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Diane Clay

DRIVER ATTITUDE AND ATTRIBUTION: IMPLICATIONS FOR ACCIDENT PREVENTION

Supervisor Dr Andrew Guppy

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DIANE CLAY

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"Truth is rarely pure,

and never simple"

OSCAR WILDE

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ABSTRACT

This study involved self-completion questionnaire-based surveys in which a total of almost 1800 respondents took part. Attributional bias identified by previous research in relation to drivers' causal attributions for road accidents (Preston & Harris, 1965; Clay, 1987) was more fully explored with the aid of both objectively and subjectively culpable driver samples. Banks et al (1977) demonstrated the utility of distinguishing drivers according to culpability in relation to accident fatalaties. The current study examined the utility of distinguishing subjectively culpable, non-culpable, and non-accident driver groups in relation to road accidents with a variety of consequences, in relation to factors which may predispose drivers to accident involvement. This study involved a large sample of drivers who were representative of the general population of licenced drivers in Britain, and specifically focussed samples which allowed the influence of objective and subjective culpability to be ascertained, while a relatively small cross-cultural survey allowed a focus on young drivers (up to 25 years), involving Victorian (Australian) licenced drivers and a sub-sample of young British drivers drawn from the main British sample.

The main objectives of the current study were to evaluate drivers' awareness of their potential for active accident avoidance, exploring attribution issues raised by previous research and examining factors which may contribute to road accidents in relation to self-reported accident involvement and culpability and their implications for accident prevention.

The main findings were that drivers seemed to have a tendency to attribute more responsibility to "other drivers" than to themselves for accidents in which they had been involved, and to consider that such other drivers had more scope for accident avoidance than they did themselves. Such tendencies, although very considerably reduced, were not eradicated within the driver group deemed culpable by traffic police investigative teams. These findings were broadly consistent with those of Clay (1987) and Preston & Harris (1965), suggesting a lack of awareness of personal influence on accident occurrence, at least to some degree, with implications for accident prevention, the quality of social interaction in the driving environment (Knapper & Cropley, 1980), and the driver's potential to learn from experience.

Perhaps more importantly, the other major finding was that clear distinctions could nonetheless be made between drivers in accordance with self-reported accident involvement and culpability in relation to driver affect/state, self-perception, attributions for accident causation, and attitudinal/behavioural tendencies, in a manner which seemed to be meaningful in terms of driver susceptibility to accident risk. The pattern of response for accident involvement and culpability effects was then examined in relation to the norms which emerged for age and sex, while the effects of driving experience duration and intensity were examined separately. The second point of focus on any distinctive features of younger driver risk, also allowed assessment of generalizability of findings across cultures, to some degree. The findings appear to have considerable implications for the development of effective accident prevention strategies, while suggesting that further exploration of drivers' causal attribution bias in relation to road accidents and distinctions between drivers according to subjective culpability may offer considerable safety benefits.

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INTRODUCTION

OVERVIEW

Considerable attention has been given since the advent of motor vehicles and accidents which ensued, to developing safety features in both vehicles and the environment they traverse. In more recent times the focus has shifted increasingly to the human component within the accident scenario, the driver in particular. This focus has been encouraged by reports that many behaviours within the control of drivers have been found to be associated with accidents. Drivers themselves appear to consider human factors to have greater influence on accidents than do factors relating to the physical environment or the vehicles which negotiate it (Banchevska, 1980). This seems to be the case for both accidents in general and those in which respondents were personally involved as drivers (Clay, 1987).

However a tendency to associate the human factor relating to accident risk with "other drivers" rather than "self" as driver has emerged (Knapper & Cropley, 1980), consistent with a general tendency for drivers to consider the risks associated with their own driving behaviours and manoeuvres to be **below average**, and their driving abilities **above average**. It is perhaps, hardly surprising that this has been followed by evidence of drivers' generally greater awareness of other drivers' influence on accident occurrence, than of their own (Clay, 1987), and that this overall effect has held even amongst drivers cited as culpably involved (Preston & Harris, 1965), consistent with biases which have been identified in causal attribution processes (Jones & Nisbett, 1972; Hewstone, 1989). Together, these factors seem to have considerable implications for accident prevention, the quality of social interaction within the driving environment (Knapper & Cropley, 1980), and the driver's potential to learn from experience.

Approaches to the problem of accident prevention have been varied, including detailed evaluation of specific factors such as speeding or drink-driving; a focus on risk-taking and socially deviant tendencies; and examination of the influence of such factors as life stress or self-perception. Clay (1987) evaluated the relative importance of many such factors in relation to accident involvement. Drivers' awareness of their relative contribution to accident causation was also explored, yielding evidence of differential self/other attributional tendencies. This was however, an exploratory study, and as such, of moderate sample size (n=295). Further distinctions between drivers were not therefore pursued at this stage, in relation to age, sex, and driving experience (Groeger & Brown, 1989), or accident culpability.

The focus of the current study, involving a survey of over 1700 drivers, is drivers' awareness of their potential for actively avoiding or preventing accidents in relation to factors which may predispose them to accident involvement. This was approached by examining the possibility of distinguishing elements of driver attitudes and attributions which may not only compromise safety, but also be amenable to change. Such factors are examined, not only in relation to accident involvement, but also duration and intensity of driving experience/exposure, age, sex, and subjective culpability, the latter allowing some measure of control over the influence of accident experience per se. Culpability seems to offer a useful focus for analysis of differential accident risk and effective countermeasure development, albeit one which has received very limited attention to date. Further dimensions are added to this study by inclusion of driver samples deemed culpable within police accident records allowing some comparison of objective and subjective culpability; a cross-cultural focus on young drivers; and a minor focus on drivers' traffic violations history. The current study also applies rigorous examination of the hypothesis that drivers tend to attribute more responsibility to "others" than to themselves for accident occurrence, which previously gained tentative support.

