

- (b) To what extent is there economic justification for expenditures to improve voluntary observance?
- (c) To what extent does business-like enforcement result in increased observance?
- 6 What is the relationship between business-like enforcement and traffic accidents?
- 7 (a) How can traffic law violations most effectively be reduced?
- (b) What is the relative importance of the various deficiencies and miscarriages of enforcement, and how can they be most effectively reduced or eliminated?
- (c) What enforcement procedure and methods are most effective?
- (d) To what degree are various penalties real deterrents?
- (e) What should be the penalties for various violations?
- (f) What would be the advantages of uniformity in penalties in different jurisdictions?
- 8 (a) What procedure and methods can police officers use most effectively in reducing traffic violations?
- (b) What training will best fit them for this work?
- 9 What are the most effective organization and methods of operation for a traffic court?
- 10 (a) What are the essential qualifications for a judicial official who is to handle traffic cases?
- (b) How best can men with these qualifications be placed and maintained in such positions?
- 11 To what extent should enforcement procedure for use in municipalities be specified in the State Vehicle Code?
- 12 The state and county aspects of these questions also warrant consideration—also the problems of a Metropolitan area including numerous Municipalities

THE ACCIDENT-PRONE DRIVER

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It has long been agreed that the "human factor" is the chief element in causing or preventing accidents—that while a highway or a piece of machinery can be made safer by engineering or mechanical improvements and safeguards, and while the lack of these undoubtedly contributes to many accidents, still the skillful, alert person usually survives even the most hazardous situation, while the blundering, reckless individual often manages to involve himself or others in serious injury despite all possible safeguards.

This human or personal factor has often been vaguely termed "carelessness" and the remedies applied have, as a rule, been equally general

There is no denying that these general remedies—mass education and supervision or enforcement—have in many cases accomplished remarkable results. If all the workmen in a factory or all the drivers in a community can be interested in safety, educated in safe practices, and disciplined for violation of safety rules, accidents are decreased.

Recently, however, an increasing number of people have been asking such questions as: Is everyone equally susceptible to accidents? Why do some people have one or repeated accidents while others in the same situation have none? Why does a person have an accident at one time and not at another? If there is a minority of the population especially prone to accidents, can we detect them by some kind of test and keep them out of situations in which they will cause injury to themselves or others? To answer these questions and to put the answers into effect obviously requires the joint efforts of statisticians, psychologists, educators, employers, and public officials. Psychological tests employing spectacular and often terrifying apparatus are by no means the whole answer although some such tests have contributed to our present knowledge.

As the result of various investigations we now know that:

- 1 Some persons have more than their share of accidents for the reason that they are especially susceptible
- 2 In many cases, at least, the cause or nature of this accident-proneness can be discovered and in most of these cases it can be removed so that the person becomes an average or better than average accident risk

While the successful remedial work thus far has been practically confined to employed drivers there is every reason to believe that some of the same principles can be applied to non-commercial drivers and some very significant work along this line is now going on.

CLASSIFICATION OF PERSONAL CAUSES

The personal causes of accidents may be divided into these three general classes: physical and mental deficiencies, ignorance, meaning lack of knowledge or lack of skill, and inadvertency or lack of sufficient will or desire to prevent the accident. While quantitative data are entirely lacking it is probable that the first of these three classes, while undoubtedly existing in numerous cases, is the least important of the three and that the last is the most important. Physical and mental deficiencies include such items as the loss of a limb, sensory defects such as defective eyesight or hearing, poor motor control, and various mental defects. Ignorance may include lack of general education, lack of training in the operation of a motor vehicle, and ignorance of laws and

regulations or of the mechanics of driving. The last group, inadvertency, may include a definite mental set (such as is often termed recklessness); cases of intoxication, preoccupation, excitability and the like; or temporary distractions which may themselves result from a variety of causes. Any statistical study of these accident facts is impossible on the present data and is probably less important than a realization of the fact that any one or more of these factors may be present in any individual and may be the cause of a bad accident record. Those interested will find a detailed sub-classification of these factors in the National Safety Council's Public Safety Memorandum Number 11.

THE ACCIDENT-PRONE DRIVER IN EMPLOYMENT

Data proving that certain drivers have more than their share of accidents, and may be thus logically regarded as especially prone to accidents, have been presented in earlier reports of the Highway Research Board Committee on Causes and Prevention of Highway Accidents.

