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# PSYCHOLOGICAL ASPECTS OF ROAD TRAFFIC ACCIDENTS

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By: M. BORG, T. TILNEY AND A. VASSALLO

## Introduction

The mortality and morbidity from road traffic accidents are increasing annually in nearly all the developed countries. Whereas transport statisticians are able to show a reduction in road accident casualties in relation to the total number of motor vehicles, to the estimated annual number of kilometers driven, to traffic density and to various other criteria; public health authorities point out that the total number of deaths and injuries from road traffic accidents continues to increase and to become more and more important in the overall public health problem. It is likely that the worldwide annual number of deaths from road traffic accidents will reach a quarter of a million and the number of injuries exceed 10 million within a very few years.

In certain countries, for example U.S.A., deaths from road traffic accidents exceed those from T.B., Polio, Diphtheria and Diabetes Mellitus put together. (WHO 1961).

Human factors must clearly be of great importance in accidents, and improved understanding of the way in which they produce their effects should lead to practical proposals for action whereby the number of road accidents could be reduced. Because of the complexity of the problem, a multi-disciplinary approach is called for, requiring the participation of doctors, psychologists, sociologists, lawyers, vehicle designers, and highway engineers.

## Investigation

Road accidents are seldom truly accidental, in the sense that they are usually due not purely to chance but to a combination of factors that are rarely revealed by official reports and statistics. The main concern of the authorities is to establish the medical cause of death or injury and to ascertain whether traffic laws were violated. Thus, a fatal accident may be ascribed to dangerous driving, but while this superficial reason may satisfy a court, it contributes nothing to the prevention of future accidents. A number of questions remain. Was the car in a sound mechanical state? Were the brakes and steering efficient? If not, who was responsible for their inefficiency — the owner, the servicing garage, or the manufacturer? Was the dangerous driving only apparent — the

result perhaps of a mechanical failure of a part of the vehicle owing to metal fatigue, faulty manufacture, or some prior accident? Was the road surface greasy, or did the car hit a pothole? What was the range of the vision at the scene of the accident? What were the weather conditions, the lighting, the width of the road and its gradient? Did the driver's actions result from the unexpected behaviour of another car? When all these questions have been asked there remain those relating to the physical and psychological fitness of the driver. Was he ill? Had he been receiving medication with drugs? Had he taken alcohol? Was he depressed or suicidal? Was he divorced, widowed, or a bachelor? Had he a history of crime or aggression?

To find answers to these questions, a team of experts would have to be employed for several weeks at considerable cost. Yet it is only investigations of this kind that will provide the basis for effective road safety measures.

## Psychology

A large number of studies have been carried out to determine the effect of psychological variables on driving performances. The psychological factors can be divided into three main groups:

1. Stable individual characteristics such as somatype, intelligence, personality, etc.
2. Age dependant factors including psychological and physiological changes with age and experience.
3. Temporary variables including illnesses of short duration, fatigue, intoxication and temporary mood changes.

What follows is a brief survey of the principal factors which psychologically influence the driver.

**Antisocial Behaviour Patters:** Psychologists claim that due to feelings of separation and of protection experienced in the driving compartment of the vehicle, previously unexperienced competative and aggressive tendencies are provoked in the driver. This is said to be especial-

ly marked in male drivers, possibly explaining why accidents caused by excessive speed are very much commoner with male drivers. This may also reflect the fact that competitive element plays a far greater part in the male than in the female character. It has also been suggested that the urge to travel at high speeds is associated with the need of the male to assert his vitality. In fact, in 25% of traffic infringements studied, the driver had a suggestive personality disorder.

**Marital Status:** Studies in the USA (Average 1949-51, US Department of Health, Education and Welfare (1958), Accidental Injury Statistics, Washington DC, Gov. Printing Office) showed that a study from death rates/100,000 population from motor vehicles accidents by age, sex and marital status, the death rates are lowest for singles, rises with widowers, and is highest in divorced individuals.

**"Accident Proness":** This is a much discussed topic, but present statistical evidence does not indicate unequivocally that there are some persons with a constantly greater liability to accidents than average.

**Cultural Influence:** In a study made in Italy (in a northern and a southern town) it was found that there were more accidents in the industrial North of Italy, but the proportion of accidents per car was higher in the non-industrial Southern region.

These findings are said to reflect the different temperamental variations in character which are known to exist between the inhabitants of the two areas.

**Driving Skills:** Driving requires training and is maintained by practice. The main psychological requirement is CAPACITY FOR VIGILANT ATTENTION and ANTICIPATION.

M.L. Chipman and Peter Morgan (1975) found that demerit points (system used in Canada and America) are a measure of vulnerability to both collisions and traffic convictions in the future and appears to be more sensitive than traits traditionally used to predict risk of accident such as age, sex, class of licence and history of previous accidents. This study showed little change with age in most demerit stretch for collision rates, the reason may be that driver control programmes begin too late to be effective among young drivers (usually started when he has 9 pts). It was also found that drivers above the 9 pts have a twice as much risk of having an accident than those with no points. Furthermore, drivers below 25 years with 3 — 5 points have substantially higher risk of collision than those with no points. McFar-

land, R.A., also found that people below 25 years of age who have an accident are more blame worthy for the accident than drivers of an older age group.

Thus it can be concluded that demerit points are the one thing the driver can control and a young person able to avoid demerit points is able to avoid collisions as one in the older age group.