To summarise, the purpose of the current research is essentially to evaluate drivers' awareness of their relative potential to influence accident occurrence or prevention via examination of relevant attitudes and causal attributions to self, others, and situational factors. It is hoped that any insight this offers may be employed to increase the effectiveness of driver education, training and accident prevention strategies. However it is acknowledged that as social beings we have, to varying degrees, both individual and collective control and responsibility (Hewstone, 1989) which may potentially be brought to bear in any situation. It seems that safety promotion needs to reflect this. Thus any concern over attitudes which may severely compromise the safety of the young male for example, would seem to require, at least acknowledgement of the various factors within the community which are most influential in promoting such attitudes (Waller & Waller, 1987).

Chapter one briefly outlines the importance of accident prevention, and the relative potential for environmental, vehicular, and human factors, which interact within the driving situation, to influence driving safety. **Chapter two** examines the influence on driver behaviour of temporal factors, such as maturation, aging, the acquisition of experience/expertise, and the confounding of driving experience with exposure to risk on the roads. **Chapter three** explores the interactive influences of attitudes and factors which have the capacity to impair driver judgment and control. The manner in which fatigue, alcohol and stress may impair driver performance, and their potential to compromise safety is discussed. The issue of alcohol-related problems as a possible indicator of multiple, related problems, especially in the young, is also raised. **In the fourth chapter**, the attitude of drivers to various aspects of the driving situation, especially risk factors and other road users (both drivers and non-drivers), is discussed. Many theoretical stances have been applied to driver attitudes, several such recent approaches are appraised. **The fifth chapter** examines attribution processes and their relevance to safety on the roads, especially in relation to driver awareness of personal influence on accident occurrence, and the implications of misattribution for the quality of social interaction. This concludes with a general summary of the introduction and a rationale for the current research.

CHAPTER 1: THE DRIVER IN CONTEXT

Preamble: This chapter is concerned with the driver's relative influence on road traffic accident (RTA) occurrence. Thus the importance of accident prevention is raised, and the driver's role within the interaction of accident components (human, vehicular and environmental) established.

THE IMPORTANCE OF ACCIDENT PREVENTION

The importance of actively preventing RTAs seems self-evident, however it may be underestimated partly because accidents are conceptualized as being, in the main, chance happenings, as the term suggests, rather than intentional. This may encourage the view that they are therefore beyond our control. However, there is much which all road users can do to minimise the likelihood of accident occurrence.

The relative rarity of RTAs may also reduce the importance attached to their prevention. When the number of hours spent on the road are taken into consideration, for most, if not all drivers, observation of an accident is rare, and personal involvement even more so. This perhaps fosters the illusion that the problem is not a particularly serious one, and that in any case, accidents are likely to happen to, and be caused by, "others".

However for those who are involved in such a brief event, albeit perhaps by their relationship with the participants, its consequences may have a profound effect. RTAs remain one of the major causes of death and serious injury in both Britain and Australia, (and probably in most countries where disease, induced and/or exacerbated by the effects of poverty, does not take a higher toll). Young people under the age of 25 years bear a notably disproportionate burden of the casualties.

RTAs accounted for 341,592 casualties in Britain during 1989, representing an increase of 7% for 1988, and 36.6% on the average casualty figures for 1981-1985. The rising number of casualties was concurrent with an increase in traffic volume, and a slight decrease in the casualty rate (per 100 million vehicle kilometres) (Dept. of Transport, 1990), suggesting that the rate of increase is merely being reduced very slowly. The number of casualties in absolute terms may therefore be expected to continue to rise in the absence of any reduction in traffic volume and/or casualty trends. However, there appears to be considerable scope for **actively** initiating positive change.

The need for effective accident countermeasures is clearly illustrated by the fact that casualties for 1989 included 63,158 people recorded as seriously injured, and 5,373 fatalities (Department of Transport, 1990). Furthermore, under-reporting of accidents is a well-known problem, apart from those involving fatal or serious injury. The total accident figures can therefore be expected to err on the side of conservatism, (Lay, 1988; Harris 1990).

The high proportion of casualties aged less than 25 years is of particular concern, including the more than thirty-five percent of fatalities which were within this age group. RTAs have also been found to account for a particularly high percentage of the accidental deaths in young people, including 78% of the 15-19 years group and 72% of those aged 20-24 (Department of Transport, 1990).

The long-term human implications for all concerned, especially where brain or spinal injury have been sustained, are immeasurable (States & Viano, 1990); while in purely economic terms the costs are very high (Guria, 1990; Department of Transport, 1990). Any expenditure on cost-effective countermeasures should not therefore be viewed simply as a necessary expense, but rather as an investment in the future of the society.

The continuing waste of life and reduction in quality of life, particularly of the young, points to an urgent and persistent need for concern to be translated into policies which not only facilitate accident prevention, but actively promote skilled, safe and pleasurable driving.

