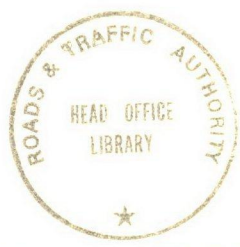
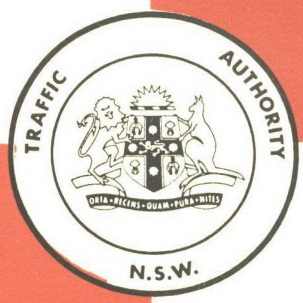


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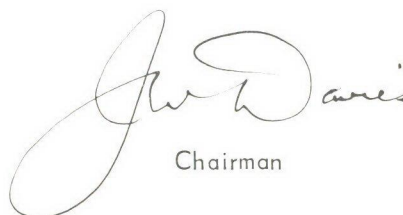


## DRIVER AND RIDER EDUCATION, TRAINING AND LICENSING: A BRIEF REVIEW

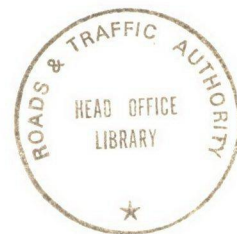
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Ph.D.

The Traffic Accident Research Unit was established within the Department of Motor Transport, New South Wales, in May 1969 to provide a scientific approach to the traffic accident problem. In September, 1981 the Unit was integrated with the Traffic Authority of New South Wales.

This paper is one of a number which report the results of research work undertaken by the Unit's team of medical, statistical, engineering and other scientists and is published for the information of all those interested in the prevention of traffic accidents and the amelioration of their effects.



Chairman



# DRIVER AND RIDER EDUCATION, TRAINING AND LICENSING: A BRIEF REVIEW

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**TRAFFIC ACCIDENT RESEARCH UNIT,  
TRAFFIC AUTHORITY OF NEW SOUTH WALES.**

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This report was prepared as part of the N.S.W. Department of Motor Transport's submission to the House of Representatives Standing Committee on Road Safety in its inquiry into the education, training and licensing of drivers, including the special needs of disabled drivers. The submission has been published as part of the Hansard report of submissions.



ABSTRACT

Relevant research related issues are briefly examined. The known influence of experience implies the possibility of effective education and training. At present, however, there is no sound evidence to show that effective programmes exist, to support the suspicion of a special effectiveness for motorcyclists, or to suggest that a licence test is an effective crash countermeasure - either as a selection device or as an incentive for pre-licensing education. Great expenditure on fairly ineffective measures results in loss of opportunity to benefit from more effective, mainly engineering, measures. Longer term driver behaviour research seems to have a high priority.

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DRIVER AND RIDER EDUCATION, TRAINING  
AND LICENSING: A BRIEF REVIEW

1. INTRODUCTION

1.1 The Perspective

In New South Wales, in the year ended 31st December, 1980, there were 1,303 people killed and 38,816 injured as a result of road crashes. It is important that efforts to counter this most serious problem are based on evaluation and sound evidence of their effectiveness.

This paper examines research-related questions in connection with priorities for road crash countermeasures based on education, training and licensing of drivers and riders.

Solomon (1972, p.57) reviewed the evidence and concluded that activities directed at educating or otherwise influencing the driver appeared to have no effect on the road crash problem. He pointed out, however, that the evidence showed that engineering measures applied to the vehicle and to the road and its surrounds had usually been effective. Solomon therefore called for an unbalanced road safety programme that gives primary emphasis to engineering solutions.

The intention of the following review is to determine whether Solomon's assessment holds today.

Driver or rider behaviour is often one of the factors in a crash. It would be of benefit if an effective way of modifying this behaviour could be developed. As will be suggested in the next section, this development appears to depend on a long-term research programme. That is, more investigation into driver education seems to be called for.



The report of the Commission of Enquiry into the N.S.W. Road Freight Industry (page 5/21) indicated that "quality" licensing in the United Kingdom may have been one of the factors which contributed to a reduction in the role of involvement of heavy goods vehicles in fatal crashes.

