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**THE DRIVING BEHAVIOUR OF
CERTAIN PROFESSIONAL DRIVERS**

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THE DRIVING BEHAVIOUR OF CERTAIN PROFESSIONAL DRIVERS

ABSTRACT

Seven professional drivers from a firm of car manufacturers drove around two separate routes (one of 12 miles and one of 18 miles) under normal traffic conditions, accompanied by two observers. During the drives, the two observers systematically observed and recorded certain items of driver behaviour.

On the basis of their driving behaviour, the seven drivers were put into three classes - Safe, Dissociated Active and Dissociated Passive and into an overall order of merit ranging from safest to least safe. These drivers were also put into an order of merit by the Supervisor of drivers from the car manufacturer who based it on accident rate and personal knowledge of the driver over a period of years. The correlation between these two orders of merit was +0.68.

1. INTRODUCTION

Prior studies of groups of drivers chosen at random and groups of drivers convicted of Careless Driving have led to the postulation of a classification of drivers into four sub-groups - Safe, Injudicious, Dissociated Active and Dissociated Passive.^{1, 2} All the drivers used as subjects in these studies were 'part-time' owner drivers, i. e. non-professional drivers.

After discussions with representatives of a firm of motor-manufacturers it was agreed that a number of professional drivers should be sent to the Road Research Laboratory to undergo the same procedure as the non-professional drivers to see how the ratings of the professional drivers by their Supervisors compared with an order of merit derived from the results of the objective observation of their driving behaviour.

2. METHOD AND PROCEDURE

Each driver drove around two separate routes, one of 12 miles and one of 18 miles, under normal traffic conditions, accompanied by two observers who observed and recorded the behaviour of the driver

in a systematic fashion. The method of observing driver behaviour was as described in RRL Report No. 25.¹ Briefly, the procedure was as follows:- the first observer sat in the front near-side seat, observed the subject's behaviour and filled in check-sheets (Appendix 1) during the whole of the drive. The second observer sat in the rear near-side seat and kept a constant watch on the subject's eyes in the rear-view mirror. Every time the subject used the rear-view mirror (or wing-mirrors, the rear observer tapped the front observer on the shoulder (unseen by the subject) and the front observer entered this observation into the appropriate column and place on the check-sheet. The rear observer gave directions to the subject and was ready to converse with him if the latter wished to do so.

After the drive, all data from the check-sheets were entered on to a drive analysis sheet (Appendix 2).

3. SUBJECTS

Seven drivers took part in this study. Nothing was known about them by the observers except their names and the times and dates of arrival at the Road Research Laboratory. The subjects were numbered F1 to F7 by date of arrival. Six subjects drove saloon cars, one drove a van.

4. RESULTS

4.1 Drive Data

During the drives, all items of driver behaviour shown in Appendix 1 were observed and recorded systematically by the two observers.

4.2 Drive Indices

After each drive was completed, all data were entered on to a drive analysis sheet (Appendix 2) and from these data the following drive indices were derived.

- (i) $\frac{AG}{M}$ - the ratio of the number of times the rear-view mirror (and wing mirrors - if fitted) was used to the number of manoeuvres carried out; allowance is made for the use of the mirror(s) more than once for a manoeuvre when this occurred.
- (ii) B - the number of times over the whole drive that the rear-view mirror (and wing-mirrors - if fitted) was used as a check when no manoeuvre was being carried out.