ACCIDENT CONSTITUENTS

Road traffic accidents are complex events involving interaction between road users, any vehicles they employ, and the changing environment through which they move in time and space. The nature of this interaction, including the potential degree of control which drivers may have over themselves, their vehicles, and any situation which they may encounter within the road environment, seems therefore to be a useful focus for accident investigation and prevention.

The Environment

There seem to be many ways in which the driving environment could be rendered less difficult for the driver to negotiate, and thus safer and more pleasurable for the majority of road users. The past few decades have been witness to rapid changes, both social and technological, which have influenced the environment in which road users interact, the nature of their interaction, and their potential for safe travel. Many situational factors may influence the degree of skill, care and awareness required by the road user, necessitating continual evaluation and modification of the driving environment at regular intervals, as well as the laws and policies which govern its use, to meet the changing needs indicated by increasing urbanisation, traffic density and variation in the speed, skill and vulnerability of all who use the roads.

The traffic cues, information, laws and policies which guide and govern the interaction of road users, would seem to require flexible adaptation, if they are to adequately meet the needs induced by the transport system's increasing complexity, density, variability and/or ambiguity. One aspect of the problem of ambiguity may be addressed by clear priority rules to guide interaction on the roads, for example at pedestrian crossings, to avoid or at least reduce variation in expectations and behaviour which may compromise safety for all, especially the most vulnerable road users (Himanen & Kulmala, 1988).

Appropriate implementation of traffic controls at 4-leg intersections such as simple stop and give-way signs, traffic signals and roundabouts have been found to allow considerable safety benefits (Frith & Harte, 1986). This seems to be consistent with Lay's (1988) suggestion that safe negotiation of intersections would be facilitated by "identifying all vehicle movements for the driver; reducing the number and extent of conflict points and areas; and providing the driver with adequate decision-making time".

The potential for policy decisions, i.e. the less apparent human factor within the driving environment, to influence safety on the roads is illustrated by many studies. The necessity to plan for both immediate and future road traffic requirements by "designing-in safety", recommended by Henning-Hager (1986) and Lay (1988), has been elaborated by Lay's advocacy that the principles of good design should not be confined to urban planning, but rather applied to the comprehensive planning of transport networks as a whole, including their interface with other such networks.

Lay made the important point that while human error is widely acknowledged as the major factor in road accidents "poor road design may enhance the driver's tendency to err or misjudge", cautioning that the inadequacy of safety features of many road design layouts "places an excessive reliance on the good judgement and restraint" of all road users. He notes that various "traffic engineering measures" may simplify the drivers' task, reducing the need to be totally error free. Human fallibility and vulnerability suggest that this is both a sensible and a constructive aim.

However, good design alone may not be sufficient to meet the needs of the travelling public well. For example, Golob, Ruhl, Meurs & van Wissen (1988) found that accident rates at nonsignalized intersections in the Netherlands were influenced more strongly by differences in traffic intensity among the intersections than by differences in geometric design. Similarly in Sweden, Garder (1989) found that "town size and traffic volumes" were considerably more influential on pedestrian behaviour at signalized crossings than were variations in crossing design. The implications of traffic intensity were suggested by a Californian study of freeway driving which reported an increase in accident rate which seemed to be attributable largely to the response of drivers to increased traffic congestion. This was inferred because of the nature of the accidents e.g. "side-swipe" and "rear-end collisions" typically associated with congested traffic conditions (Golob, Recker & Levine, 1990).

Many factors apart from design features may be expected to affect traffic flow and accident rates. Allsop & Turner's (1986) findings offer some insight, suggesting the potential influence of public transport policies. They reported that public transport fares, increased in London in 1982 for economic reasons, were subsequently reduced the following year after evaluation of accident statistics. In the wake of the fare increase, road traffic casualties were found to be considerably higher (by several thousands) than would otherwise have been expected. Although no direct causal relationship was, or could be claimed, the nature and degree of relationship between the accessability of public transport prices and road traffic casualties does imply an indirect link in the causal chain.

This seems to illustrate the potential consequences of decisions taken in relative isolation, rather than within the context of safety within the transport network as a whole. Perhaps a concept of the public transport system as a public service with road safety potential, rather than one which is required to aspire to economic viability as a purely comercial entity devoid of all safety implications, may be useful.

It would seem that where economic savings can be made within any one component of the transport network, if they are made at the expense of increasing casualties, then the net result for road safety overall, and certainly for the society, is a loss. It could be argued that in purely economic terms such decisions may be very costly, but in human terms considerably more so.

Factors which are largely beyond human control, such as weather conditions, require adaptation on the part of both driver and vehicle. They are an important feature of the environment, potentially reducing driver control by affecting visibility, road conditions, and also degree of comfort and attention. The risk of an injury accident is considered to increase two- or even three-fold during rainy as compared to dry conditions, while driving on wet roads after a long period of dry weather appears to increase the risk still further (Brodsky & Hakkert, 1988).

Risks associated with adverse weather conditions highlight the need for implementation of environmental measures which could render road conditions safer, thus avoiding potentiation of driver error or risk taking. Such measures may include: improved hazard signs; effective lighting; better road design and surfaces with "well maintained" markings (Brodsky & Hakkert, 1988); good road drainage (Lay, 1988); and adequate gritting of roads to reduce the effects of snow and ice as necessary. Reducing the number of fixed roadside objects such as poles, or resiting them at a point further from the roadside, may also offer considerable road safety benefits (Good, Fox & Joubert, 1987; Lay, 1988). Adequate road maintenance is of particular importance to both motorcycle and bicycle riders. It becomes increasingly important to all road users when weather conditions reduce the road holding capacity of vehicles (Lay, 1988) and also when visibility is limited (McFarland, 1966; Planek, 1981; Quimby & Watts, 1981) e.g. due to fog or mist; or during reduced illumination conditions such as dusk, dawn or night.