This paper does not purport to deal with "quality" licensing of road haulage operators; it deals only with the licensing of a driver as a driver, not as a participant in an industry.

## 1.2 Driver and Rider Experience: The Possibility of a Sound Basis for Driver Education and Training

There is a great deal of evidence that more experienced riders and drivers tend to have fewer crashes than inexperienced riders and drivers\*. After reviewing the literature, Marek and Sten (1977, p.14) like Cameron and MacDonald (1973, p.66) concluded that there should be some way of devising a training course which will result in accident reduction. Since there is an improvement over seven or eight years on the road, then something is being learnt. There is at least some hope that what is being learnt can be taught.

As Cameron and MacDonald (1973, p.66) pointed out:

"It is necessary first to identify what exactly is learned and then to develop suitable methods of instruction. It appears that the first aspect has so far received less attention than the second."

---

\* There is a related argument referring specifically to motorcyclists. This will be discussed in the next chapter.

Little action appears to have been taken to remedy the situation revealed by Cameron and MacDonald's review.

Most present courses of instruction appear to have been developed from unsubstantiated theory and personal experience by experts on driving. Perry (1979) reported that the theoretical basis for driver education, training and licensing in Australia is the system used at the Hendon School for police drivers in England. Perry could detect no scientific basis for, or evaluation of, the Hendon system.

In the U.S.A., some courses have been based on analyses by McKnight and his associates (McKnight and Adams, 1970; McKnight and Heywood, 1974). McKnight's approach was based on asking experts. This approach cannot be thought of as a scientific analysis of the driving task because it is based purely on subjective data.

As Gilbert, Waller and Li (1980, pp 109-110) and Johnston and Perry (1980) pointed out, there is a high priority need for long-term study of driver behaviour. This would importantly focus on differences between novice and experienced drivers.

The overall organisation of the transport system is based on assumptions about driver behaviour. By replacing these assumptions with knowledge derived from research some benefit may accrue to the organisation of the system, with accompanying benefits to both safety and traffic flow.

In the past there has been some reluctance to expend road safety money unless there is some prospect of an immediate effect.

Funds expended in attempting to obtain such a short-term effect by "improved" licensing and training programmes are likely to be wasted, however, unless these are based on the findings of long-term driver behaviour research.

Previous evaluations of driver education, training and licensing programmes have generally not shown them to be effective. The research findings will be briefly outlined in the following two chapters.



## 2. DRIVER AND RIDER EDUCATION AND TRAINING

### 2.1 The Different Types of Training and Education

Perry (1979) avoided debate about what is education and what is training by referring to all aspects of pre - and post-licensing education and training as "driving instruction". Driving instruction can be thought of under the following categories:

1. high school driver education;
2. pre-licensing instruction;
3. more advanced driver training;
4. defensive driving courses; and
5. education of the public by use of the mass media.

Note that, even though they are discussed separately below, the contents of these various types of instruction are not mutually exclusive.

### 2.2 High School Driver Education

Some early studies (e.g., Allgaier, 1964) appeared to show that driver education reduced accident frequency. Further analysis (McGuire and Kersh, 1969) showed that the earlier studies were logically deficient. These deficiencies were mainly related to the selection of people to do the courses. People for whom a driver education course was available and who chose to take it differed from others in ways relevant to safety, e.g. intelligence, attitudes to safety. Most later studies in which an attempt was made to control for these effects have failed to show any beneficial effect of driver education (U.S. National Highway Traffic Safety Administration, 1975).

As an additional consideration, it is possible that high school driver education might increase the public health problem of road crashes. This is suggested by two large scale studies; one in the

U.S.A. (Robertson and Zador, 1978) and one in the U.K. (Shaoul, 1975). Both of these studies found that driver education appeared to have no effect in reducing likelihood of a crash in one study (Shaoul) or of a fatal crash in the other (Robertson and Zador). Both studies also showed that high school driver education encouraged young people to get their licence earlier and to drive at a younger age. Thus the driver education did not prevent crashes, and those who were educated tended to drive more and consequently were more frequently involved in crashes or fatal crashes.