### Fatigue.

Fatigue, in both its physical and emotional components, is believed to be an important factor in increasing risk of accident involvement. Many cases have been reported of accidents occurring as a result of loss of attention or falling asleep while driving. Continuous physical work, particularly when the muscles are in a state of contraction, leads inevitably to the onset of fatigue. Unsatisfactory driving posture, unnecessary amount of effort to operate the controls, considerably shortens the interval before fatigue sets in. On the other hand, the onset of fatigue is postponed by frequent periods of resting. It may follow that in tasks such as driving, which require unremitting attention, vigilance may fail and may be followed by inaccuracy, poor judgement and sluggish reactions, if the task is allowed to continue for too long without respite.

The degree of sensory stimulation is also important in maintaining alertness, thereby facilitating perception, co-ordination and other higher brain functions. Diminution in sensory stimulation which is liable to occur during long journeys on monotonous motorways, inhibits these functions. It has been suggested that there is an optimum range of environmental stress and that deterioration in driving performance sets in both above and below this range as a result of fatigue. The onset of fatigue is also influenced by "arcadian" fluctuations in physiological activity.

Another phenomenon which has been detected after prolonged performance of a complex task such as driving, is the inability to distribute attention appropriately. Too much attention may be paid to one part of the task, and insufficient to another. This kind of disturbance of attention has also been noted in the case of alcoholic intoxication.

Too much noise can certainly lead to the earlier onset of fatigue. The effects of fatigue on vision are also important.

Deprivation of sleep is, of course, one of the commonest causes of fatigue. Its importance in increasing risk of accident, particularly in young people.

**Illness, stress and accidents:** There is no doubt that certain medical conditions, such as

cardiovascular disorders, hypoglycaemic attacks, epilepsy, and disorders of vestibular function, can cause accidents. Nevertheless, it is generally agreed that the sudden onset of illness while driving is responsible for only a small proportion of road accidents, the figures reported in different countries varying from 0.1% to 1%. Since certain medical requirements have usually to be satisfied before a driving licence is issued, those unfit to drive are to some extent kept off the roads.

**The Influence of Drugs:** From the little evidence available, people who abuse drugs appear no more likely to be involved in road accidents than normal people, perhaps because they are unwilling to drive during the period of euphoria. Drugs taken on medical instructions are of greater interest. Those most likely to reduce driving efficiency include narcotics, hypnotics and sedatives, analgesics, stimulants, tranquillizers, anticonvulsants, antihistamines, ganglion-blocking agents, and muscle relaxants. The effects produced may be enhanced when drugs are taken in conjunction with alcohol. The initial period of drug-taking is the most dangerous, since it takes time to become accustomed to the effects of drugs, and the dose may need adjusting.

**The Driver and his Environment:** Vehicle design, road conditions, and the weather are examples of environmental factors that effect driving and increase the risk of accidents. Less obviously, the "perceptual load", i.e., the amount of sensory information received by the brain, is also an important environmental factor. There may be an excess of such information, as in driving in a crowded street, or not enough, as in driving on motorways. In the first case, a reduction in the information load, eg., by providing barriers at the edge of the pavement to control the movements of pedestrians, may result in a reduction in accidents; in the second, lateral "rumble" strips can be incorporated in the road surface to reduce the monotony.

Much has been written on road design as a factor in accident prevention. The segregation of pedestrians from traffic in urban areas, the construction of by-passes, and the careful design of intersections have all been shown to reduce the number of accidents. Road surfaces should be constructed to have adequate skid resistance under wet conditions. Speed limits have been shown to be valuable in reducing accidents in urban areas, and there is much evidence in favour of speed limits on motorways. The general effect of a speed limit on motorways, say 115 km/h (70 mls/h), is to produce more uniform speeds, and this in turn makes accidents less likely to occur.

Vehicle design has been the subject of a good deal of criticism, not only because of the union of the occupants and of other road users in the event of an accident, but also because designers have failed to take various human factors into account. Recently the science of ergonomics, or "human engineering", has been applied with considerable success to the design of vehicles that are safe to drive. From the point of view of ergonomics, the driver is considered as one of the components of a complete system, the instruments being extensions of his nervous system and the controls extensions of his hands and feet.

#### **Are licencing procedures satisfactory?**

In most developed countries, a driver is required to hold a valid driving licence. The procedure that has to be gone through to obtain a licence is aimed at eliminating those who are unfit to drive.

Road accidents are not due purely to chance. They can be reduced in number if suitable precautions are taken. Improvements to roads, the replanning of towns, the safer design of vehicles, an increased educational effort, improvement in communication and in ambulance services, and a revision of the legislation in the light of research on human behaviour on the road would all materially reduce the injury and death rates.

Doctors must play their part in health education of drivers, bearing in mind effects of diseases and drugs. Drug manufacturers should be required to investigate the effects of new drugs on driving performance before they are marketed, and if any effects are detected due warning should be given.

Such improvements would be expensive, but against their cost must be set the very great and ever rising cost to the community of the deaths of many able and productive citizens, of the prolonged absence from work of the injured, and of the proportion of hospital services utilized — to state the problem in its most materialistic terms. The cost of road safety is the cost of the social revolution brought about by the motor vehicle which has enlarged the scope of man's life and improved his standard of living. These advantages must be paid for, either in money or in lives.

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