Safety can also be influenced by the manner in which drivers are warned of imminent hazards, informed of decision requirements, or directed to take specific action. Clear indication of potential hazards such as sharp bends, narrow bridges etc. provide constructive cues (Fell, 1976; Sabey & Taylor, 1980; Planek, 1981) which help to reduce the unpredictability of the environment and therefore of the driving situation. This may be particularly useful to the driver who is tired, stressed or travelling under acute time constraints.

Signs indicating approach to a temporary change in the driving environment which may be hazardous (e.g. roadworks, river in flood) and/or decision requirement (e.g. approach to motorway junction, town exit), need to be easily seen and understood, allowing sufficient time for any necessary action to be taken (McFarland, 1966; Fell, 1976; Planek, 1981). This becomes increasingly important as the longevity of the population as a whole increases and with it the number of drivers aged over 65 (Fell, 1976). Thus it is vital that traffic cues and messages are communicated in a manner which facilitates rapid and unambiguous comprehension; allows sufficient time for appropriate action to be taken; and avoids the obvious hazard of being obscured e.g. by foliage, parked vehicles etc. Modern traffic conditions, with their mix of experience levels, as well as vulnerability of road user, make such environmental evaluation and planning essential.

Considerable benefits have been found to be obtainable by offering drivers specific instructions regarding speeding (van Houten & van Houten, 1987), i.e. a sign directing drivers to "BEGIN SLOWING HERE" as compared to the conventional sign which advises drivers to "SLOW DOWN" or "REDUCE SPEED TO...." whatever the specified limit is. Van Houten et al found that a reduction in the percentage of drivers who drove over the specified limit was achieved by the use of their "BEGIN SLOWING HERE" sign for 60km/hr, 65km/hr and 70km/hr zones, the respective reductions being: 18%, 32% and 33%. A second trial achieved even greater reduction in the number of drivers travelling over the legal limit for 60km/hr (26%), 65km/hr (45%) and 70km/hr (59%). However, the long-term durability of such benefits has yet to be established.

A particularly important factor within the driving environment is of course other road users, including other drivers, motorcyclists, cyclists, and pedestrians. Lay (1988) advised that "deliberate provision must be made for public transport, parking, pedestrians and cyclists". The case has been argued for special provision to be made for cyclists in particular, such as cycle tracks. Bracher (1989) pointed out that Britain has less provision of this kind than many other European countries.

Provision of facilities for cyclists, independent of the roads, seems to offer benefits which are twofold: reduction in risk of injury to cyclists; and a proportionate decrease in driver stress and frustration. Such benefits seem to both complement and enhance the potential economic as well as human savings. It seems therefore that such a solution would be acceptable to both these road user groups. Their marked differences in speed and vulnerability suggest that provision for both groups should reflect their differing needs appropriately (Bracher, 1989).

The degree to which the environment may influence road safety seems to depend largely on whether potential environmental hazards can be removed; avoided; clearly indicated; or anticipated, observed and made allowance for effectively. Many environmental factors determined by transportation policies such as road design, traffic cues and controls, and the adequacy of public transport provision, will influence traffic flow and the degree of congestion at various times and within various portions of the transport system. Such factors may influence the uncertainty, stress, perception of risk, and difficulty involved in the journeys of the travelling public, as well as the likelihood of accidents.

Modes of travel and the environment traversed have changed considerably over the ages. Therefore adaptation of all travellers to environmental changes, including the variety of vehicles and the needs, constraints and concerns of all other road users, will influence not only their own safety, but that of all whom they encounter on their journeys.

The social component within the driving environment requires special consideration. Driving appears to create a rather unusual social (or perhaps asocial) setting for the individual in which to interact with others. Such interaction often occurs at close proximity, while each driver remains within his/her own vehicular cocoon, separated to some degree in space as well as socially, from all other road users. Thus the driving environment may involve a relatively rare climate for social interaction, in which any misperception or misattribution may remain relatively unchallenged (Knapper & Cropley, 1980). Perhaps this unusual setting heightens the need for the provision of an environment and regulatory policies which facilitate the safe passage of all road users from one destination to another, with as little confusion, difficulty, and aggravation as possible.

The Vehicle

The influence of the vehicle on possible accident involvement will depend largely on the degree of control which the driver can exert over it. Drivers therefore need to be aware that regular servicing and maintenance checks increase their potential for vehicle control at all times. Such checks should include observation of the manufacturer's recommendations for all fluid levels and correct tyre pressures (Lay, 1988; Road Traffic Authority [Victorian Traffic Handbook], 1988; HMSO Police Drivers' Manual, 1990)

Potential control will also be influenced, not only by the vehicle's handling characteristics, but also the driver's awareness of them. Godthelp & Kappler (1988) suggest that drivers appear to have far greater difficulty maintaining control of an oversteering vehicle than one which understeers, and that this poor handling effect seems to be exacerbated considerably by high speed. The driver's difficulties may also be compounded by fatigue induced by the extra effort required to retain control of the vehicle, particularly on long journeys. They found that the problems experienced by the driver related to maintaining control over the direction of travel, e.g. "straight lane keeping" and steering through curves in the road. Such functional control is obviously a prime concern of drivers.

