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AGO-
Report
~~Study~~ No. 33

Report of the Study of Tests of Army Truck Drivers at Fort Bragg.

In compliance with Staff Directive, the Personnel Procedures Section of the Adjutant General's Office has studied the reports of tests of motor vehicle operators given at Fort Dix, New Jersey and Fort Bragg, North Carolina. The purpose of the study was to determine whether or not the tests will eliminate wasted training effort, reduce accidents and result in better motor vehicle operation within the Army.

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The general conclusions from this study may be stated as follows:

1. Measures of previous driving experience are more important for selecting good drivers than are any of the tests of steering, brake reaction time, or vision employed. If it is desired to select men who are immediately available for satisfactory driving, it is indicated that they should be selected on the basis of previous driving experience.

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2. Although the tests of steering, braking time and vision were not highly related to present driving ability, they may be of value in selecting men who could be trained advantageously as drivers. Further studies, however, will be necessary to determine their usefulness in this respect.

3. None of the tests were found to be of practical value for discriminating men who reported having had civilian driving accidents from those men who reported having had no civilian accidents. The night vision test gave an indication of slight relationship to civilian accidents. Civilian violations, number of Army Accidents, and years licensed as a civilian were most highly related to the civilian accidents of the drivers.

Procedure

Selection of Men for the Study. The men available for the study included 3,432 from Fort Dix, New Jersey and 3,835 from Fort Bragg, North Carolina, making a total of 7,267 men. The men tested at Fort Bragg were selected for study since the distribution of ratings on driver ability as given by the examiners at Fort Dix showed an exceptionally high proportion of satisfactory ratings. It may be true that the men at Fort Dix are as a group better drivers than those at Fort Bragg but it is also possible that the examiners at Fort Dix used less discrimination in rating their men. In the absence of further information with respect to these two possibilities it was considered best to use only the Fort Bragg men.

A further selection was made from the 3,835 men at Fort Bragg. Certain examiners gave a disproportion of "good" ratings and others gave a disproportion of "poor" ratings when their distribution of ratings were compared with the total distribution of ratings at Fort Bragg. The 1,454 men examined by five examiners whose distribution of ratings compared favorably with the total distribution of ratings at Fort Bragg were selected for further study. These men were used in determining the relationship between driving experience and present driving ability and between the scores on the tests and driving ability.

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From the 1,454 men, 952 were selected all of which had information available on all items of experience and tests. This group was used in studying the percentages of failures on the driving test when various eliminations of men were made on the basis of experience, education, or test results.

Information Used. The following information was available for use in the study:

1. Personal data - age, height, weight, education.

2. Driving experience data - type of license, years licensed, civilian violations, civilian accidents, Army license, annual mileage last year, years driving experience, type of vehicle driven in civilian life, Army accidents.

3. Psychophysical test data - brake reaction time, vigilance braking, simple steering score, vigilance steering score, visual acuity, depth perception, glare vision with and without glasses, glare recovery with and without glasses, night vision, reaction apparatus number.

4. Road test data - type of vehicle used on test, route number, grounds for immediate failure, number of unsatisfactory items of performance, general rating on road test on a four-point scale as follows: 1. failure, 2. failure with recommendation of further training and later re-test, 3. very satisfactory, 4. exceptional skill or ability.

The percent of the total group of men which was included in each category of each of the items of information is shown in the tables in the appendix of this report.

