TRAFFIC ACCIDENT RESEARCH UNIT

DRIVER TRAINING, NOT THE WHOLE ANSWER

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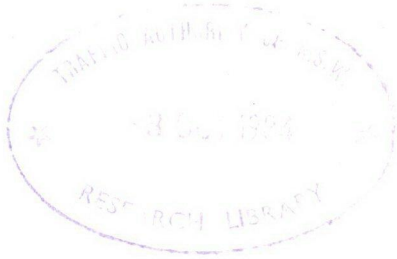

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ABSTRACT

This paper discusses the value of existing driver training and education programmes and concludes that further research is required in order to find ways of motivating drivers to drive safely.

Methods used in developing safety measures, based on scientific investigation of crashes, are described and measures such as seat belts shown as of especial value. In comparison with the trend in vehicle occupant deaths before seat belt wearing was made compulsory (in 1971) New South Wales saved about $110 Million in economic terms as well as 400 lives in the single year 1980.

It is suggested that professional driving instructors should set examples to their pupils and should teach them

(1) Never drink-drive
(2) Always be properly protected (by belt or helmet)
(3) Never exceed speed limits
(4) Never show off driving skills
(5) Never drive when depressed, worried or tired, and
(6) Never undertake long tiring trips.

1. INTRODUCTION

It is clear from the programme that has been distributed for this Seminar that, in addition to consideration of the training of car drivers by professional instructors, attention will also be given to the special needs of motorcycle riders and of the drivers of heavy trucks and buses. It is of course obvious, from the fact that the Seminar is being run by the Army School of Transport, that the special needs of Army personnel going about their duties, were first and foremost in the minds of those who proposed that the Seminar should take place at Puckapunyal.

The Traffic Accident Research Unit which is a Branch of the N.S.W. Department of Motor Transport, has for several years assisted in a detailed review of the training needs of the first three of these groups of road users that is, car drivers, motorcycle riders and the drivers of heavy vehicles. This resulted in the issue this year of a completely new Motor Traffic Handbook, and a Motorcyclist Handbook, and the preparation of a Handbook for the drivers of heavy vehicles. This last one has yet to be printed. Whilst this review has not included a detailed reconsideration of N.S.W. regulations regarding professional instructors, there is much that has come out of the review that has relevance to instructors, and I shall try to highlight some of that material in this paper.

As you would expect, we have not given any attention to the special problems of Army personnel, but I trust that what we have done and what I have to say, will be found of interest to this important group.

Possibly the first point that I should make is the obvious one that any professional, offering his services for payment, in any field of activity, should be very clear in his mind as to the value to his client, of the services for which he is receiving a fee. In the driver training field, the professional should ask himself what his clients will gain as a result of paying a fee. Will the client have fewer crashes as a result of his own driving and that of his employees? Will the clients' vehicles be cared for better with a smaller maintenance and replacement

bill? Will the goods carried on the vehicles be in better condition upon delivery? Will there be fewer court actions as a result of the driving of the clients' employees? Will the training course improve the reputation of the client's firm? And so on.

As a safety scientist and administrator, my chief concern with the quality of driver training, is the contribution it might make to better road safety, and that is what I shall mostly speak about. I mention these other matters however (what I shall call the social and business needs of driver training) both to acknowledge their importance, and to make clear that I have little that is useful to contribute in those areas.

It is however important, when talking about the safety needs of training, not to confuse them with the social and business needs. This is especially important when we are talking about road traffic regulations and the licensing requirements of drivers. Licensing requirements are concerned with:-

1. Ensuring that drivers have a basic understanding of the operation of a motor vehicle on a public street and a working knowledge of the road rules, and

2. Ensuring that drivers can be identified for legislative purposes in the case of a crash or misdemeanour.

People not concerned with the licensing of drivers and indeed, many who are, try to add to these two functions of the licensing process, a responsibility upon the licensing authority, to improve road safety through driver and rider licensing.

I am not proposing nor have I ever proposed, that this is not a highly desirable objective of licensing. It therefore follows that I see road safety as a desirable aim of driver training. From that it follows that I agree that professional driving instructors should be well versed in road safety matters, and also that they should be highly competent in producing safer drivers, if that is not asking too much of them.

So, is it too much to ask of them?