HARRIS (1987) found that some drivers of low performance vehicles attempted overtaking strategies which were inappropriate for their vehicles' performance potential, and therefore very risky. Such lack of awareness, or acceptance, of the implications of their vehicle's performance potential, may also compromise the safety of drivers and others whom they encounter on the road.

Any safety features which vehicles afford, such as vehicle size, robustness, road grip, and visibility (both forward and rear vision), may also influence the likelihood of accident involvement, although not necessarily in the direction predicted. Engineering expertise allows greater safety features to be incorporated in the design of large cars as compared to small cars, not least of which is impact resistance. This may lead to an expectation that small cars may be more highly accident involved.

However, the reverse was found in studies by Lee, Glover & Eavy (1980), and Evans (1985), which suggested that driver behaviour may strongly affect, and even negate the influence of vulnerability on accident involvement in small cars. Evans noted that "results...suggest that drivers of smaller cars are reducing their risk taking, and a plausible explanation of part of this reduction is fear of the consequences of a crash with a large car".

Such cautious behaviour seems strongly advisable in light of the possible consequences, for small cars, of crash involvement. Partyka (1990) reported differences in fatality rates in the US of 15.53 (per 100,000 vehicles) on the largest cars as compared to 28.76 for "minicompacts" i.e. the smallest cars.

However, car mass is not necessarily the only protection which may be afforded by the vehicle. Whitfield & Fife (1987) point out that "a broad range of passive technologies such as air bags, antilacerative windshields, improved braking systems for large trucks, and improved crashworthiness for automobiles would reduce vehicle mortality for all age groups". Support and elaboration of the protective potential of airbags is provided by Evans' (1991) finding that the efficacy of airbags "does not depend much on driver age or alcohol consumption, but is greater for two-car crashes than for single-car crashes (21% compared to 16%)".

Some engineering modifications to vehicles or environment specifically designed to improve road safety appear, ironically, to have influenced the opposite effect. Driver perception of increased safety, or reduced need especially for complex decision-making, may lead to comparable reduction in level of arousal and attention. Mahalel & Szternfeld (1986) cited several examples involving engineering improvements which appear to have resulted in a significant increase in accident rate. They attributed this to driver workload being below the level required to maintain arousal and attention within an optimum range (i.e. a demand/arousal balance). Both excessive and insufficient driver workload seem to be implicated in accident involvement, albeit in different ways.

However, such examples do not suggest that we cannot improve the safety of either the vehicle or the environment, or that we should not continue to try to do so. Many changes have effectively increased road safety to date. What the examples cited do strongly suggest, is a need to carefully examine the role of the driver in accident prevention, and the ways in which he/she interacts with both vehicle and environment i.e. the man/machine/environment interface (McKenna, 1982). Unless this interaction is taken into consideration, problems may be resolved, unwittingly, in a manner which is not only ineffective, but actually detrimental to the intended goal of accident prevention.

The complexities with which drivers must deal include many changes in the road environment and the variety of vehicles which are part of any modern transport system. Such complexities have been attenuated to some extent by a variety of safety features which have been identified and incorporated into these two components of the transport network. However a wide body of research suggests that accidents are, to a considerable degree, attributable to human error rather than mechanical failure or adverse environmental conditions (Sivak, 1981).

The Driver

The majority of accident involved drivers could not be presumed to have intentionally set out to inflict harm on themselves or any other road users, or damage to their vehicles. Investigation of all human factors which increase the probability of RTA causation despite such lack of intention seems therefore to be central to the problem of accident prevention. The more comprehensive the understanding of factors which increase the likelihood of accident causation, and their interaction, the greater would seem to be the potential to help all road users to actively avoid accidents.

Drivers are the most powerful and least vulnerable group of road users (by comparison with motorcyclists, cyclists and pedestrians). They therefore have proportionately the greatest responsibility for the safety of all road users. The requirement of advanced or specialized driver qualifications for heavy goods vehicle (HGV) drivers and public service vehicle (PSV) drivers seems to be, not only necessary to allow adequate control of the vehicle, but an implicit acknowledgement of such responsibility.

The degree to which the driver maintains control over his/her vehicle within the environment through which it moves, will be influenced by many factors. These may include demographic variables such as age, sex, occupation, and area of residence. They will also involve variables which relate to the function of driving itself e.g.

experience (duration, intensity and diversity), familiarity with the vehicle, familiarity with the locale, expertise in the manoeuvres required, awareness of potential hazards, and impairment due e.g. to fatigue, stress, and alcohol consumption.

Attitudes to driving in general, and all other road users in particular, are also very relevant, and may influence level of attention, anticipation, attitude to the prevailing conditions (road, weather and traffic), and the degree of caution each dictates in relation to the level of expertise and control assumed by each driver in him/her self as well as in other drivers.

Factors relating to the driver include those which are on the whole fixed and unchangeable e.g. sex; those which are by nature continually changing e.g. age; and those which are amenable to change. Some factors open to change, are, within personal and situational constraints, under control of the driver's volition, e.g. occupation, area of residence.

Others, such as attitudes to driving, other road users etc. are potentially amenable to change according to the influence of a variety of sources e.g. maturity effects; peer group; "important others" (e.g. family, friends etc.); media information; influential sources i.e. those whom the individual respects as a source of knowledge; driver education schemes; and experience effects (both quantity and diversity).