- (iii) S/M - the ratio of the number of signals given to the number of manoeuvres carried out over the whole drive.
- (iv) V1 - the mean value of all the "clear" speeds in the 30 mile/h restricted zones. ("Clear" speeds being the speeds at which the subject drove when there were no obstacles of any kind in front of him and he could drive at what speed he wished.)
- (v) V2 - the mean value of all the clear speeds in the 40 mile/h restricted zones.
- (vi) V3 - the mean value of all the clear speeds in the de-restricted zones.
- (vii) O/T - the ratio of the number of times the subject overtook mechanically-propelled vehicles to the number of times he was overtaken by such vehicles. The larger number is divided by the smaller. A plus sign is placed in front of the ratio when the subject overtook more than he was overtaken - a minus sign when he was overtaken more than he overtook.
- (viii) T. M. - the total number of manoeuvres carried out during the drive.
- (ix) T - time taken to complete the drive (in minutes).
- (x) N. A. - near-accidents - any action by the subject which forced him or another driver to take avoiding action or to carry out an emergency stop.
- (xi) R - risk - any action on the part of the subject which could have led to a near-accident or accident.
- (xii) U. S. - unnecessary signal - signal given when the situation does not call for one - e. g. on a bend.
- (xiii) U. M. - unusual manoeuvre - any repeated item of behaviour not called for by the situation in being - e. g. slowing at the appearance of oncoming traffic.

In Table 1 details of the 13 drive indices for each drive are given and the mean values of indices for the two drives.

For details of near-accidents, risks and unusual manoeuvres see Appendix 3.

TABLE 1

Subject Number: Date	Drive Number	AG M	B	S/M	V1	V2	V3	O/T	T.M.	T	N.A.	R	U.S.	U.M.
F.1	1	0.60	4	0.64	31	37	43	+3.0	25	29	0	0	1	0
	2	0.41	9	0.77	34	31	43	+2.0	39	38	0	0	0	0
	Mean	0.51	6.5	0.71	33	34	43	+2.5	32	34	0	0	0.5	0
F.2	1	0.46	26	0.96	31	35	58	+4.0	22	30	0	0	3	0
	2	0.22	17	0.68	32	35	59	+9.0	41	35	0	0	0	1
	Mean	0.34	22	0.82	32	35	59	+6.5	32	33	0	0	1.5	0.5
F.3	1	0.46	25	0.36	34	38	46	+2.0	22	25	0	0	0	0
	2	0.59	27	0.53	35	34	44	+2.0	32	32	0	0	0	0
	Mean	0.53	26	0.45	35	36	45	+2.0	27	29	0	0	0	0
F.4	1	0.44	56	0.93	30	36	42	-0.4	27	27	0	1	4	2
	2	0.33	44	0.89	31	30	40	-0.3	46	39	1	0	4	1
	Mean	0.39	50	0.91	31	33	41	-0.4	37	33	0.5	0.5	4	1.5
F.5	1	0.19	19	0.69	36	41	51	+8.0	32	25	1	0	3	5
	2	0.14	5	0.84	37	35	47	+4.0	37	32	0	4	4	5
	Mean	0.17	12	0.77	37	38	49	+6.0	35	29	0.5	2	3.5	5
F.6	1	0.48	29	0.92	37	43	59	+1.0	25	24	0	0	1	0
	2	0.91	42	0.95	34	38	49	+12.0	43	35	0	0	0	0
	Mean	0.69	36	0.94	36	41	54	+6.5	34	29	0	0	0.5	0
F.7	1	0.36	22	0.68	37	35	47	+7.0	22	25	0	1	0	5
	2	0.32	19	0.71	37	38	46	+8.0	38	32	0	3	1	2
	Mean	0.34	21	0.69	37	37	47	+7.5	30	29	0	2	0.5	3.5
F.8	1	0.36	22	0.68	37	35	47	+7.0	22	25	0	1	0	5
	2	0.32	19	0.71	37	38	46	+8.0	38	32	0	3	1	2
	Mean	0.34	21	0.69	37	37	47	+7.5	30	29	0	2	0.5	3.5

4.3 Classification of Drivers and Order of Merit

The 7 drivers will be divided first into 2 sub-groups -

Sub-group 1 - those who had no near-accidents and
(Safe) took no risks

and Sub-group 2 - those who had near-accidents and/or
(Unsafe) took risks.

The following drivers will then be in Sub-groups 1 and 2 -

Sub-group 1 - F1, F2, F3, F6.
(Safe)

Sub-group 2 - F4, F5, F7.
(Unsafe)

Drivers in both groups can now be placed in order of merit -
as follows:-

Of drivers F1, F2, F3 and F6, F2 showed no unusual manoeuvres during the first drive, but one on the second drive, whereas the other 3 drivers showed no unusual manoeuvres at all on both drives.