A major study is now underway in one county in the U.S.A., at a cost of more than six million dollars (Weaver, 1978; 1980). This study will be concluded in 1982 and its results should be useful in a further assessment of the value of driver education.

At present, however, there is no sound evidence that high school driver education is of any benefit.

### 2.3 Pre-Licensing Instruction

Every licensed driver has learned to drive in some way. The question is whether some special instruction programmes are worthwhile. One part of pre-licensing instruction is high school driver education, discussed above.

There appears to be no evidence that licence applicants who are trained by driving schools are less likely to be involved in crashes. On the other hand, Skelly (1968) found that drivers who had been trained by driving schools had a higher crash rate than drivers who had been trained by friends or relatives. Worse still were drivers who had been trained by both a driving school and friends or relatives.

Skelly's study cannot really be taken as evidence that driving school instruction causes crashes since it is possible that drivers who chose different methods of learning may have differed in ways relevant to safety.



Still, there is no evidence that special pre-licensing driving instruction is an effective road crash countermeasure.

#### 2.4 More Advanced Driver Training

Perry (1979) distinguished between two types of advanced driving course:

- (a) carcraft; and
- (b) roadcraft.

The distinction is not completely clear-cut, but it seems that carcraft courses attempt to increase driving skills relating to "sporting" type driving, and roadcraft courses attempt to increase practical skills in relation to defensive driving.

There is no evidence that carcraft courses reduce the likelihood of crashing. There is concern that increasing skills and confidence in undertaking hazardous manoeuvres may result in a greater likelihood of crashing. Williams and O'Neill (1974) found that a group of highly skilled sports drivers had more crashes than a group matched on race, age and sex. The highly skilled group were national competition licence holders of the Sports Car Club of America who were qualified by attending a skill course, passing a test, and competing in a sufficient number of races.

There also appears to be no evidence that roadcraft courses have any effect as a road crash countermeasure. Perry (1979) emphasised the distinction between carcraft and roadcraft courses but offered no evidence that the latter has any benefit.

One interesting programme which could be described as a roadcraft course is the Smith-Cummings-Sherman driver training system (Marek and Sten, 1977, pp 123-124; Smith and Cummings, 1956). Payne and Barmack (1963) evaluated the effectiveness of this system on the crash involvement of semi-trailer drivers. They were not able to show any significant effect of training.



The interesting feature of the Payne and Barmack study is the effect of the trainer rather than the effect of the course. In the study two trainers were employed, and four groups of drivers. The first group was trained by one trainer, the second group was trained by the other trainer, the third group was trained by both trainers, and the fourth group did not receive the training. A group trained solely by one of the trainers showed a substantially and statistically significantly lower crash rate than the other three groups. This is a surprising result, especially in view of the small number of drivers (120) in the study.

Cameron and MacDonald (1973), in discussing the Payne and Barmack study, claimed that "the [Smith-Cummings-Sherman] method itself must have some virtue for any success to be achieved" even by one instructor. This is not clearly the case, since this instructor might have been able to have success with almost any course. Research directed at discovering ways to make other instructors more effective would appear to have some value, if the Payne and Barmack study can be relied upon.

## 2.5 Defensive Driving Courses

There is some research which purports to show that defensive driving courses are effective in preventing crashes. Like the research which purports to show the effectiveness of high school driver education, however, this research can be criticised for the use of an inadequate method.

Some studies (O'Day, 1970, Planek, Schupack and Fowler, 1974) have employed the technique of questionnaire surveys. Only a low proportion of those sent questionnaires, however, responded; and there is reason to believe that non-respondents were different from respondents in ways relevant to their crash record (O'Neill, 1974).