Factors amenable to change which may influence accident reduction and prevention are the prime concern of this study. However, other relevant factors, particularly those which strongly influence and confound the incidence of RTAs, must also be considered.

Summary: Despite the importance of environmental and vehicular factors in accident occurrence, they appear to be far outweighed by the role of driver, which will therefore be discussed in depth. However it seems important to bear in mind the considerable influences to which drivers are subject, not only directly in accordance with transportation policies, but a wide variety of policies which impinge upon their daily lives, potentially affecting all skilled performance.

CHAPTER 2: THE HUMAN FACTOR IN ACCIDENTS

Preamble: In order to evaluate the role of driver attitudes and attributions appropriately, it seems necessary to examine factors over which drivers have considerably less, or even no control, which qualify and interact with their approach to the driving situation. This chapter therefore focuses on the influence of driver demographics on accidents, especially the issues of exposure to risk in relation to annual mileage, and risk patterns associated with maturation and aging.

Human factors are widely acknowledged as highly influential within the accident scenario. Treat, Tumbas, McDonald, Shinar, Hume, Mayer, Stansifer & Castellan's (1977) comprehensive study yielded the conclusion that of 420 accidents investigated in-depth, human factors were causally implicated in 93%. More specifically, Harano, Peck & McBride (1975) reported that "in general, basic biographical and driving-related variables such as age, marital status, mileage and traffic convictions have been consistent predictors of accident involvement", consistent with the findings of many studies, such as those of Schuster (1968) and Peck & Kuan (1983).

EXPOSURE

Young male drivers as a group tend to be highly exposed to risk on the roads due to their often considerable annual mileage, including an inclination to drive during the hours of darkness and at weekends. Investigating the possibility that young males' over-representation in accidents may be largely a product of a higher rate of exposure to road hazards, Pelz & Schuman (1971) found on the contrary that "if anything, males aged 18-19...did less driving than those aged 20 or more with safer records". Furthermore, following control for after dark and weekend mileage, the younger males continued to exhibit higher accident involvement.

Chipman (1982), offered further support that accident involvement is not simply a byproduct of exposure, noting that "demerit points seem to be directly associated with collision risk only when exposure is relatively low", qualifying Chipman & Morgan's earlier (1975) finding that "demerit points were more strongly associated with future risk of collision than age, sex, or class of license". Furthermore, although exposure variables could partly account for sample variance in accident frequency within Harano et al's large, comprehensive study, many "nonexposure, person-centred variables contributed", and such contribution "exceeded that of mileage".

The relative contribution of exposure to risk is further complicated by the fact that with each mile or kilometre travelled, the driver is not only exposed to risk, but thereby also gains driving experience. The influences of experience/exposure are also confounded with age. However age, or relative immaturity, has been found to be more influential than inexperience in compromising safety (Drummond, 1987; Levy, 1990).

Both in Australia and the USA, significant differences in fatality rates have been found to be associated with driver licensing laws. The minimum licensing age differs between states within both countries. This inconsistency in itself, raises problems. However, where the legal age is as low as 16 or even 15, the percentage of fatalities in these age groups is significantly higher than it is by comparison with fatalities involving new licensees in other states where the legal driving age is 17 or 18. There appears to be a consistently reciprocal relationship between minimum legal driving age and fatality rate. Drummond concluded that although inexperience is clearly an important risk factor, lack of maturity is considerably more so. Similarly Levy found that age was strongly associated with fatal accidents, whereas inexperience was less influential, as demonstrated by the difference in fatality rates of novice driver groups separated by two to three years in age during a vital time in maturation terms. Such studies suggest the potential clarity which may be obtained by allowing separate examination of variables which tend to be confounded.

AGE

Government statistics and numerous studies have consistently shown that people aged less than 25 years, especially males, are over-represented in road accidents, while to a lesser degree the same applies to those aged over 65, especially in relation to their somewhat reduced exposure to road hazards. Clearly, age-related risk on the roads does not involve a simple linear relationship.

Age, and associated influences such as maturation and the degenerative changes which are part of the aging process, have been found to interact with other factors to affect accident involvement. This seems to suggest the need for a multivariate approach to the problem of accident investigation and prevention, allowing analysis of the nature and degree of relationship between factors associated with road accidents.

The tendency for driver error to differ according to life stage is well known. McFarland (1966), for example, found that accidents involving drivers under 25 years were often associated with errors due to speed, road position, and vehicle maintenance, whereas older drivers' involvement tended to relate to "failure to give right of way, improper turning, ignoring stop signs and improper starting".

More recent enlightenment from Brendemuhl, Schmidt & Schenk (1988) suggested that although elderly motorists did not differ markedly from 30-50 year olds in their ability to master cognitive driving tasks, their adherence to "priority regulations" was less efficient, considerably increasing their potential involvement in traffic conflicts. The older drivers were also less efficient in observing road signs and correct lane discipline, while demonstrating greater on road hesitancy, and poorer technical skills in relation to their vehicles.

The Problems of the Aging Driver

Physiological changes due to aging tend, at variable rates, to negatively affect acuity of sensory perception, speed and quality of information processing, and short-term memory, reducing driver performance potential (McFarland, 1966). Fell (1976) found that, although the percentage of drivers within his study exhibiting information failures "steadily increased....beyond age 25", a marked change was apparent in the accident involved drivers aged 65 and over, amongst whom "60% were considered culpable due to information failures".