In order to answer that question, we should I believe look at the process of general driver education (including training by instructors) and try to identify a programme that will improve safety. There are several ways in which we can set about this examination. We can examine existing programmes and see if they have been instrumental in bringing about an improved safety record among the students who passed through the programmes. A second option is to carry out a theoretical study of driver education, design a new programme based on that study, and evaluate its effect on students; this is a powerful method because we should be able to make a direct comparison with other students who are identical to the experimental group, except that they did not take the experimental programme. A third option is to investigate why road crashes happen, and try to identify safety-related factors that are amenable to change by education. Yet a fourth option is to make no assumption that driver education can or cannot improve safety, but to simply carry out a fundamental study the aim of which is to determine the most cost-effective ways of improving safety.

You will not be surprised to learn that we in the Traffic Accident Research Unit have pursued all four of these options. I should like to tell you what we have found. Before doing so however, I should point out a very important difference between training for professional drivers of buses, trucks and Army vehicles on the one hand, and training for amateur drivers on the other. In the first group it is perfectly proper for employers to use driver training schemes in an attempt to weed out drivers who by their performance in tests, are likely to have crashes. For the general population of amateurs however, it is politically impossible to eliminate more than a very small number of obviously incompetent or incorrigible applicants for licences.

In making this distinction between professional and amateur drivers, it is implied that one can select by testing, those drivers who will have a poor crash record. I therefore give this matter my first attention in the remainder of the paper.

2. VALIDITY OF DRIVER TESTS

The California Department of Motor Vehicles (Carpenter, 1976) set out to evaluate the Californian written test for drivers and studied 48,000 applicants. New test forms were produced and compared for effectiveness with the old ones. For each test form it was found that the test score predicted the level of general education of the applicant but did not predict driver record. There was also no correlation between level of education and driver record.

The U.S. Army conducted a study (Uhlaner and Drucker, 1965) in which a battery of psychological tests was used to select drivers. These tests were intended to eliminate applicants with poor attitudes and other personality problems. It was found that 23 per cent of applicants failed the battery of tests and that the rate of crashes in the U.S.A. could be reduced 50 per cent by refusing licences to those 23 per cent. However, a large number of drivers who would have good driving records would also have been barred from driving. Even if the pass mark in the psychological tests were lowered so as to reject only 10 per cent of applicants, 1 in 5 of those rejected would have been unlikely to have crashes.

As Saffron (1981) has said recently, the denial of licence without sound reason results in great personal cost to the person to whom the licence is denied and unnecessarily restricts the applicant's potential contribution to a society and an economy which depend on the use of motor vehicles.

It also seems highly probable that the refusal of licences to large numbers of people would not stop them driving, but would increase the amount of un-licensed driving.

3. REVIEW OF EXISTING DRIVER TRAINING AND EDUCATION

Driver education schemes may be divided among three groups-

(a) Basic training. This provides the skill necessary to drive the vehicle, and the information on road rules necessary to obtain a licence to drive. This training is given usually by relatives, by friends or by a commercial driving school.

(b) Safety education. This involves educating drivers, either before or after licensing, to drive with consideration for the safety of themselves and other road users. It includes "defensive driving" as taught by the Department of Motor Transport's Traffic Accident Research Unit, aimed at teaching drivers to avoid getting in to hazardous situations.

(c) Advanced driving. Often taught by professional competition drivers, this involves increasing driving skill with the object of driving out of hazardous situations.

You will note my distinction between defensive driving techniques that aim to keep people out of trouble and alternative techniques that concentrate on driving out of hazards.

STUDIES OF DRIVER EDUCATION.

Many claims have been made for the success of (mainly American) high school programmes of driver education, in reducing the crash rates of successful participants. These claims have however been rejected by cynics who have pointed out that the courses were taken mainly by volunteers, who clearly had a prior interest in driving safely, and so might have had safer records, even without any assistance from

education. Some driver education programmes have clearly not benefited their pupils. An evaluation of an Advanced Driving School operating in Sydney (Sowerbutts, 1975) found a greater number of traffic violations among graduates of the School, than in the general population of drivers. It was not known how many crashes they had.