Description of Psychophysical Tests. Brake reaction time, simple steering score, vigilance steering score and vigilance braking time were obtained by testing the drivers on a dummy motor vehicle apparatus. The apparatus consists of a seat, steering wheel, brake, accelerator and dimmer button arranged in the conventional manner and of full size. The driver faces a moving scene which depicts a dual highway at an intersection with a traffic light and an approaching truck. The hood of a miniature truck is placed between the windshield and the moving scene and gives the driver the illusion of viewing the road over the hood of his truck. Two red lights mounted on either side of the windshield indicate by flashing on or off whether the driver is steering his truck within the limits of the highway. Automatic timers record the time taken to apply the brake after the red traffic light flashes on, the time required to release the accelerator when the red traffic light flashes on, and the percent of the time which the driver has his truck centered in the right hand lane of the highway. Brake reaction time and simple steering scores are taken when the driver is required to react solely to traffic signals or is engaged in steering but not required to perform the two operations in combination. The vigilance braking time and vigilance steering scores are obtained when the driver is required to steer his truck and at the same time react to traffic lights whenever they flash on or off.

The glare-test apparatus is a light-tight black box in which a dimly illuminated test object is placed at one end just to one side of a pair of bright lights which simulate the headlights of an approaching vehicle. The driver looks at the test object with both eyes through a slit in the opposite end of the box and reports whether he can see the object and the position it is in under varying conditions of illumination.

Glare vision was tested by determining the least illumination under which the driver could perceive the test object in its correct orientation. Glare recovery-time was measured by allowing the driver's eyes to become adapted so that the test object could be perceived under very low illumination, then exposing him to a glaring light for 30 seconds, and finally measuring the time required for the driver to be able again to distinguish the test object. The men who wore glasses were tested both with and without their glasses.

Visual acuity and depth perception were tested by means of the Keystone Telebinocular Apparatus. This apparatus is a stereoscope into which the subject looks through lenses at a series of cards placed in back of the lenses. The apparatus is so constructed that the scenes on the scenes on the cards appear in three dimensions. The cards used to measure visual acuity show a series of test objects which appear to be at increasing distances from the subject. Acuity is measured in terms of the farthest appearing object that can be seen by the subject. Depth perception is measured by means of a series of cards of test objects so arranged that one object will appear to stand out in front of the others under normal conditions of depth perception. Acutity was measured for each eye separately as well as both eyes taken together.

Night vision was tested by means of the Wald Adaptometer. The adaptometer is an apparatus which exposes a light from a small bulb for one-fiftieth of a second within a light-tight box or room. The intensity of the light is varied by means of a rheostat and the least intense light which the driver can distinguish is determined. The driver is allowed twenty-five minutes in the dark room before being tested so that his eyes will become adapted to darkness.

Criterion of Driving Ability Used. The measure of driving ability was the rating on a comprehensive road test which included a standard series of driving performances such as stopping, turning, backing, parking, turn about, etc. The ratings were given on a four-point scale as described above in "4. Road test data".

Comparisons Made. Two series of comparisons were made to determine the relations between the available items of information and driving ability as measured by the comprehensive road test. A third series of comparisons were made between the items of information and the accident records of the men.

1. Men who were given ratings on the road test of exceptional ability, very satisfactory, or fair were compared with those who were rejected or failed the road test. Comparisons were made on the basis of measures of driving experience, personal data, and the psychophysical tests — braking time, steering score, and visual tests. These comparisons were designed to show the degree of relationship between each of the measures and driving ability in order to answer the question of whether men who make "good" scores on these measures tend to have "good" ability as drivers and conversely whether the men who make "poor" scores on the measures also tend to have "poor" driver ability.

The results of these comparisons showed that the measures of previous driving experience had the highest degree of relationship to driving ability. Years of driving experience, mileage driven the past year, and years licensed as a

civilian driver yield the best information for choosing able drivers. That is, if men are chosen on the basis of driving experience they will be more certain to be good drivers than if they are chosen on the basis of high scores on any of the psychophysical tests of reaction time, or vision. Several of the psychophysical tests gave indications of possible usefulness in selecting drivers but in no case did they appear to be as good selection devices as were the measures of driving experience. It is possible that the psychophysical tests may be useful for selecting inexperienced men who will become good drivers after training. However, further studies will be needed to determine whether or not this is true.

