

# REPORT OF COMMITTEE ON TRAFFIC

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## MOTOR VEHICLE ACCIDENTS AS REFLECTED BY PSYCHOLOGICAL TESTS AND REACTION METER

BY W A VAN DUZER

### SYNOPSIS

Accident records show that the majority of traffic accidents are caused by a small percentage of the drivers. It is desirable to devise some method to determine what drivers are likely to have accidents. Applicants for drivers' licenses in Washington are required to answer orally a number of questions concerning the regulations. Recently, some 200 applicants were given an additional written psychological test consisting of twenty-four questions and a reaction time test. The applicants were graded and their ratings have been compared with their accident records with indications that it can be forecast which drivers will have the worst accident records. It is recommended that applicants for licenses be given a written psychological test, a physical examination, a driving test, and, if it can be devised a test to measure emotional stability.

There are 27 States, including the District of Columbia, which compel motor vehicle operators to have a license. This means that 22 States do not require a driver's permit. Some States require written examination, others written and oral, some oral and some no examination at all. The majority of States, however, require a driver's test. The minimum age limit is 12 years, in South Carolina, and several States have 14, 15 and 16 years. The methods of examining the drivers and the questions asked are almost as numerous as the number of States listed.

Opinions as the requirements of a safe operator are plentiful, but the actual measurement of the applicant's ability for the operation of a motor vehicle is very inadequate. The majority of the States have only two points in common—that is, they are all insufficient and unreliable. It seems to me that if driving ability really exists it can be measured and tests prepared that will obtain this measurement.

A motor vehicle administrator has only one desire and that is to keep reckless and accident-prone drivers from operating motor vehicles. This can be done by education. A large proportion of all accidents is caused by a group of drivers composed of a relatively small percentage of the total number. Therefore, the first concern of those in charge of motor vehicle operation should be the detection and the elimination

of these incompetent drivers before, and not after, they obtain their driver's permits

The highway engineer has contributed much in making the streets and highways safe for vehicles operated in a reasonable and safe manner. He has eliminated the more dangerous curves, widened and super-elevated curves on highways in rural districts, widened streets in urban sections, reduced grade crossings, and has generally increased road capacity.

The automotive engineer has likewise contributed to making our streets and highways safe. Most cars are now equipped with four-wheel brakes, safety glass, steel frames, balloon tires and tire treads that practically eliminate old-fashioned skid chains. There has been improvement in lighting during the past few years, but the lights in use leave a great deal yet to be desired. We believe also that much can yet be done by both the highway and the automotive engineer toward making the vehicle and the road safe for motor vehicle operation.

Approximately 75 per cent of automobile accidents are attributed to the drivers. We think human engineers—if we may use that term—should now contribute in a greater measure toward the reduction of accidents. Motor vehicle administrators must, with the help of the legislatures if necessary, put into effect laws and regulations which will eliminate the incompetent drivers by education, if possible, or examinations which will restrict the incompetent or careless operator.

The District of Columbia has about the average system for licensing drivers, but we realize that we are not putting into effect the restrictions on the issuance of operator's licenses that it is possible to make.

With this thought in mind we had all the applicants for drivers' permits on May 18th, 19th and 20th, of 1933, take a short written test to see if a test of this type would show any correlation with traffic violations. We made this experiment in an effort to find out if a short, written psychological test would help in picking out the good driver from the score he had made in the test. While it may be a little early to make any predictions the results seem gratifying.

We gave the test to 300 persons on the days mentioned, but our study is based on the 210 of them who got their permits to drive. The rest never received their permits. This shows that our group was a selected one to begin with.

The test itself is composed of three parts. Part I has twenty-four True-False questions dealing with driving situations, Part II has five completion questions dealing with the driving regulations, Part III has nine multiple choice questions, designed to test driving judgment.