The review of driver training by Cameron and MacDonald (1973) was fairly supportive of the effectiveness of defensive driving courses, at least for volunteers. They placed reliance on a Canadian study (M.W. Menzies Group Pty. Ltd., 1971) in which it was reported that a group of

drivers had a substantial drop in crash frequency after doing a defensive driving course. There are two notable weaknesses in the Canadian study:

- (a) It is difficult to generalise the finding to non-volunteers or to people who volunteer under different circumstances, e.g., after a massive promotion.
- (b) Since there was no control group who did not take the course, the Canadian study could not demonstrate that the improvement resulted from the drivers taking the course.

A study by Hill and Jamieson (1978) provides evidence in relation to these two points. These investigators studied the records of people who had been ordered by the court to attend a defensive driving course. There was a matched control group of drivers with an accident and conviction record similar to that of the drivers in the experimental group. The experimental group showed a marked reduction in accident frequency after the course. It would be a mistake, however, to attribute the improvement to the course; the control group showed an even greater improvement. There are two notable points in the Hill and Jamieson study:

- (a) The study suggests that defensive driving courses are not effective with at least one type of non-volunteer.
- (b) The fact that the control group showed marked improvement renders unconvincing the simple uncontrolled before and after studies such as the Canadian study discussed above. Such studies are likely to encounter a phenomenon known as "regression to the mean" whereby any group of people with abnormal behaviour are likely to return to normal behaviour over a period of time; thus those who have several accidents in one period of time are unlikely to have as many in the next period.



Overall there appears to be no sound evidence that defensive driving courses are effective in preventing crashes.

## 2.6 Education of the Public by the Use of the Mass Media

Changes to the law are often communicated to the public by use of the mass media. It is important that such communications are easily understood by the target audience and therefore communications should be tested with representatives of those to whom the message is addressed. Sometimes the mass media is also used in persuasive campaigns aimed at changing road users' attitudes and/or behaviour.

While this report does not purport to deal with this topic in detail, it is acknowledged that after drivers are licensed the main possibility for communicating with them is by using the mass media (unless the driver undertakes further driver training).

The Traffic Accident Research Unit of the N.S.W. Department of Motor Transport has, in the past, conducted many mass media campaigns and the results of some of these have been published in research reports (Freedman, Henderson and Wood, 1975; Freedman and Rothman, 1979; Linklater, 1980; Linklater and Lind, 1978).

Since mass media campaigns are extremely costly, care should be taken to ensure that adequate research is done before the communication messages are relayed to the public. Some features have been identified as important when using the mass media in an attempt to change behaviour (Avery, 1973; Linklater, 1980).

## 2.7 Implications of the Evidence

The above brief review of the evidence suggests that there is no support for the proposition that driver education and training is an effective road crash countermeasure. As Marek and Sten (1977, p.14) pointed out, the research findings suggest that a rational base for driving instruction does not exist, or if it does exist, it is not properly utilised.



This seems difficult to accept since the content of the courses appears to be so relevant to safety.

The Information Section of the N.S.W. Department of Motor Transport runs a defensive driving course. This course includes advice about drink-driving and wearing and properly adjusting the seat belt. The relationship of these behaviours to death and serious injuries is well-known and well-established (see, e.g. Herbert, 1980). Many courses include such information.

It seems clear from the evidence that the content of a course is no guarantee of its success. The need for long-term research into driver behaviour was pointed out in the first chapter of this review. The findings of this research may result in making the contents of driving courses more relevant to safety. More importantly, the research might show how driving behaviour is changed by experience. The problem in education related to safety is not to impart knowledge or improve ability for its own sake, the problem is to change behaviour in the real driving situation. People might know what to do to be safer and they might be able to do it; the problem is whether they will do it. Thus there needs to be some consideration of the relationship of motivation to driver behaviour.

## 2.8 Motivation or Skill

Naatanen and Summala (1976) presented a powerful argument that safe driving depends more on motivation than on skills, because driving is not a "forced pace" task. That is, drivers decide the difficulty of the task for themselves; they can simplify the task by, for example, avoiding hazardous manoeuvres such as overtaking, driving more slowly when approaching bends, leaving larger safety margins when joining traffic, etc.