2. The percentages of men who were rated on the road test as 1 = failure, 2 = failure with recommendation of further training, 3 = very satisfactory, and 4 = exceptional ability, were studied when successive eliminations of men were made who fell below critical levels on experience or on performance on the psychophysical tests. The percentages of men falling in each of the four rating categories when men were eliminated were compared with the percentages of men in the four categories when all the men were included.

Eliminating all drivers with less than 6 months driving experience, less than 500 miles driven per year, not at present licensed or never licensed reduced the percentage of failures on the road test from 34.9% to 16.7%. Making further eliminations on the basis of poorest scores on reaction time, simple steering, vigilance braking and vigilance steering reduced the percentage of failures from 16.7% to 15.7%. The percentages of men in each of the four rating categories on the road test are shown below for the total group, the group after eliminations were made on the basis of insufficient experience, and the group after additional eliminations were made on the basis of poor scores on the reaction time, steering and braking tests.

Percent Retained in Each of the Four Rating Categories on the Road Test When Eliminations of Men Made on Basis of Experience and Poor Scores on Tests

Group	Rating on Road Test*			
	4	3	2	1
Total	2.4%	39.7%	23.0%	34.9%
After men with little experience eliminated	3.6%	51.0%	28.6%	16.7%
After men with poor scores on tests also eliminated	3.9%	52.5%	27.9%	15.7%

*1 = Failure
2 = Failure with recommendation of further training
3 = Very satisfactory
4 = Exceptional ability

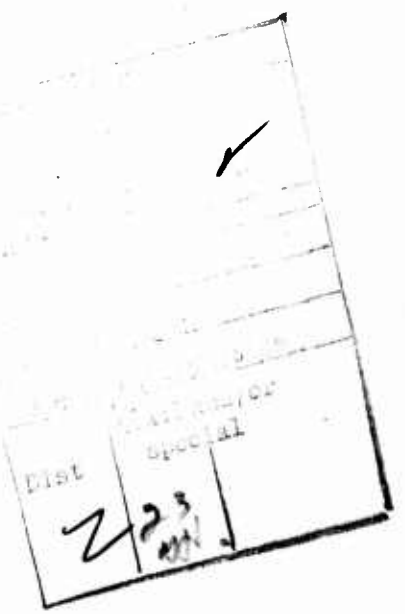
It is thus seen that eliminating inexperienced men eliminates a large proportion of the poorest drivers but further eliminations based on poor scores

on the psychophysical tests makes only a slight reduction in the percent of poorest drivers retained. This indicates again that for purposes of selecting men who are at present acceptable drivers the amount of previous driving experience is a better basis for selection than is the performance in the psychophysical tests.

3. The men who reported having had civilian driving accidents were compared with those who reported having had no accidents. Comparisons of these two groups were made on the basis of their previous experience and their scores on each of the tests. The groups were compared in such a way that the degree of relationship between the experience and test data and the civilian accidents could be measured.

Civilian violations, Army accidents, years licensed as a civilian driver, and night vision test scores had the highest relation to civilian accidents and in the order given. However, with the exception of civilian violations and Army accidents, none of the items of information, including experience and test scores, were sufficiently related to civilian accidents to be of any practical value in selecting the accident prone driver.

The reports of accidents as given by the men tested are probably very inaccurate, and this should be taken into consideration in interpreting the results of the study. Until more complete and more accurate information with respect to drivers can be subjected to study, it is advisable not to draw any general conclusions from these data.