Moreover, the ratio $\frac{AG}{M}$ of F2 is 0.34 as against 0.51, 0.53 and 0.69 respectively for the other 3 drivers.

On these two counts, F2 goes into 4th place of these four drivers.

For drivers F1, F3, F6, selected drive indices values are as follows:-

TABLE 2

Subject	$\frac{AG}{M}$	S/M	B	T. M.	T	$\frac{T. M.}{T}$
F1	0.51	0.71	6.5	32	34	0.94
F3	0.53	0.45	26.0	27	29	0.93
F6	0.69	0.94	36.0	34	29	1.27

F6 takes first place with the highest values of $\frac{AG}{M}$, S/M, B and ratio of T.M. to T.

F3 comes next and F1 third.

Overall order in Sub-group 1 is therefore F6, F3, F1, F2.

Similarly in Sub-group 2 -

TABLE 3

Subject	$\frac{AG}{M}$	S/M	B	T.M.	T	$\frac{T.M.}{T}$	U.M.
F4	0.39	0.91	50	37	33	1.12	1.5
F5	0.17	0.77	12	35	29	1.21	5.0
F7	0.34	0.69	21	30	29	1.03	3.5

On the basis of number of unusual manoeuvres and on the values of $\frac{AG}{M}$, S/M and B, these three drivers are placed in the order F4, F7, F5.

4.4 Sub-group Classification

F6, F3, F1 and F2 are S(or safe) drivers.

There are no I (injudicious) drivers in this group. There is to be expected on the basis of previous studies where I drivers were found to form a very small percentage (4 per cent) of groups of drivers chosen at random.

Of drivers F4, F7 and F5 -

F4 is placed in the DP sub-group (O/T = -0.4)

F7 is placed in the DA sub-group (O/T = +7.5) and

F5 is placed in the DA sub-group (O/T = +6.0)

Hence, in the group of seven drivers, there are 4 S, 1 DP and 2 DA drivers.

4.5 Comparison of Orders of Merit

The firm's Supervisor of drivers placed the drivers in an order of merit, basing his placings on accident records and his personal knowledge of the drivers (see Appendix 4). The R. R. L. order of merit has been explained above.

TABLE 4

Order of Merit	Placing by Car firm	Placing by R. R. L.
1	F6	F6
2	F1	F3
3	F3	F1
4	F7	F2
5	F5	F4
6	F2	F7
7	F4	F5

Rank correlation between the two orders of merit = +0.68.

4.6 Comparison of Drive Indices

A comparison was made between the car firm sample and a random sample of drivers.

TABLE 5

	$\frac{AG}{M}$	B	S/M	V1	V2	O/T	$\frac{T.M.}{T}$	N.A.	R	U.S.	U.M.
Car-firm sample	0.42	25	0.75	36	48	+4.37	1.07	0.28	0.43	0.86	0.43
Random sample	0.44	32	0.47	32	44	+0.14	1.20	0.08	0.20	0.58	0.28

(In this table V2 refers to the mean value of clear speeds in the de-restricted zones.)

Compared to a sample of fifty drivers chosen at random, the seven drivers concerned in this study used their rear-view mirrors when manoeuvring to much the same degree, but used fewer B mirrors. Their signals to manoeuvres ratio was higher and they drove faster in both the 30 mile/h zones and in the de-restricted zones, overtaking thirty-one times as much as the random group.

The frequency of occurrence of near-accidents, risks, unnecessary signals and unusual manoeuvres are all much higher with the group under study. This last statement is partly explained by the fact that three "poor" drivers were deliberately included in this sample - almost fifty per cent of the sample.

5. CONCLUSIONS

1. The order of merit given by the employers of the subjects used in this study and that given by the Road Research Laboratory correlated +0.68.
2. The small group of drivers used in this study differed in many respects from a sample of fifty drivers chosen at random.

6. ACKNOWLEDGMENTS

The research team which carried out this study were S. W. Quenault, Mrs. P. M. Pryer, W. A. Wilson and R. D. Fairhead.