Naatanen and Summala pointed out that many motives other than transport and time-saving influence driving behaviour. These include play, aggression, achievement, sensual pleasure of speed, and the need to

conform to the norms or expectations of one's peer group. Acting against these motives is the usually low subjective assessment of the risk of either a crash or apprehension by the police.

It appears that present driving instruction programmes concentrate on improving skill. This is a fundamental limitation on their success, if motivation is such an important factor in safe driving.

It is very difficult to affect motivation through driver instruction because motives form part of the structure of the person's social values which are initiated in childhood. Carlson and Klein (1970) found that social values in respect to driving behaviour appear to be much more strongly determined by family than by education or other institutional factors.

Note that evaluations of driver education and training are on shaky ground if they attempt to measure the effect on attitudes rather than behaviour. This is because there is serious reason to doubt whether there is any strong relation between expressed attitudes and behaviour (Wicker, 1969).

It is possible to relate the tendency of more experienced drivers to have fewer crashes to changes in motivation.

Naatanen and Summala pointed out that at the very beginning of learning to drive, a driver appears to operate under a high level of subjective risk, and drives at lower speeds and avoids short headways and all but the easiest of overtaking manoeuvres. Every driving behaviour provides feedback to the driver and as he or she successfully completes manoeuvres the level of subjective risk falls off. This level of subjective risk will be suddenly increased as the novice driver finds that the safety margin in some manoeuvre is unexpectedly or frighteningly small. The level of subjective risk governing the behaviour of novice drivers will thus tend to fluctuate markedly, when compared with that of the more experienced driver. Naatanen and Summala (1976, p.88) suggested that the initial trial and error process necessary to develop more



permanent safety margins results in the high risk to novice drivers. This speculation is consistent with other parts of Naatanen and Summala's well worked out argument, and deserves further research to investigate the possible application to the training of novice drivers.

A view which has some similarity is that of McKnight (1981, p.8), who claimed that there is an emotional response which alerts the experienced driver in the type of situation where he or she has had a fright. If McKnight's speculation is correct, then measures which could produce this emotional response in beginners would be desirable. McKnight noted that telling and showing beginners is not sufficient; some type of experience is required.

In any case, it seems that motivation needs to be taken into account in studies of driver behaviour. This means that present driver licensing and instruction programmes are limited and future developments will be difficult.

## 2.9 Motorcyclists

The argument that skill is relatively unimportant to safe performance is often denied in the case of motorcyclists. Intuitively, the riding of a motorcycle appears to demand more skill (e.g., co-ordination, balance) than driving a car. Therefore, it is often thought that training is more important to the safety of motorcyclists than to that of car drivers.

At first sight, this appears to be supported by crash data and on-scene studies of crashes. Herbert (1980, p67) reported that inexperience was much more often a factor in crashes involving motorcyclists than in crashes involving other road users. Crash data give the same indication of the role of inexperience in motorcycle crashes (Harano and Peck, 1968; Henderson, 1970; Johnston, Milne and Cameron, 1976; Messiter, 1972).



The problem with all these studies is that there appears to be no exposure data. That is, there may be many more inexperienced riders on the road than inexperienced drivers. If so, it is not surprising that the proportion of motorcycle crashes involving inexperienced riders is greater than the proportion of car crashes involving inexperienced drivers.

There has been a great deal of work recently on motorcyclist training and testing by the Motorcycle Safety Foundation (MSF) in the U.S.A. There appear to be no soundly based attempts to evaluate the MSF work.

A study at the California Department of Motor Vehicles by Anderson, Ford and Peck (1980) was designed to evaluate a rider licence test package which included the MSF Motorcycle Operator Skill Test (MOST). The study was not able to demonstrate any effect of the MOST on safety. In the California study people who were offered the new licence test were less likely to get a licence, rode less, and consequently had fewer crashes. This failure to get a licence was not related to the MOST since 85% of those who remained unlicensed and were offered the new test did not take the MOST at all, and may not have even known what the MOST entailed. In the study, however, some of the licence applicants did appear to benefit from a very short (three hour) training course; but since these applicants were not chosen at random it is difficult to generalise.