APPENDIX

Year of Birth

Year	No. of Men	%
1894 and earlier	1	0.1
1895 - 1899	2	0.1
1900 - 1904	14	1.0
1905 - 1909	130	9.0
1910	57	3.9
1911	45	3.1
1912	47	3.2
1913	70	4.8
1913	92	6.3
1915	103	7.1
1916	140	9.7
1917	169	11.7
1918	224	15.4
1919	227	15.6
1920	48	3.3
1921	30	2.2
1922	37	2.5
1923	6	0.4
No data	9	0.6
	1451	100.0

Years Education

No. of Years*	No. of Men	%
19	3	0.2
18	5	0.3
17	7	0.5
16	22	1.5
15	19	1.3
14	24	1.7
13	34	2.3
12	207	14.2
11	136	9.4
10	120	8.3
9	120	8.3
8	283	19.5
7	179	12.3
6	90	6.2
5	69	4.7
4	35	2.4
3	41	2.8
2	19	1.3
1	9	0.6
Less than 6 mo.	22	1.5
No data	10	0.7
	1454	100.0

*To nearest year, ½ yr. counted as 1, e.g., 1½ yrs. = 2

Weight			Height (in inches)		
No. of Pounds	No. of Men	%	No. of Inches	No. of Men	%
250 and over	1	0.1	Over 75	3	0.2
225 - 249	3	0.2	75	11	0.8
200 - 224	26	1.8	74	55	3.8
195 - 199	19	1.3	73	57	3.9
190 - 194	16	1.1	72	138	9.5
185 - 189	41	2.8	71	173	11.9
180 - 184	52	3.6	70	159	10.9
175 - 179	59	4.1	69	171	11.8
170 - 174	87	6.0	68	194	13.3
165 - 169	109	7.5	67	181	12.4
160 - 164	129	8.9	66	144	9.9
155 - 159	136	9.4	65	61	4.2
150 - 154	179	12.2	64	56	3.9
145 - 149	150	10.3	63	28	1.9
140 - 144	163	11.2	62	15	1.0
135 - 139	95	6.5	61	1	0.1
130 - 134	97	6.7	60	3	0.2
125 - 129	43	3.0	Under 60	4	0.3
120 - 124	28	1.9			
115 - 119	15	1.0			
110 - 114	2	0.1	Total	1454	100.0
105 - 109	1	0.1			
No data	3	0.2			
Total	1454	100.0			

Annual Mileage Last Year

No. of Miles	No. of Men	%
74,500-99,499	23	1.6
49,500-74,499	40	2.8
44,500-49,499	9	0.6
39,500-44,499	10	0.7
34,500-39,499	14	1.0
29,500-34,499	57	3.9
24,500-29,499	35	2.4
19,500-24,499	86	5.9
14,500-19,499	113	7.8
9,500-14,499	178	12.3
8,500- 9,499	25	1.7
7,500- 8,499	41	2.8
6,500- 7,499	17	1.2
5,500- 6,499	51	3.5
4,500- 5,499	83	5.7
3,500- 4,499	32	2.2
2,500- 3,499	92	6.3
1,500- 2,499	69	4.7
500- 1,499	131	9.0
Less than 500	333	22.9
No data	15	1.0
Total	1454	100.0

Type Vehicle Driven, Civilian

Type	No. of Men	%
Private Passenger vehicle	420	28.9
Light truck, panel or up to, and including ½ ton	8	0.6
Heavy truck, over ½ ton capacity	53	3.6
Bus	3	0.2
Taxi	0	0.0
Farm Implements	2	0.1
Private passenger vehicle and light truck	60	4.1
Private passenger vehicle and heavy truck	567	39.0
None	252	17.4
No data	89	6.1
Total	1454	100.0

Type of License, Civilian

Type	No. of Men	%
Passenger	590	40.6
Chauffeur's	128	8.9
No License	435	29.9
No data	300	20.6
Total	1453	100.0

Years Civilian Driving Experience

No. of Years	No. of Men	%
20 and over	18	1.2
15 - 19	76	5.2
10 - 14	257	17.6
9	47	3.2
8	126	8.7
7	90	6.2
6	104	7.2
5	114	7.8
4	104	7.2
3	88	6.1
2	77	5.3
1	78	5.4
0	272	18.7
No data	3	0.2
Total	1454	100.0

