCRIPTION/RECOMMENDATIONS (contd.)


An argument against continuing driver improvement efforts without making drastic changes to the entire system of highway transportation management. Special emphasis on serving local community traffic safety needs and linking driver and highway improvement.


In response to a contract to develop a plan to evaluate current and proposed licensing programs, the authors devised a broad program development framework known as planning-feedback-change.


A review of the driver licensing and improvement practices nationwide, and pertinent research. Study was intended to write rigid national standards for driver licensing, but summarizes here the flexibility needed to respond to driver needs, rather than operate on unrealistic screening process which attempts to isolate "bad" drivers.
### 2.0 STUDIES AND DESCRIPTIONS OF PROGRAMS TO CHANGE ROAD USER BEHAVIOR

#### 2.0.2 PROGRAM DESCRIPTION/RECOMMENDATIONS (contd.)

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2.0 STUDIES AND DESCRIPTIONS OF PROGRAMS TO CHANGE ROAD USER BEHAVIOR

2.0.2 PROGRAM DESCRIPTION/RECOMMENDATIONS (contd.)


2.0.3 INSTRUCTIONAL MATERIALS


2.1 BEGINNING ROAD USER EDUCATION AND TRAINING

Goldstein, H. G. "The 'case' against driver education," Journal of Safety Research, vol. 1, no. 4, 1969, pp. 149-164. Fig.

2.1.1 EVALUATION STUDIES

------. "Driver education evaluation shows—effectiveness of various programs," Texas Transportation Researcher, vol. 8, no. 4, October 1972, p. 2


2.1 BEGINNING ROAD USER EDUCATION AND TRAINING

2.1.1 EVALUATION STUDIES (contd.)


Results of an experiment comparing the training in a car to training on a shadowgraph simulator showed no significant difference (N=72). Performance on the intelligence test, a test of mechanical comprehension, showed fairly high correlations with speed of learning to drive. The data also shows that older people take longer to learn to drive. Sample lesson record sheet and instruction programs for simulator and car along with diagrams of the simulator road layout and off road driving test route are included.


Provides a description of the Auto-Tutor—a driving simulator which works on the shadowgraph principle and is one of the cheapest simulators available in Britain. 55 driving schools using the simulator responded to a questionnaire about instruction and advantages of the Auto-Tutor. The general opinion was that the simulator was most suitable for teaching pupils with no previous experience and enabled an instructor to teach a pupil more easily on the road especially to the teaching of controls. The report cites the findings of their own (Transport and Road Research Lab.) experiment with the Auto-Tutor and also discusses other aspects of simulator driving covered in the questionnaire.
2.1 BEGINNING AND ROAD USER EDUCATION AND TRAINING

2.1.1 EVALUATION STUDIES (contd.)


A study (N=12,000) comparing California high school driver training to commercial driver training and also comparing standard six hour training or simulator training (short training programs) with an enriched program providing four extra hours behind-the-wheel (long training programs). Comparisons of immediate criteria (training variables), intermediate criteria (licensing variables), ultimate criteria (driving records), teaching techniques, and costs reveal no significant differences in subsequent mean accident rates for pupils taking any of the courses. Commercial courses were, however, considerably less expensive.


Describes the study design procedures for a cost-benefit analysis of driver training programs comparing secondary school instruction with commercial school instruction.


A useful sampling of pupil and adult opinions on the acceptability of driver training programs. (NOTE: In California "driver training" denotes behind-the-wheel instruction only.)
2.1 BEGINNING AND ROAD USER EDUCATION AND TRAINING

2.1.1 EVALUATION STUDIES (contd.)


The authors' attempt at "scientific housecleaning" for this contentious area. A useful review of claims of effectiveness in various types of driver education (mainly high school), and of the technical problems of evaluation.