In Britain, the Institute of Advanced Motorists selects for membership only those that pass a rigorous test. A study of members in 1967 (Hoinville, 1972) showed them to have 25 per cent fewer crashes over a 3 year period than those who failed the test. It cannot however be concluded that such a test, if applied to all applicants for a licence, would be acceptable to the public, because only 49 per cent passed on the first or a later attempt. Moreover, applicants were probably more likely to pass than the general population because they included fewer young and fewer old drivers, and fewer manual workers. Also, they had more driving experience and a history of fewer motoring offences. More to the point, the British study did not produce results that could be applied in developing a more suitable programme of tuition.

In Victoria, a study was made (Perry 1978) of drivers attending an advanced driving training course. The authors said "that drivers voluntarily attending driver-improvement courses differ markedly in attitude and driving experience from drivers attending the course as a job requirement". These volunteers were rated "as having poor attitudes towards driving and had a higher accident involvement". The schools appeared to "collect aggressive drivers", and did not modify this aggressive behaviour.

An American study (Robertson, 1975) was made in 27 States of the amount of driver education received by teenagers. Among 16 to 17 year olds, driver education greatly increased the number of licensed drivers without decreasing the fatal crash involvement per 10,000 licensed drivers. Because 80 per cent of this age group would not have been licensed until age 18 or thereafter had there been no driver education in high schools, the net effect of driver education was a much higher death rate. At least 2000 fatal crashes per year were attributed to increased driving among 16 to 17 year olds associated with education programmes.

That study emphasised the importance of delaying until as late as possible the age at which people drive or ride.

These results were consistent with a study in England (Shaoul, 1975) conducted by the University of Salford. They concluded that driver education had no effect on the likelihood of an individual having a crash.

What the English did find was that the critical factors in increasing crash risk were exposure and experience. Crashes increased directly with amount of exposure to risk and crashes decreased directly with amount of on-road experience.

Since increased experience cannot be gained without increasing exposure, it becomes largely a matter of luck that determines the individuals that gain experience without their increased risk actually leading to a crash.

4. THE DEVELOPMENT AND EVALUATION OF NEW PROGRAMMES

I have mentioned the disastrous consequences of the large programme of driver education in high schools in the U.S.A., leading to an increase in the number of deaths. In 1976 the U.S.A. Government decided to make a "last ditch" attempt to produce an effective programme. They let a $6 Million contract to a group in Atlanta, Georgia under the direction of Mr. Jack Weaver. The U.S.A.'s National Highway and Traffic Safety Administration stated that the future of driver education funding depended on Weaver developing a new programme that produced at least 15 per cent fewer traffic violations and at least 10 per cent fewer crashes for students that do the course, compared with students in a control group who do not do the course (Herbert, 1980a).

Weaver was in Sydney in December 1980 and described what he had been doing. He devised a training scheme based on the well known task analysis conducted by McKnight (1970, 1974) whose approach was to ask professional driving instructors what were the critical elements of a driver training course. All Weaver's instructors were full time University graduates, some with Master's degrees, who were given special training in driver instruction.

After a few hours in a simulator, pupils got in a car and drove alone on a special training area fenced off from the public. They were monitored by radio from a control tower with two helpers on the ground. Weaver said that the aim was to accelerate the gaining of experience in handling a car. Up to 30 cars with pupils were on the track at any one time. The track measured 350 ft long in straights and had various curves and other areas. It cost $250,000 to $500,000 to build each of the four tracks in Dekalb County. Tuition and transport to the site were free. Remedial work was supplied for slow learners. Operating cost of the Special Course was $84 per student for 98 hours of training. This compared with $128 for the regular 30/6 Course which comprised 30 hours in the classroom and 6 on the road.

18,000 pupils were put through the scheme, 6000 on the new Special Course, 6000 on the regular 30/6 Course and 6000 with no formal training. The three groups were matched for sex, socio-economic status and school grades.

Weaver reported the preliminary results. Briefly,

1. Special Course pupils acquired more knowledge than others.

2. Male pupils performed better in the Special Course than females.

3. At the end of the trials, there was no difference between the Special Course, Regular Course and untrained groups for traffic violations.

4. There was no difference between the three groups for crash frequency.

5. HUMAN FACTORS IN CRASHES - CAN THEY BE CHANGED?

Obviously, the performance of drivers is very important to the likelihood of crashes occurring. The failure of existing driver training courses to change drivers in ways that will reduce crash frequency, raises the question of whether human behaviour can be changed at all.