Years Licensed as Civilian Driver

No. of Years	No. of Men	%
20 and over	1	0.1
15 - 19	13	0.9
10 - 14	79	5.4
9	20	1.4
8	28	1.9
7	34	2.3
6	109	7.5
5	79	5.4
4	94	6.5
3	98	6.7
2	129	8.9
1	138	9.5
0	359	24.7
No data	273	18.8
Total	1454	100.0

U. S. License

	No.	%
Yes	219	15.1
No	1212	83.4
No data	22	1.5
Total	1453	100.0

Civilian Accidents

No. of Accidents	No. of Men	%
10-14	5	0.3
9	0	0.0
8	0	0.0
7	0	0.0
6	0	0.0
5	0	0.0
4	0	0.0
3	1	0.1
2	9	0.7
1	64	4.4
0	777	53.4
No data	598	41.1
Total	1454	100.0

Civilian Violations

No. of Violations	No. of Men	%
10-19	5	0.3
9	0	0.0
8	0	0.0
7	0	0.0
6	2	0.1
5	2	0.1
4	1	0.1
3	11	0.8
2	28	1.9
1	116	8.0
0	712	49.0
No data	577	39.7
Total	1454	100.0

Army Accidents

No. of Accidents	No. of Men	%
10 - 14	4	0.3
9	0	0.0
8	0	0.0
7	0	0.0
6	0	0.0
5	0	0.0
4	0	0.0
3	0	0.0
2	0	0.0
1	6	0.4
0	811	55.8
No data	633	43.5
Total	1454	100.0

Type of Vehicle Used On Road Test

Vehicle	No of Men	%
½ ton	24	1.
1 and 1½ ton	1132	77.8
4 and 4½ ton	207	14.2
No data	91	6.3
Total	1454	100.0

Route Number, Road Test

Route	No. of Men	%
A	1168	80.4
B	157	10.8
No data	127	8.8
Total	1452	100.0

Grounds for Immediate Failure on Road Test

Grounds	No. of Men	%
None checked	1055	72.6
Accident	61	4.2
Dangerous Action	11	0.7
Inexperienced	309	21.2
Dangerous Action and inexperienced	7	0.5
Accident and Inexperienced	1	0.1
"X" - Inconsistencies	10	0.7
Total	1454	100.0

Number of Unsatisfactory Items on Road Test

No. Checked	No. of Men	%
None	138	9.5
1	320	22.0
2	242	16.6
3	188	12.9
4	132	9.1
5	115	7.9
6	42	2.9
7	24	1.7
8	7	0.5
9	17	1.2
"X" - Inconsistencies	229	15.7
Total	1454	100.0

Brake Reaction Time

Score	Number	%
65-69	4	.003
60-64	25	.017
55-59	124	.085
50-54	489	.336
45-49	538	.370
40-44	228	.157
35-39	14	.010
34 and under	3	.002
No data	29	.020
Total	1454	1.000

Vigilance Braking Time

Score	Number	%
95-99	1	0.1
90-94	4	0.3
85-89	17	1.2
80-84	44	3.0
75-79	87	6.0
70-74	134	9.2
65-69	177	12.1
60-64	219	15.1
55-59	312	21.5
50-54	318	21.8
45-49	96	6.6
40-44	14	1.0
39 and under	5	0.3
No data	26	1.8
Total	1454	100.0

Brake Reaction Apparatus Number

Apparatus	No. of Men	%
A	506	34.8
B	794	54.6
No data	154	10.6
Total	1454	100.0

Simple Steering

Score	Number	%
95-99	83	5.7
90-94	221	15.2
85-89	341	23.5
80-84	258	17.7
75-79	155	10.6
70-74	155	10.6
65-69	42	2.9
60-64	88	6.1
55-59	17	1.2
50-54	33	2.3
45-49	16	1.1
40-44	13	0.9
35-39	3	0.2
30-34	5	0.3
29 and under	4	0.3
No data	20	1.4
Total	1454	100.0