A study of the motorcycle training offered by the Royal Automobile Club and the Auto-Cycle Union in the U.K (Raymond and Tatum, 1979) showed that riders who attended a training course tended to have a higher crash rate than riders who had no training. The authors (Raymond and Tatum, 1979, p.123) thought that this may have resulted from the training having made the riders overconfident.

There remains a strong suspicion that skill is especially important to motorcycle riding. Evidence is still required to establish this suspicion as fact. The effect of motivation on motorcycle rider performance should not be discounted.

### 3. DRIVER LICENSING

#### 3.1 Aspects and Uses of Licensing

There are two aspects of driver licensing which are claimed to be relevant to safety:

- (a) driver improvement (i.e., licence review); and
- (b) the test (including the vision test).

In the past, licence review and the points system have been seen as related to enforcement rather than driver education. Coppin (1977) suggested that the points system can also be used as a diagnostic device to decide which drivers need some remedial programme. Only those who cannot be improved by the programme need to be eliminated. There is evidence that the fairly elaborate system of driver improvement in use in California has some small effect in preventing crashes (Coppin, 1977). The most cost-effective part of the programme appears to be the warning letter (Coppin, 1977; McBride and Peck, 1970). The question of the introduction of other aspects of the California system will not be pursued here, especially since more recent evidence from the California Department of Motor Vehicles (Kadell, Peck, Fong and Marsh, 1980) has placed the value of even the warning letter in a little doubt.

The driver licence test appears to be the area where countermeasures are most often proposed; the proposal usually being that some upgrading of the test is necessary.

Japan is sometimes given as an example of successful licensing measures to reduce crashes. However, there are no control studies to illustrate this success. Moreover, large amounts of money have been spent improving the road system (Japanese Government, 1979, p.28) which may account for the apparent success of changes to the licensing system. It is not clear in what way, if any, the licence scheme in Japan is designed to improve safety.



The driver licence test has been viewed either as a selection device or as an incentive for pre-licensing education (or both). The possibility of achieving these two proposed goals of the licence test will be examined below. The vision test will be given a very brief separate discussion.

### 3.2 The Licence Test as a Selection Device

It is sometimes stated that the licence test should be used as a selection device; that is, to predict which of the licence applicants are most likely to have road crashes and then attempt to keep them off the road by not allowing them to have driving licences.

It has often been pointed out, however, that the licence test cannot be used as a selection device. The arguments have been summarised several times; for most of the arguments, see Coppin (1977, pp16-17). The main points are covered below.

All licence tests which have been evaluated appear to have low predictive validity, i.e., the correlation between performance on the test and subsequent crash record of drivers is either zero (Ratz, 1978; Wallace and Crancer, 1969) or very low (McRae, 1968; Waller and Goo, 1968).

There is little prospect of developing a test with any substantial predictive validity. Waller, Li, Hall and Stutts (1978) pointed out some of the constraints on the effectiveness of a licence test. Some of the constraints which limit predictive validity will be discussed below.

Licence tests appear to be unreliable; that is, the score on a test appears to partly depend on who the examiner is, and where and when the test is carried out. Attempts can be made to increase the reliability by introducing standard and more objective score sheets, by providing more training for examiners and by making test longer. Jones (1978) showed that reliability of a driving test was much greater if drivers were re-tested after 30 minutes than if they were re-tested after two



weeks. Whatever the cause of the change in behaviour, it is clear that if scores can change in such a short period of time the test cannot be used for prediction.

Another factor limiting the predictive validity of licence tests is that the score depends on other factors than those related to safety. For example, Carpenter (1976) found that the highest correlation with scores on knowledge tests was level of general education. Yet he found that education was not a predictor of crash involvement; the correlation was zero.