The first detailed and practical study of accident-prone employees having to do with street traffic was that made for the Boston Elevated Railway by Dr. W. V. Bingham and Dr. C. S. Slocombe under supervision of Mr. Edward Dana, General Manager, who is also Vice-President for Public Safety of the National Safety Council. The early results of this work, reported in Volume III of the 1928 Transactions of the National Safety Council, included the detection, study and treatment of 181 high accident men operating street cars, an occupation obviously similar to that of driving a motor vehicle. In this report Dr. Bingham stated that more than one-half of this group had been cured of their accident-proneness and that all but 10 per cent had shown definite improvement. What were the causes of this accident-proneness? In only 10 per cent were physiological defects the chief characteristics. In 19 per cent the principal cause was a lack of understanding of accident hazards of the highway. In 21 per cent it was faulty judgment of speed or distance. The remaining cases included wrong attitude toward the work, slowness of reaction, excessive susceptibility to fatigue, general nervousness and fear, and similar elements. The outstanding conclusions from this study, which has been continued to date and has become a regular part of the operating procedure on this street railway system, are

First, the high accident men can not only be detected but in nearly all cases can be cured or at least improved. This is of the highest importance if we consider applying similar methods to non-commercial drivers—that is, the general run of the population—who are prone to accident, for no matter how logical and scientific a method might be developed, for detecting such drivers, if the result were to bar a high

percentage of the people from use of the highways, the procedure could never be enacted into law and enforced. But if the procedure consists of cure rather than prohibition, its adoption becomes a much easier matter.

Second, the method does not consist in subjecting all employees to psychological or other tests and rejecting those who fall below an assumed standard of intelligence or skill. On the contrary the method consists of ascertaining from the accident records what men have had numerous accidents, and then studying each individual to determine whether his trouble is a physical or mental defect, a bad habit, or a wrong attitude—then applying the appropriate remedy which often is a matter of practical supervision or discipline. In certain cases general or special tests, physical, psychological, or psychiatric, may be needed. But the whole purpose is to obtain a complete picture of the man in relation to his job.

It is impossible here to describe the somewhat similar studies which have been made in other electric railways and motor vehicle fleets. The conclusions are generally the same except that at least one investigator found a small group of men whom it seemed impossible to cure, some of them in fact met with fatal or other serious injury after they had been transferred from truck driving to a presumably non-hazardous job. It may be that the excellent personnel and safety work previously carried on by the Boston Elevated Railway had already weeded out the extremely high hazard men. There is undoubtedly a certain percentage of the population, probably extremely small, that cannot possibly be made into safe drivers.

CONTROL THROUGH DRIVERS' LICENSES

The results described above are possible in a company operating street cars or commercial vehicles because of the control exercised by the employer, who is able to obtain and analyze accident records, to subject the high accident men to study and examination if necessary, and to apply the indicated treatment.

Among private drivers, who represent the vast majority of motor vehicle mileage and motor vehicle accidents, there is no such control. The nearest approach to it is found in the administration of drivers' license laws including the collection and analysis of accident records, the examination of applicants for licenses, and the power to suspend or revoke the license, the latter usually implying the power to call in the high accident men for study or examination. A dozen states have, through experience of from one to twenty years or more, developed certain methods of examining applicants for licenses, for the purpose of making sure, as far as possible, that every such person will be a competent and fit driver before a license is given him. They likewise have

developed procedures for calling in drivers with bad records, or against whom complaint has been made, and subjecting them to hearings, after which the license may be suspended or revoked. The question naturally presents itself—do these examinations in fact weed out the incompetent or unsafe driver? Is the power of suspension or revocation in fact exercised in such a way as to eliminate or cure the driver who has shown himself to be a public hazard?

The general answer is that a considerable degree of success has been obtained because, according to a careful statistical study by the National Safety Council, the motor vehicle fatalities in the license law states have been 29 per cent less, since the adoption of such laws, than they would have been if these states had experienced the same rate of increase as occurred in the non-license law states. It seems almost certain, however, that even greater reductions could be obtained.

In some of these states a closer and more careful coordination of the examination procedure and record, the subsequent accident and court record of the driver, and the suspension or revocation hearing would seem desirable. A complete record of the examination should be filed, including any data as to slight defects or lack of skill observed. When a driver piles up a record of more than one accident, the nature of these should be carefully studied, in connection with his examination record, and if necessary the driver should be called in, not primarily for the purpose of taking away his license but rather to discover whether his accidents were due to some deficiency or bad habit which could easily be removed—exactly as in the case of the Boston Elevated Railway motormen. Only in case of a seriously wrong attitude would the power of suspension or revocation need to be invoked. In some cases a driver thus called in would be subjected to a further road test for observation of his driving habits and in some cases he might be subjected to a physical or psychological test. By thus helping the driver to avoid more accidents in the future a service would be rendered to him as well as to the public.