Vigilance Steering

Score	Number	%
95-99	6	0.4
90-94	39	2.7
85-89	161	11.1
80-84	204	14.0
75-79	240	16.5
70-74	297	20.4
65-69	128	8.7
60-64	171	11.7
55-59	36	2.5
50-54	74	5.1
45-49	17	1.2
40-44	27	1.9
35-39	4	0.3
30-34	11	0.8
25-29	0	0.0
20-24	4	0.3
19 and under	0	0.0
No data	35	2.4
Total	1454	100.0

Acuity of Right Eye

Score	Number	%
110	2	0.1
105	308	21.2
100	635	43.7
90	316	21.7
80	80	5.5
70	38	2.6
60	23	1.6
50	13	0.9
40	4	0.3
30 or less	13	0.9
No data	22	1.5
Total	1454	100.0

Acuity of Left Eye

Score	Number	%
110	1	0.1
105	174	12.0
100	723	49.7
90	332	22.8
80	77	5.3
70	77	5.3
60	21	1.4
50	9	0.6
40	4	0.3
30 or less	11	0.8
No data	25	1.7
Total	1454	100.0

Acuity of Both Eyes

Score	Number	%
110	2	0.1
105	725	49.9
100	389	26.7
90	232	16.0
80	51	3.5
70	18	1.2
60	8	0.6
50	4	0.3
40	3	0.2
30 or less	0	0.0
No data	22	1.5
Total	1454	100.0

Glare Vision Without Glasses

Score	Number	% of Those Reporting
10	5	0.4
9	17	1.2
8	180	12.7
7	283	20.0
6	358	25.3
5	250	17.6
4	160	1.3
3	74	5.2
2	68	4.7
1	22	1.6
No data	37	
Total	1454	
No. Reporting	1417	100.0

Glare Vision With Glasses

Score	Number	% of Those Reporting
10	5	10.0
9	0	0.0
8	1	2.0
7	4	8.0
6	2	4.0
5	9	18.0
4	3	6.0
3	6	12.0
2	9	18.0
1	11	22.0
No data	1404	
Total	1454	
No. Reporting	50	100.0

Night Vision

Score	Number of Men	% of Those Reported
45-49	4	2.9
40-44	7	5.1
35-39	37	26.7
30-34	67	48.6
25-29	19	13.8
20-24	4	2.9
No data	1316	
Total	1454	
No. Reporting	138	100.0

Depth Perception

Score	Number	%
100	1164	80.1
90	96	6.6
80	16	1.1
70	74	5.1
60	28	1.9
50	4	0.3
40	6	0.4
30	10	0.7
20	5	0.3
0-10	26	1.8
No data	25	1.7
Total	1454	100.0

Glare Recovery Without Glasses			Glare Recovery With Glasses		
Score	Number of Men	% of Those Reporting	Score	Number of Men	% of Those Reporting
95-99	45	3.2	95-99	4	10.3
90-94	7	0.5	90-94	0	0.0
85-89	11	0.8	85-89	0	0.0
80-84	16	1.1	80-84	0	0.0
75-79	17	1.2	75-79	1	2.6
70-74	15	1.1	70-74	1	2.6
65-69	21	1.5	65-69	3	7.7
60-64	31	2.2	60-64	0	0.0
55-59	43	3.0	55-59	0	0.0
50-54	78	5.5	50-54	0	0.0
45-49	101	7.1	45-49	3	7.7
40-44	128	9.0	40-44	3	7.7
35-39	168	11.7	35-39	5	12.7
30-34	201	14.2	30-34	8	20.5
25-29	256	18.1	25-29	8	20.5
20-24	188	13.3	20-24	3	7.7
15-19	75	5.3	15-19	0	0.0
10-14	17	1.2	10-14	0	0.0
No data	36		No data	1414	
Total	1454		Total	1453	
No.Reporting	1418	100.0	No.reptng.	39	100.0