Older drivers tend to modify these effects to some extent, by driving more slowly, drawing on their often quite considerable driving experience (McFarland, 1966), and also by avoiding hazardous driving conditions such as night and winter driving (Planek, 1981). Nonetheless, drivers over the age of 65 years have been found to be over-represented in accidents during the hours of darkness, their accident involvement being exceeded only by drivers aged under 25 (Mortimer & Fell, 1989).

However, Cooper (1990) noted that when daylight driving is also examined, although elderly drivers limit their accident involvement, in part, by reducing their driving, i.e. accident exposure, their accident rate has been found to be higher than that of their younger counterparts, and older drivers have also been more frequently considered culpable for the accidents in which they were involved.

The type of errors which older drivers tend to make appear to be entirely consistent with the specific deficits with which they have to deal (Viano, Culver, Evans, Frick & Scott, 1990). A considerable proportion of these may be due to visual impairment (Babbitt Kline, Ghali, Kline & Brown, 1990; Kosnik, Sekuler & Kline, 1990; Sturr, Kline & Taub, 1990), particularly of dynamic visual acuity (Scialfa, Garvey, Gish Deering, Leibowitz & Goebel, 1988), as well as reduction in cognitive functioning (Korteling, 1990; Salthouse, 1990) due to aging effects.

Much research has focused on the consequences for the elderly driver of degenerative changes due to aging. Identification of specific deficits and evaluation of their nature, degree and implications have been the concern of many studies. Rabbitt (1990), reviewing much of the recent research on cognitive aging, found despite considerable evidence that degenerative changes occur, they do not appear to mirror the relative consistency of developmental changes, i.e. the other end of the age continuum, and his conclusions were therefore, somewhat equivocal. The sometimes quite considerable deterioration of function in a relatively small proportion of the elderly, tends to distort age-related findings accordingly. The problem seems to be not so much frequency of occurrence, as degree of devastation, when such degenerative changes do occur.

Rabbitt noted that the considerable variance in maintenance of cognitive function at various ages from about 50 onwards, suggests that a steady deterioration is far from inevitable. There appears to be much which can be done to actively promote continuing function at a high level, probably for the majority of elderly people, both by the individual, and the society as a whole. He concluded that "cognitive change will be slower; the old will live richer, socially more useful, and longer lives if we come to grips with the simple evils that have always devastated human existence: illness, ignorance, poverty, hunger and lack of compassion for the weak".

Insight into problems faced by the elderly suggests that it is not only possible and advisable to implement constructive changes to attenuate these problems, but essential if a very high human cost is to be avoided, in both personal and societal terms, quite apart from any economic considerations.

The Problems of the Maturing Driver

The problems of the young differ considerably from those of their elders. Although young drivers are at their peak physiologically, for example with regard to sensory perception, mobility, cognition, memory and speed of response, they are still in the process of acquiring driving experience, and developing emotional and social maturity (McFarland, 1966). Adolescence and young adulthood is a time of considerable change and adaptation: physical, emotional, social and intellectual. It is an important stage with regard to achieving independence, interdependence, and academic and career goals. There may therefore be, not only many potential sources of support, but also many sources of stress and conflict with which the young must cope.

It is perhaps not surprising therefore that emotional lability and limited self control have been associated with accidents in which young drivers were not only involved, but for which they were considered responsible (Hilakivi, Veilahti, Asplund, Sinivuo, Laitinen & Koskenvuo, 1989). Emotional stability and self-control are developed during the normal maturation process, varying only in degree and rate of attainment. However such variance may be considerable, just as the circumstances which young people inherit, and with which they must cope, may differ enormously.

Similarly, the nature and importance of the driver role in people's lives may vary according to age, sex, personality and situational influences. McFarland (1966) for example considered that the vehicle may have a symbolic value, for young males in particular, which far outweighs its functional one, and that this may influence their approach to driving.

Schuman, Pelz, Ehrlich & Selzer (1967) found evidence suggestive of different patterns of accident involvement within the younger age group. Although drivers of 16-21 years seemed to use their vehicle "as an emotional outlet" more frequently, they tended to limit their mileage, and drive with caution, reducing both the rate and severity of their accident involvement to some extent. The 22-24 years age group, by comparison, had acquired both more experience and confidence. Although their exposure to road hazard was increased, they were less frequently involved in accidents. However any accidents in which they were involved were usually more serious. The nature of their driving errors tended to involve features not easily compensated for by other road users, such as excessive or inappropriate speed for their own skills and/or the prevailing road, weather, or traffic conditions, thus increasing the risk to both themselves and others.

The over-representation of young drivers as compared to their elders in road traffic accidents has been attributed to some degree to their perception of less risk in a variety of specific driving situations. Finn & Bragg (1986) found that young drivers (or at least males, aged 18-24 years) perceived their own likelihood of accident involvement as being considerably less than that of both their peers and older drivers.