7. REFERENCES

1. QUENAULT S. W., Some methods of Obtaining Information on Driver Behaviour. Ministry of Transport, RRL Report No. 25, Harmondsworth, 1966 (Road Research Laboratory).
2. QUENAULT S. W., Driver Behaviour - Safe and Unsafe Drivers. Ministry of Transport RRL Report LR. 70. Crowthorne, 1967 (Road Research Laboratory).

**8. APPENDIX 1
DRIVE CHECK SHEET**

et 9

Location	Clear Speed	Sig.	O/T	Ot'kn.	Pass	Mirror		Unusual Manoeuvres	Junctions	Posture	Others
						A	B				
(9) restricted											
bedding en ction											
g ight											
d gley al Bridge											

(10)
mile/h
ne

lway
ridge

olds"

t. L. Gate

Time:
Mileage
Observer 1
Observer 2

DRIVE ANALYSIS SHEET

SUBJECT

CAR

TYPE

DATA SHEET

	1 (30)	2 (40)	3 (D)	4 (30)	5 (D)	6 (30)	7 (D)	8 (30)	9 (D)	10 (30)	Totals	DAY/DARK
Average Clear Speeds												Date:
Overtook												Time:
Overtaken												Observer 1:
Signalled												Observer 2:
Did not signal												NOTES:
Mirror A/B												Near Accidents:
Pedestrian crossings	1.					1. 2. 3. 4.						
Followed Vehicles												
Weather												
Visibility												
Posture												
Junctions												
Other points												

10. APPENDIX 3

DETAILS OF NEAR-ACCIDENTS, RISKS AND UNUSUAL MANOEUVRES

Subjects F6, F3 and F1 had no near-accidents, took no risks and carried out no unusual manoeuvres. F2 carried out one unusual manoeuvre - close following - on the second drive.

- | | |
|--------------------|---|
| Subject F4 | - 1 Near-accident, 1 Risk, 2 Unusual Manoeuvres. |
| Near Accident | - subject cut corner then ran over sack of waste paper in road and veered into path of oncoming car. |
| Risk | - Both hands off steering wheel - signalling and changing gear at the same time. |
| Unusual Manoeuvres | - Unnecessarily close following.
Used rear mirror after manoeuvre. |
| Subject F7 | - 4 Risks, 5 Unusual Manoeuvres. |
| Risks | - Passed parked vehicles in face of oncoming traffic twice. Drove over narrow hump-backed bridge at high speed, and without looking for oncoming traffic.
Overtook car and tanker on blind bend. |
| Unusual Manoeuvres | - Wide sweeps on overtaking.
Straddled white lines.
Cut corners.
Wide passing.
Used mirror after manoeuvre. |
| Subject F5 | - 1 Near-Accident, 4 Risks, 5 Unusual Manoeuvres. |
| Near Accident | - Passed van in face of oncoming traffic which had to take avoiding action. |
| Risks | - Only one hand on steering wheel often.
Cut across oncoming traffic to turn right (twice).
Passed lorry in face of oncoming traffic. |

Unusual
Manoeuvres

- Close following, straddled lanes,
indicator used on bends and left on, 3rd
gear used as top instead of 4th gear.
Cut corners.

11. APPENDIX 4

SOME DETAILS OF SUBJECTS' DRIVING RECORDS

Subject Number	Age	Average Annual Mileage	Number of Years Driving	Miles driven for firm (thousands)	Number of Accidents with firm	Mileage (thousands) Accidents (for firm)
F1	49	70,000	27	264	1	264
F2	51	30,000	29	472	9	52
F3	42	50,000	16	333	5	67
F4	52	60,000	28	304	9	34
F5	54	9,000	22	500	3	167
F6	45	25,000	22	500	0	∞
F7	49	20,000	32	369	3	123

On accident record alone, the Firm's order of merit would be -

F6, F1, F5, F7, F3, F2, F4.

However, other factors, such as attitude to those in authority and time-keeping were taken into account, altering the above order to -

F6, F1, F3, F7, F5, F2, F4.

F3 and F5 having changed places in the two orders of merit.