Malfetti, J. L. "Critical incidents in behind-the-wheel instruction in driver education," Highway Research Bulletin, No. 330, 1962, pp. 69-86. Fig. Refs. 11


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2.1 BEGINNING AND ROAD USER EDUCATION AND TRAINING

2.1.1 EVALUATION STUDIES (contd.)


A comparison of the driving records of 521 people who completed the conventional public high school driver training and students who received commercial driver training showed that the commercial course was probably better than the public course. Points out some of the structural faults of both training programs and gives a possible alternative for a more effective training program.


One of four concurrent DOT funded studies of this problem. Emphasizes use of experimental design techniques and a variety of driver measurement techniques.


2.1 BEGINNING AND ROAD USER EDUCATION AND TRAINING

2.1.1 EVALUATION STUDIES (contd.)


A landmark study of beginning driver education in the United Kingdom. Study compared pupils in selected schools; in half of the schools, a driver education course was introduced (total pupil N=1800). Because very few pupils in Britain reach licensing age while they are still at school unless they are in academically advanced ("grammar") schools, this study was necessarily restricted pupils above the population average in measured academic ability. A very comprehensive study involving psychological testing of experimental and control groups, and analysis over two years of driving knowledge and attitudes, license test performance, methods of subsequent driver instruction, age of learning to drive and license application, number gaining license, miles driven, and surveyed accident/violation experience. Uses advanced statistical techniques. Follow-up studies are planned for an additional two years. Results in this report suggest substantial improvements in knowledge attributable to the course, as well as increases in the number of licenses obtained and decreases in miles driven, for trained pupils. Accident/violation data was inconclusive but trends suggest a possible effect of training on the type of accident.

Risk, A. W. An examination of the problems of continuous assessment in driver education. Road Research Unit, Department of Civil Engineering Report. August 1973. AA/CVM Road Safety Research Project. 23p. Fig.

### 2.1 BEGINNING AND ROAD USER EDUCATION AND TRAINING

#### 2.1.1 EVALUATION STUDIES (contd.)

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<td>Seals, T. A.</td>
<td>An evaluation of selected driver and traffic safety education courses. August 1966, Information and Education Department, Aetna Life and Casualty, Hartford, Connecticut. 15p. Fig.</td>
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<td>Shively, J. E. and Asher, W.</td>
<td>&quot;Characteristics of students who could not take and schools which did not offer driver training,&quot; The Journal of Educational Research, vol. 64, no. 4, December 1970. pp. 185-189</td>
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A summary of the characteristics of persons taking their first driver license examination, their previous experience with other vehicles and the method of training used. These data were related to their test results. The questionnaire used to obtain this information is included along with tables indicating, for example, the relationship between age and pass rate, pass rate to occupational class of men drivers, and pass rate to method of training.

Divided the learning task into two parts—motor skills and perceptual skills. Results showed that this part—method of training was not successful. Tasks learned in isolation have to be "unlearned" when used together. A description of psychological tests and off road training exercises is attached. Also a section on correlations between psychological test scores and driver training variables.
2.1 BEGINNING AND ROAD USER EDUCATION AND TRAINING

2.1.1 EVALUATION STUDIES (contd.)


2.1.2 PROGRAM DESCRIPTION/RECOMMENDATIONS


(NOTE: Summary description; author notes that a full description is published commercially under a series known as "Learning to Drive" from the Addison-Wesley Publishing Company, Menlo Park, California; we have not reviewed these.)


Included as an example of the many state-produced driver education curriculum materials packages. The Illinois materials are exceptionally well developed around a three way classification of content elements.

2.1 BEGINNING AND ROAD USER EDUCATION AND TRAINING

2.1.2 PROGRAM DESCRIPTION/RECOMMENDATIONS (contd.)

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* A guide to the presentation and content of three films covering: rural driving, driving in traffic, and critical driving patterns. Gives theoretical basis for the films.


* A painstakingly detailed description of the task of behind-the-wheel instruction, written after ten years of experimentation by the author. It has been much underused because of its length.


* A concise but comprehensive resource book on the use of film-type fixed base simulators in driver education. Summarizes research findings on use of this equipment.