The first significant finding of scientific analysts back in the 1960s was that, whilst the most faulty part of the road-vehicle-man system (that is road traffic) was the human operator of the vehicle, man was much more difficult to change than the road or the vehicles. It became obvious that man is a fallible creature with errant behaviour, so road and vehicle designers should take account of these traits, and not assume perfect, well behaved drivers behind the wheels of (even the majority of) vehicles.

The second finding was that the most significant driver factor in fatal and other very serious crashes is alcohol in the blood, being involved in nearly half of all rider and driver deaths (Herbert, 1980b). Alcohol then is the human factor that should receive most attention in driver instruction.

The third finding was that the commonest factor in crashes of all kinds is lack of concentration on the driving task. The reasons for lack of concentration were found to range from alcohol and fatigue, to distraction by other events and worrying about business or domestic affairs. These too should be given detailed attention by instructors.

The fourth was that motivation was the chief factor in drivers driving well when presenting for licence tests but poorly afterwards. In other words, the motivation when tested, is to pass the test, so drivers are sober, keep below speed limits, overtake with plenty of room, and know the road rules. Later on their motivations include getting quickly from A to B, enjoying the thrills of speeding and overtaking, and showing off to men and women friends.

These last three findings explain in large measure why it is so difficult to change driver behaviour in ways that will reduce crash frequency.

The fifth finding is that the best way to prevent death and serious injury is to wear protective gear like seat belts and crash helmets, and to wear it properly. A study of the motives behind the occasional failure to wear belt or helmet, needs to be done as a matter of urgency.

Clearly, if motivation plays such an important role in safe and dangerous driving, a completely different approach needs to be taken with respect to driver training than has been the case in the past. It looks as though a lot of fundamental research is needed.

For the professional driving instructor we can draw some important conclusions about the examples he should set his students. The driving instructor should:

- NEVER DRINK-DRIVE
- ALWAYS BE PROPERLY PROTECTED (seat belt, helmet)
- NEVER EXCEED SPEED LIMITS
- NEVER SHOW OFF DRIVING SKILL
- NEVER DRIVE WHEN DEPRESSED, WORRIED OR TIRED
- NEVER UNDERTAKE LONG TIRING TRIPS

Obviously these rules should form the basis of road safety teaching.

6. THE MOST COST EFFECTIVE WAYS OF REDUCING THE ROAD TOLL

If a truly objective view of road crashes is taken it will not be assumed that better training of drivers is the most cost-effective way of reducing the road toll. Instead, an open-minded investigation of crashes will be undertaken in an attempt to identify the best approaches.

These studies have often treated road safety as a problem of public health, like disposing of sewage and providing pure water supplies for drinking. It is pointed out that dangerous water supplies were not made safe by punishing people for drinking poisoned water or teaching them not to drink it: what was done was to provide pure water and punish any companies and individuals who contaminated the catchment area (the water supply environment). Scientists asked why was road safety not treated likewise: Why were roads and vehicles not built so that they were safe? Why were organisations that contaminated the road environment with poles, bridge structures and trees not prosecuted?

Increasingly the finger was pointed at the designers of roads and vehicles, challenging them to produce a less hostile and more forgiving environment for road users.

The move to better vehicles, that would have fewer crashes and that would provide protection for the occupants, was given increasing support.

In New South Wales there had been a steady increase in number of vehicle occupants killed each year, until 1972, the first full year of compulsory seat belt wearing. In that year there was a 25 per cent drop in the number killed. If the pre - 1972 trend had continued to the present day, a total of 1250 vehicle occupants would have been killed in N.S.W. during 1980, instead of 846 which was the actual figure. At an economic value of $300,000 for each of the 404 lives saved and assuming that all the saving was due to seat belts with a total seat belt cost in 1980 of $11 Million, the cash return on this investment was $110 Million just in that one year, a return of 1000 per cent per annum.

Crash investigations should reveal the need for other safety measures, if they are conducted objectively by trained personnel.

In the case of a fairly early, retrospective, investigation of a crash, it is likely that the event that triggered notification would be a violent collision between a motor vehicle (including motor cycle) and a fixed object, pedestrian, pedal cyclist, or vehicle. The other most evident consequences are likely to be a damaged vehicle, with a probability of injuries to some of the people involved.

Persons living near or arriving at the scene will probably call an ambulance. A tow-truck is likely to arrive, also the police. If a scientific organisation such as the Traffic Accident Research Unit is involved, it will probably be called to the scene by the ambulance despatcher and might arrive soon after the ambulance.