Another factor limiting the validity of the licence test as a predictor of crash frequency is the nature of the distribution of crash frequency over individuals. In any two or three year period the vast majority of drivers have no crashes. Compounded with this is the fact that most of the drivers who have crashes in one time period will have no crashes in the next period (Forbes, 1939; Stewart and Campbell, 1972) - see the earlier description of the "regression to the mean" phenomenon.

Most fundamentally, Peck, McBride and Coppin (1971), in a large scale study of crash data, showed that the role of person-centred factors (i.e., individual differences or "accident proneness") is minimal. That is, whether or not a particular person will have a crash is just not very predictable.

Overall, it can be seen that there is little prospect of developing a test with substantial predictive validity. The use of a test of low validity to select those who could have licences would have undesirable consequences.

First of all, in order to justify the use of the test it would have to be shown that its use would have a substantially greater effect on crash frequency than would be achieved by eliminating the same proportion of candidates at random. Uhlener and Drucker (1965) showed that, to achieve this advantage over random elimination using a low validity test, a high proportion of applicants would have to be eliminated.

The low validity of the tests also means that a great proportion of the applicants who would be eliminated would be those who would have low crash frequencies had they been allowed to drive (Uhlener and Drucker, 1965).

The denial of a 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.

Without public support, widespread denial of licences may result in an unfortunate increase in the prevalence of driving without a licence.

### 3.3 The Use of the Test for Setting Educational Goals

An alternative approach to driver licensing has developed as a result of research. This is outlined and supported by Coppin (1977). In this approach, the aim of driver licensing is to raise the standard of all drivers rather than to exclude a few.

Under this approach, it is sometimes suggested that the applicant should be asked to demonstrate a higher standard of skill in more difficult circumstances than those required in the present test. This would be justified by pointing out that such requirements would be an incentive to encourage more or different pre-licensing education and training.

Whether this can be any advantage in relation to road safety depends on the existence of appropriate education and training programmes. The discussion in the last chapter suggests that there is no evidence supporting the role of existing driver education and training in crash prevention.



### 3.4 The Vision Test

It is often noted that drivers who have been involved in crashes report that they did not see what they ran into. The intuitive approach is to call for more frequent vision tests.

On the other hand, the vast majority of the studies of the relationship between visual abilities and involvement in crashes either have found a very small correlation or have failed to show that the correlation is statistically significantly different from zero (Davison, 1978).

Studies at the scene of crashes (Clayton, 1972) have shown that even though perceptual error is frequently an important factor, these errors very seldom result from poor vision. The point is that there are many factors other than poor vision which result in looked-but-failed-to see crashes.

From studies by Clayton (1972) and Hills (1980), some countermeasures which are more relevant than the vision test in preventing these crashes are identifiable and these include: increasing conspicuity of some objects with which collisions occur, e.g., pedestrians, motorcycles, rear ends of trucks; reducing peaks of information processing demands on drivers; making road markings and signs unambiguous and easy to follow in all weather and lighting conditions; changing vehicle design, road geometry and roadside furniture in order to improve sight lines and remove obstructions; improving road lighting at certain sites; countering both drink-driving and driving while fatigued.



#### 4. COST-EFFECTIVENESS CONSIDERATIONS

The seriousness of traffic injuries was outlined in section 1.1. It is often claimed that driver education and licensing are obvious means of reducing traffic injuries. This report has argued that such claims are not supported by evidence.

Any claim that the introduction of countmeasures based on common sense or intuition is harmless and may in fact have some effect (despite the failure of evaluation studies to detect the effect) should be questioned.

Haddon, Suchman and Klein (1964, p.5) pointed out that the introduction of such measures is not harmless since:

- (a) it may dissipate funds, time, and public concern that might be applied to more effective measures, and
- (b) the public and its government may conclude that everything that can be done is being done.

Thus, it is important that expenditure on traffic safety should be made as effectively as possible.