* A brief guide for driver education teacher on the use of behavioral objectives and "contrast" modules.
### 2.1 BEGINNING AND ROAD USER EDUCATION AND TRAINING

#### 2.1.2 PROGRAM DESCRIPTION/RECOMMENDATIONS (contd.)

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A comprehensive classification of driver education content with detailed instructional objectives (several for each of 31 teaching "episodes"). Intended to enable teachers to develop their own curricula. (Also see three critiques of this curriculum, prepared for Committee 3 (Driver Education) of the Highway Research Board, meeting of October 27, 1970, Chicago, Illinois by: Earl D. Heath, Leon G. Goldstein, and Robert H. Kisk.)


The interim version of the comprehensive driver education curriculum developed under DOT sponsorship from its earlier task analysis. Specifications cover performance and mediating objectives, instructional approaches and materials needed by teachers, student and participating parents.
2.1 BEGINNING AND ROAD USER EDUCATION AND TRAINING

2.1.2 PROGRAM DESCRIPTION/RECOMMENDATIONS (contd.)


Applies the concept of role exchange to driver training by using audiovisual materials, classroom instruction and practice driving sessions. Comparison with a control group showed that the role exchange group were more aware of other drivers and spent less time learning factual material in the classroom. The program improved attitudes as well as skills and knowledge.


2.1 BEGINNING AND ROAD USER EDUCATION AND TRAINING

2.1.2 PROGRAM DESCRIPTION/RECOMMENDATIONS (contd.)

Quane, W. L. *Visual perception and the driving task.* n.d. Published by Highway Users Federation for Safety and Mobility, Washington, D.C. 18p. Refs. 21
Brief non-technical review of the literature in this area, written for driver education teachers.


2.1.3 INSTRUCTIONAL MATERIALS

2.1 BEGINNING AND ROAD USER EDUCATION AND TRAINING

2.1.3 INSTRUCTIONAL MATERIALS (contd.)


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### 2.2 NON-NEGLIGENCE ROAD USER IMPROVEMENT

#### 2.2.1 EVALUATION STUDIES


  Articles on safety programs operated, respectively, by two California Highway Patrolman aboard U.S. Navy ships, and a "hot car" enthusiast at overseas military bases.

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The American University, Follow-up questionnaire; U.S. Coastguard driver improvement project, Development Education and Training Research Institute, Washington, D.C., 1972.

Mailed questionnaire on exposure, social, drinking and driving habits, accidents and violations. Also additional material on the relationship between the items and twelve "perspectives" (aspects) of driving competency, together with associated behaviors and possible criterion measures.

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The Department of Motor Vehicles (in cooperation with the Dept. of Education & National Highway Safety Bureau), 3-hour pre-licensing orientation program, Albany, New York, 1971, 5 pp.

Summary of interim results on accident, conviction, suspension and revocation data—substantial reductions attributable to program; research methodology not described.

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2.2 NON-NEGLIGENCE ROAD USER IMPROVEMENT

2.2.1 EVALUATION STUDIES (contd.)


Study (N=42) shows that skid control techniques can be taught to drivers and that an undetermined amount of practice on a fixed-base driving simulator can be substituted for some skid pan practice. Includes a section on the total annual operating cost of the skid pan and simulator.


2.2 NON-NEGLECTIBLE ROAD USER IMPROVEMENT

2.2.1 EVALUATION STUDIES

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### 2.2. NON-NEGLIGENCE ROAD USER IMPROVEMENT

#### 2.2.1 EVALUATION STUDIES (contd.)

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<td>Planek, T.W., Comments on Dr. Sorenson's assessment of: an evaluation of the National Safety Council's defensive driving course in selected states, National Safety Council, March 26, 1973, 6 pp.</td>
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<td>Sorenson, W.W., Assessment of: an evaluation of the National Safety Council's defensive driving course in selected states, State Farm Research Department, March 1973, 4 pp.</td>
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2.2 NON-NEGLIGENCE ROAD USER IMPROVEMENT