The immediate objective of the scientific team is to establish the chain of events leading from the beginning of the journey of the motor vehicle(s) involved, to the moment of collision and to the production of injuries. At a later stage, detailed studies will be made of the injuries themselves and of vehicle and other object damage.

For simplicity, I will consider the case of a collision of a car with a tree, ignoring any injuries for the moment. Thus the "terminal event" giving cause for investigation is the collision of car with tree. Tracing events backwards in time, it will perhaps be found that the tree was on a slope below the road, the car had left the side of the road on a steep slope, the car's brakes were defective, the car was obtained from a hire company, the driver showed a positive blood alcohol concentration. Reversing these into correct time sequence these events are:-

1. Driver hires car.
2. Driver drinks alcohol.
3. Driver drives hire car.
4. Car brakes fail on hill.
5. Car leaves road on downhill curve.
6. Car hits tree on slope.

An experienced investigating team will be aware that there may be many factors involved in each of these six events, and that the particular crash could probably have been prevented, had the chain of six events been broken at any link. These possibilities are now discussed.

1. Driver hires car. Obviously if he had not hired the car, the crash would not have occurred. Since this paper is concerned only with practical measures for reducing crash frequency and severity, it might be thought that there was no scope for preventing the driver hiring the car. It is possible however that the driver was regularly a heavy drinker and regularly drove after drinking hence measures to prevent his drink-driving (say by fitting a breathalyser-ignition lock) or driving at all (by constraints on his licence or hiring credit) are practical possibilities. These can all be seen as environmental measures and a full investigation of the status of the driver should include a study of his drink-driving history and of any measures then available for controlling it.

2. Driver drinks alcohol. Preventing a driver from drinking may likewise be seen as impractical. An investigation aimed at discovering, amongst other things, means of doing just that, should at least investigate the means by which he was able to obtain alcohol. If it was from a hotel on a highway, this raises questions about measures to control such sales, or to place respondsibility for any subsequent crash upon the publican. The objective must be to discover the facts and record them.

3. Driver drives hire car. Liability of people serving drivers with alcohol is an issue that could be addressed here, also the possibility of friends dissuading drinkers from driving.

4. Brakes on hired car fail. An investigation of the brakes and of servicing arrangements would obviously be made by the scientific team. However, it should also be asked whether a driver with no alcohol at all in him, would have driven so far before finding the brakes to be ineffective. A difficult question to answer but the point is that, if drinkers are to be allowed to drive when even mildly under the influence of alcohol, then the car should be suited to the degraded capacity of the driver to think out problems, and to his increased propensity for risk taking. The scientists should enquire to what extent these were factors. They might also consider the value of any supplementary braking system, existing or not.

5. Car leaves road on downhill curve. Since brake failure is a real possibility, one might expect that roads would be constructed to be forgiving of such a defect. The investigators will consider to what extent the road allowed the driver to stop his car without brakes, to what extent the downhill grade provided the acceleration and resulting high speed that necessitated high braking effort, and whether the curve was designed for a car with failed brakes. The road surface may also be a factor in braking efficiency. Since inattention and fatigue may be human factors, the road shoulder will be examined in order to see if driving on it provided a warning (an audible one for example) that the car was leaving the road pavement. The absence or presence of barriers preventing the car leaving the road will be recorded. Similarly presence of objects such as tree stumps and culverts that limit the safe passage of the car on the shoulder will be noted.

6. Car hits tree on slope. The size of trees will be noted in order to determine what size can be hit without serious consequences. These factors will have special importance to preventing serious injury by avoiding the placement of large trees where cars can hit them, or removing trees in dangerous locations, during reconstruction.

7. CONCLUSIONS

This paper can probably best be summed up by saying that since we have no idea at all about how to train drivers not to have crashes, we had better concentrate our efforts in areas known to be productive. These include making the road environment much safer by removing poles, trees etc. from hazardous locations, and by improving the performance and utilisation of protective gear like seat belts and crash helmets. We should also make sure that scarce road safety funds are spent on these most cost-effective items.

This does not mean that we should ignore driver behaviour. Indeed the importance of drink-driving is so great, in its involvement in nearly half of our drivers' and riders'deaths, that it must continue to receive top priority.

There may also be social and business reasons for driver training but these should not utilise safety funds.

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