Peck, McBride and Coppin (1971, p.28) argued that a measure with even a slight effect can be useful since the cost of a crash is so great. Some aspects of the driver improvement programme in California, for example, appeared to have benefits which were greater than their costs (Coppin, 1977, p.114).

What Peck, McBride and Coppin overlooked is the opportunity cost (see, e.g., Mishan, 1971) of such measures. The funds to be expended on traffic safety are limited by limited resources and the other needs of human welfare. If a great deal of money is spent on a measure which has a slight effect then little or no money will be available for other

projects; that is, the community forgoes the opportunity to benefit from these other projects. If the projects which are forgone are much more effective than the projects on which money is spent then the opportunity cost to the community could be great. If a measure has little effect as compared with alternative measures, then its benefits can exceed its costs only if opportunity costs are ignored.

According to the above review there is no evidence that driver education, training and licensing have any benefit. At the same time, suggested measures in these areas usually entail a great deal of expenditure.

If there is to be expenditure in the area of driver and rider behaviour it might be better spent on long term research to develop effective measures. Great expenditure in the area of education, training and licensing cannot be justified; not only because the measures are not supported by evidence but also because there are alternative projects for which expenditure would be more effective.

The countermeasures examined so far relate to the prevention of crashes. In the past, expenditure on in-crash protection of vehicle occupants has been much more important to the prevention of fatalities and the amelioration of injuries. There is evidence that there are immediate benefits which could be gained from improvements to occupant protection, greater enforcement of legal obligations in relation to occupant protection, and removal or modification of roadside utility poles\*(Herbert, 1980).

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\* The N.S.W. Electricity Development (Amendment) Act which came into effect on 19th December, 1980, enables the Energy Authority to direct a Local Council to remove or relocate an electricity structure from a road for the purposes of traffic safety, and subsidise the removal or relocation of such structures.



## 5. SUMMARY AND CONCLUSIONS

The money which is to be spent on road safety should be spent as effectively as our limited knowledge permits. Expenditure of limited resources on less cost-effective crash countermeasures is counterproductive. It is counterproductive because the opportunity is consequently forgone to spend the money on more cost-effective measures.

At present the evidence suggests that there is no soundly based system of driver education and training, or if there is, it has not been used. This deficiency refers not only to the contents of the courses but even more importantly to their effect in changing driving behaviour. There are some elements of course content that are established as relevant to safety, for example, drink driving, wearing and adjustment of seat belts, and proper use of both brakes on a motor cycle. The problem is not only to establish the safety relevance of a larger set of driving behaviours but also how to actually change behaviour.

At the same time, it should be noted that experienced drivers tend to be less likely than inexperienced drivers to have a crash. Long term research is required to discover the basis of this difference and investigate the possibility of making inexperienced drivers more like experienced drivers.

It should also be noted that there is evidence that motivation more than skill is important to safer driving. Driving instruction programmes have concentrated on skill. Motives form part of the structure of a person's social values and they are developed when people are very young. Consequently it is difficult to change motives. It is easier to change verbally expressed attitudes, but these may not be related to actual behaviour.

Evidence and analysis clearly show that the licence test cannot be used to predict which licence applicants are most likely to have a crash. Changes to the licence test could be used to promote more or



different pre-licensing instruction. The usefulness of this depends on whether there is an effective system of driver instruction that should be promoted. There appears to be no such system.

It is often argued that training and licence tests for motorcyclists should be more effective because riding more than driving appears to depend on a high level of skill. The evidence for this proposition seems inadequate.

Overall, there appears to be no evidence that licence tests and driver instruction would be of road safety benefit. At the same time, there are alternative countermeasures which have been shown to be more effective. These should have priority in the allocation of road safety funds.

Rather than increased expenditure on licence testing and instruction, what is required in relation to driver and rider performance is long term systematic study of perception, skills, motivation and individual differences. Differences in experience are apparently of importance to safety and require scientific analysis with the hope of long term benefits.

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