2.2.1 EVALUATION STUDIES (contd.)


2.2.2 PROGRAM DESCRIPTION/RECOMMENDATIONS


A guide for classroom and behind-the-wheel training of postal drivers in the operation of mailsters, 3-wheeled postal delivery vehicles. Includes course materials used, film strip script narration, sample training test course, and a section on mailster driving remedial training.
2.2 NON-NEGLECTIBLE ROAD USER IMPROVEMENT

2.2.2 PROGRAM DESCRIPTION/RECOMMENDATIONS (contd.)


Ford Motor Company, "Bringing the highway into the classroom," The American Road, August 1969, pp. 16-17.

Article on the testmate programmer learning device for classroom driver instruction.


Franzmeier, S., "Troopers learn vehicle and personal limitations in pursuit driving course," Traffic Digest and Review, 11(8), August 1963, pp. 8-11.


2.2 NON-NEGLIGENCE ROAD USER IMPROVEMENT

2.2.2 PROGRAM DESCRIPTION/RECOMMENDATIONS (contd.)


Experiments to measure the effect of a leaflet on the wearing of reflective clothing by children.


The success of a DDC course in the Philadelphia area jointly sponsored by the Insurance Co. of North America, WIP radio station and the NSC is discussed from a public relations standpoint. Three reasons are outlined: enthusiastic company backing support of publicity media, and good administration and management.


2.2 NON-NEGLECTENT ROAD USER IMPROVEMENT

2.2.2 PROGRAM DESCRIPTION/RECOMMENDATIONS (contd.)

Michigan Department of State, First-time renewal program, information sheet on proposed program provided for Michigan Driver Education Association Annual Conference, Bellaire, Michigan, May 11, 1973, 3 pp.


Smithson, F.D. and Whitworth, R.A., Development of an "advanced" driver education program, revised, General Motors Corporation, Proving Ground Section, Report No. 4637, April 1972, 23 pp. figs. refs. 18, photos.
Identifies specific driving emergencies that are common driver problems. describes training used to handle these emergencies, and evaluates the program by comparing the driving records of trained control groups. Course outline and the six driving exercises are included.

Strasser, M.K., The development of a program of driver selection training and education for commercial motor vehicle fleets, Dissertation for Ph.D., New York University, 1949, 360 pp., 35 Refs.

A comprehensive survey of commercial fleet operations and detailed recommended operating practices.


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2.2 NON-NEGLECTIBLE ROAD USER IMPROVEMENT

2.2.2 PROGRAM DESCRIPTION/RECOMMENDATIONS (contd.)


A short review of the variations in the Defensive Driver instructor development program offered in Columbus, Ohio highlighting course objectives, student recruitment, class structure, instructor qualifications, course procedures, and monitoring procedures.


Article on inexpensive racetrack experiences offered to the public in miniature pace cars on a scaled-down track circuit.

2.2.3 INSTRUCTIONAL MATERIALS


2.2 NON-NEGLECTIBLE ROAD USER IMPROVEMENT

2.2.3 INSTRUCTIONAL MATERIALS (contd.)

Canada Safety Council, *Defensive driving manual*,
Canada Safety Council Defensive Driving Program,
1972, 50 pp. Figs.

Fales, E.D., *The book of expert driving*, New York,

A guide for adult drivers intended to enable
mastery of car handling, driving techniques,
and dangerous driving conditions. The book
covers many detailed principles of good driving,
including interpretation of other drivers' actions. Many diagrams and sketches.

Rodolf, J.D., *How to drive; a guide for beginning and
experienced adult drivers*, Washington, D.C.,
American Automobile Association, Traffic Engineering
and Safety Department, 1972, 124 pp. Figs.

Broad coverage of basic driving traffic techniques,
plus advice for specific hazardous situations,
including accidents and extreme weather. 13-page chapter on towing trailers. Some reference to
reducing pollution and operating costs.