In order to check their records we put the drivers' permit numbers, along with their test scores in the files at the Traffic Bureau. A check was made after three months and another at six months. Oddly enough

the number of applicants who were arrested in the three-month period just about doubled when the six-month period was checked, and two persons got one violation in each period

Out of the 210 persons tested and checked, 26 were found to have records at the end of the six-month period. Seven persons had two violations and two persons had three violations. Only six applicants out of the 26 who had violations were above the average score and only two of the six had scores above 75 per cent.

Looking at the test from a statistical standpoint we found we had a range of scores from six, as the lowest, to 48, as the highest, with the average at 36. The average was a little higher than we expected, but we believe it is due to the selection, since we took only the scores of the successful applicants. We had eliminated about 40 per cent who did not get their permits, therefore, we might expect the average to be a little higher than it would have been had we based it on the total number who applied.

While it is recognized that a test of this type would have to be put in alternate forms, say four or five, and the forms would have to be worked out on a much larger number of cases, it does seem like a step in the right direction.

It is generally agreed that an actual operating test is essential to determine the ability of the applicant to drive a car, and this should be more than merely driving around the block and parking the car. The time has come when we must realize that driving an automobile is a privilege and not a right, and the sooner we become more strict in the licensing of our drivers the better.

In closing I recommend the following for the licensing of drivers.

- (1) A written psychological test
- (2) A physical examination of applicants and a periodic one of drivers in the future
- (3) An eye test with color and peripheral test
- (4) An actual driving demonstration
- (5) Some test for measuring the emotional stability of the individual

Mr Roy Brown, of the Firestone Rubber Company, has built a machine which measures in one hundredths of a second, first, the time elapsing from the instant a light appears to the time that the applicant removes his foot from the pedal corresponding to the accelerator and second, the time from the instant that a light flashes that he takes to move his foot from the pedal corresponding to the accelerator to the pedal corresponding to the brake and to start the application of the brake.

This machine has been used by the Psychological Laboratory at George Washington University and also by the Department of Vehicles and Traffic of the District of Columbia. The Department of Vehicles

and Traffic gave some 300 subjects this test, but sufficient time has not elapsed to make a thorough analysis of the data. However, a hurried inspection indicates the following:

1. The average reaction time under No. 1—that is, the time elapsing from the instant the light goes on to the time the applicant takes his foot off the accelerator—is about 0.1 per second. Under No. 2, or the time elapsing from the instant the light goes on and the applicant takes his foot off the accelerator and starts to apply the brake it is about 0.2 of a second.

2. Within certain limits (16 to 55) chronological age is not very closely related to reaction time. At the upper end of the age scale, however, Dr. Walter R. Miles, Professor of Psychology, Yale University, has made tests which seem to indicate that the reaction time slows up considerably.

Unquestionably the reaction of the subject from the time he is given a signal to the time the brake is applied is a factor in an increase or reduction of motor vehicle accidents. If a motor vehicle is going at a rate of 40 miles an hour and the reaction is 0.3 of a second longer than it should be a car will move approximately 20 feet during this period. This may be sufficient to cause a serious accident.

## NOTES ON TRAFFIC SPEEDS

BY A. N. JOHNSON

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### SYNOPSIS

During the summer of 1933 the Maryland State Roads Commission in cooperation with the University of Maryland carried on a highway traffic speed survey to obtain comprehensive knowledge of the way traffic actually uses the state highways.

The speed of traffic was observed at about 50 of the regular traffic census stations which the State Roads Commission has used for many years.

At each point two observers counted and measured the speed of traffic from 9 A. M. until 4 P. M. This was done by the use of the Eno Foundation speed detector as devised by Professor C. J. Tilden of Yale University. About 500 vehicles were timed in each direction at each station.

The average speed as observed from 41,000 vehicles was 35.5 miles per hour, with 87 per cent of all the traffic within 45 miles per hour and 99 per cent within 55 miles per hour and with only an occasional vehicle moving over 65 miles per hour.

The percentage of various rates of speeds was

8 per cent	between 15–25 miles per hour
36 per cent	between 25–35 miles per hour
43 per cent	between 35–45 miles per hour
12 per cent	between 45–55 miles per hour
1 per cent	between 55–65 miles per hour