It is probable also that the examination methods could be improved by studying them from the standpoint of educational psychology.

Some pioneer work in this field is just now being undertaken and it is much to be hoped that this will continue and that similar efforts will be made in other states.

CONTROL THROUGH POLICE AND COURTS

The other present means of control of non-commercial drivers is through the local police and courts, which have jurisdiction over drivers brought in for violation of laws and ordinances. In a growing number of cities the police and courts are following the wise plan of giving special attention to traffic violations which result in accidents, on the basis

that it is these violations that are really of the greatest public importance

Among a small but growing number of such officials the idea is growing that their job is corrective rather than punitive, and some of them are beginning to try out a procedure comparable to that suggested above for a state motor vehicle bureau. That is, the judge as well as the police department does not concern himself simply with the question whether the defendant is or is not technically guilty of an offense against the traffic regulations. He rather attempts to find out why the defendant was guilty—if he was guilty, why he became involved in the accident (when another driver, perhaps equally guilty of a violation, would nevertheless have avoided accident), and what can be done to prevent further accidents involving the same driver. In a few cases—but probably very few—the record of a driver is so bad that he should be subjected to a psychological examination which may disclose such extremely low mentality as to prove his total unfitness ever to drive on the public highway. In other cases such examination or other study of the case will suggest other appropriate remedies such as have been discussed.

PROBLEMS FOR STUDY

It is evident from the foregoing that the facts already discovered regarding accident-proneness deserve further detailed study, and that there is tremendous opportunity for similar investigation and development in other fields, especially in the study and cure of accident-prone private drivers. Following are some of the specific studies that might well be undertaken by companies operating vehicle fleets, or by state motor vehicle bureaus or city police departments, or by philanthropic or civic organizations in cooperation with public officials.

- 1 Studies of accident-prone drivers in commercial fleets, similar to the work on the Boston Elevated Railway
- 2 The addition of trained psychologists (with experience in the practical application of that science) to the staffs of state motor vehicle bureaus, to study the whole procedure of examining applicants, reporting and analyzing accidents, and dealing with high accident drivers and habitual violators, applying thereto the general methods of psychological analysis and the particular facts and methods which have been found effective in dealing with the commercial driver
- 3 Somewhat similar studies could be undertaken by a city police department or court, or by the psychopathic clinic of a city hospital in connection with the police and courts
- 4 Universities and other institutions can continue to make valuable investigations in the field of psychological testing for the purpose of discovering correlations between certain physical and mental characteristics, and accident-proneness

- 5 A study of the underlying causes of accidents could be made in a state or portion of a state, not too large in area, including a careful case study of each accident or each serious accident from the medical, psychological, engineering and legal standpoints, resulting in statistical data on the relative importance of various causes or factors, and also including special attention to accident-proneness of individuals involved

As the whole subject is so definitely in the experimental stage, any of the studies mentioned would undoubtedly disclose the need for further research. There can be little doubt that properly directed study along any of these lines would be of the very greatest public benefit and would point the way to material reduction of the national traffic accident toll.

GENERAL DISCUSSION

ON

HIGHWAY TRAFFIC

MR E W JAMES, *U S Bureau of Public Roads* I have read with much interest the eight topics included in the report on highway traffic, and find that they indicate very fully the variety, scope, and in many cases, details of the major problems which are most urgent in connection with the subject.

I was especially impressed with the various problems suggested in the first paper by Dr McClintock, and I venture to point out that practically all of them depend for their solution on the evaluation of delay. It is to be noted that the determination of comparative delay is not sufficient if relief from any existing undesirable condition depends upon the installation and operation of signaling devices or on any form of reconstruction or construction of our street system. Comparative delay will serve to demonstrate the relative merits of alternative conditions from the standpoint of traffic convenience and safety only. If expenditure is involved in producing the desirable alternative condition, then we must have a determination of cost of delay in order to establish the economic soundness of the alternative. Such determination of the cost of delay may be made—first, on the basis of all discoverable items involved, or second, on only the obvious and easily measured items.

The first includes all expenses possibly attributable to operation under the conditions imposed, and will involve the cost of gasoline, oil and grease, all items of wear on brakes, tires, and moving parts, the effect of inertia, of manual operation of the controls, and all the details of car operation that may be affected by differences of speed and by frequent starting and stopping of the appropriate mechanisms. The second