The Ministry of Transport, *Driving--the ministry of
transport manual*, London, Her Majesty's

U.S. Post Office Dept., *The mailsters professional
drivers manual*, Post Office Dept. Publication 49,
August 1966, 24 pp. Figs.

A pocket-sized manual which instructs the pro-
fessional postal driver on the operation and
driving of the mailster--a three-wheeled vehicle,
powered by a two-cylinder engine. The manual
covers standard vehicle procedures, and accident
prevention but also includes special problems
in mailster and truck driving.

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## 2.3 NEGLIGENT ROAD USER IMPROVEMENT

### 2.3.1 EVALUATION STUDIES

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2.3 NEGLECTED ROAD USER IMPROVEMENT

2.3.1 EVALUATION STUDIES


(Included for some background on delimiting the definition of "drinking drivers.")

Kaestner, N. and Syring, E. M. Brief driver improvement interviews in Oregon; a follow-up report. Oregon Department of Motor Vehicles, Driver License Division, Salem. June 1968. 15p. Figs.

Kastelle, C. G. and LeSueur, C. M. An evaluation of the Pierce County pilot program in driver improvement utilizing the group discussion method. Washington State, Department of Motor Vehicles, August 1965. 35p.


2.3 NEGligent ROAD USER IMPROVEMENT

2.3.1 EVALUATION STUDIES

<table>
<thead>
<tr>
<th>Author(s)</th>
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<tr>
<td>Marsh, W. C.</td>
<td>&quot;A re-evaluation of group driver improvement meetings.&quot;</td>
<td>California State Department of Motor Vehicles, Division of Administration, Research and Statistics Section.</td>
<td>1967</td>
<td>120-131</td>
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2.3 NEGLIGENT ROAD USER IMPROVEMENT

2.3.1 EVALUATION STUDIES


Wilson, W. T. Lonero, L. and Brezina, E. "A skills-improvement approach to collision reduction," March 1, 1972—prepublication copy. To be published in Canadian Psychologist. 20p. (Driving," the learning booklet used is referenced in section 2.3.3.)


2.3.2 PROGRAM DESCRIPTION/RECOMMENDATIONS

2.3 NEGLIGENT ROAD USER IMPROVEMENT

2.3.2 PROGRAM DESCRIPTION/RECOMMENDATIONS


2.3 NEGLIGENT ROAD USER IMPROVEMENT

2.3.2 PROGRAM DESCRIPTION/RECOMMENDATIONS (contd.)

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<td>Thowp, S.</td>
<td>Court sponsored driver improvement programs. (Presented at the 9th Annual Conference, American Driver and Traffic Safety Education Association, 1965.)</td>
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2.3 NEGLIGENT ROAD USER IMPROVEMENT

2.3.3 INSTRUCTIONAL MATERIALS

2.4 ROAD USER LICENSING AND CONTROL


2.4.1 EVALUATION STUDIES


Review of the Sylvania Report. Summarizes the amount of agreement with study recommendations by four state agencies--Department of Motor Vehicles, California Highway Patrol, Office of Traffic Safety and Administrative Office of the Courts. Level of implementation is rated in each case.

2.4 ROAD USER LICENSING AND CONTROL

2.4.1 EVALUATION STUDIES (contd.)


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2.4 ROAD USER LICENSING AND CONTROL

2.4.1 EVALUATION STUDIES (contd.)


2.4.2 PROGRAM DESCRIPTION/RECOMMENDATIONS


A basic detailed manual covering a wide range of recommended examining procedures. Includes a section on vision and other physical and mental factors.
2.4 ROAD USER LICENSING AND CONTROL

2.4.2 PROGRAM DESCRIPTION/RECOMMENDATIONS (contd.)


McKeown, B. "Driver's license for snowmobiles?" Popular Mechanics, January 1974, pp. 156-158.


2.4.3 INSTRUCTIONAL MATERIALS

3.0 BIBLIOGRAPHIES