Matthews & Moran (1986) subsequently examined risk perception in relation to perception and evaluation of driving ability, reporting that young drivers (males, aged 18-25 years) rated both their own driving abilities and accident risk as being equivalent to those of older drivers. The younger drivers also rated their driving abilities more highly than those of their peers, and consistent with this supposition, their risk of accident involvement as being less than that of their peers. The potential danger involved in a discrepancy between perceived and actual ability, noted by Matthews & Moran, seems to illustrate the pertinence of Groeger & Brown's (1989) emphasis on the need for novice drivers to have a realistic awareness of their own driving capabilities. However, scrutiny of the risk perceptions of the young male would seem to be rendered more valuable by contrasting them, not solely on the basis of age, but also sex and accident involvement, with some attempt to clarify the basis on which those who are particularly at risk may be distinguished from their less risky peers, and what factors may contribute to the potential danger to which they subject themselves and others on the roads. Such issues are addressed more fully in Chapter 4 which is concerned with driver attitudes.

If young drivers are less aware of risk, it is hardly surprisingly that they also seem less aware of the driving environment than their more experienced counterparts. Egberink, Lourens & van der Molen (1986) for example, found that younger drivers (aged 18-24) detected the presence of children (both pedestrians and cyclists) on the roads less frequently than did drivers aged 30-56 years. This has obvious implications for accident involvement.

Younger drivers have been found to be better at detecting children in high access streets where potential danger is more obvious, than in residential areas where danger is less apparent, whereas older drivers do not differ significantly in their detection of children according to the type of street in which they are driving. This suggests a difference in anticipation and active searching which may be due to inexperience of the younger drivers, however such skills would seem to be amenable to acquisition via education and training strategies.

Egberink et al found that older drivers (30-56 years) also exhibited inadequate anticipation of children on the roads, lack of awareness of the potentially unpredictable nature of children's behaviour and the need for caution and careful visual search in any area where children may be encountered, especially where visibility is obscured (e.g. by parked cars). They therefore recommended an education campaign to heighten awareness of all drivers, but especially the younger group in which such deficits were found to be more pronounced.

Young drivers' on-road awareness may be restricted, not only by inexperience, but also by such factors as alcohol, particularly during the evening, night and weekends. Mayhew, Donelson, Beirness & Simpson (1986) point out that while it is far from rare for teenagers and young adults to drink frequently and heavily, they are less likely to drink and drive than are older drivers, although they are more likely to be accident involved after drinking than their elders, at all equivalent blood alcohol levels. Such issues are addressed more fully in Chapter 3, which is concerned with driver impairment.

Alcohol impairment does not appear to be a solitary issue, especially where young drivers are concerned. Drink driving has been found, not infrequently, to be associated with other "problem behaviours", which together constitute "an adolescent risky behaviour syndrome", expressing a cluster of "psychosocial risk factors" (Jessor, 1987). Thus, young driver risk may be essentially related to behavioural expression of problems arising within the young person's lifestyle. However, such problems have been found to persist with age in a proportion of the population (Jonah, 1990), whose difficulty in coping with life demands may be expressed in such behaviours as drink driving offences.

Summary: Many studies have identified associations between accident risk and age, sex, and driving experience/exposure. However accident risk appears to be mediated by different factors at various experiential levels and life stages. The solutions to such diverse problems, if they are to be appropriate and effective, may need to be equally diverse. This seems to highlight the need to allow separate examination of the influence of such qualifying factors within analyses of accident risk. Life changes appear to contribute to accident risk in conjunction with many factors, especially to young driver risk, including impairment factors such as alcohol. This suggests the potential value of examining life stage in relation to factors over which drivers have considerable control and which have been found to be strongly associated with accident occurrence. Thus evaluation of the importance drivers attribute to various risk factors and the risks to which their behavioural tendencies tend to expose them, may be usefully examined in relation, not simply to accident involvement, but also age, sex, and experience intensity and duration. Drivers' estimates of the relative culpability of self and others may allow further insight into discrepancies between perceived and actual risk.

CHAPTER 3: DRIVER IMPAIRMENT

Preamble: This chapter addresses the issues of driver impairment, the relative importance of fatigue, stress and alcohol in accident causation, and their interactive effects, while the contentious issue of responsibility in relation to impaired driver control is raised.

Sivak (1981) suggested that much of the difficulty in accounting for road accidents in terms of human skills is due to a failure to allow for their "sensitivity to frequently occurring transient human states such as fatigue, stress and alcohol intoxication". Considerable empirical evidence supports the view that impairment factors are highly influential in accident causation. Accordingly, road safety bodies caution drivers not to drive while impaired. The Road Traffic Authority [Victoria, Australia] (1988), for example, advises drivers "No matter how good a driver you are, if you are not in shape to drive, then you are a danger to yourself and others. You may have had too much to drink, be too tired to concentrate, or just be upset about something"

FATIGUE

Falling asleep while driving is an obvious example of diminished control with potentially dangerous consequences, as reflected partly in police and hospital accident records. However the whole continuum of fatigue effects, from dozing off to momentary loss of concentration, may increase the likelihood of serious consequences. Such effects may be due to weariness associated with excessive or sustained demands on the driver (Hancock & Warm, 1989), or insufficient stimulation (Mahalel & Szternfeld, 1986) leading to boredom, inattention and/or distraction.

McDonald's (1984) comprehensive literature review suggested that fatigue may be far more widely implicated in accident causation than is generally realized, pointing out that "truck and bus drivers themselves attribute a larger proportion of the accidents in which they are involved to factors related to fatigue". Fatigue and its effect on level of arousal was also elicited as an accident risk factor in an Australian survey of truck drivers' attitudes and opinions. Night driving was rated as being more important in accident causation than was day driving, and it was also considered to be an important factor by a higher proportion of drivers (Stevenson & Williamson, 1988). Many studies concur with McDonald's conclusions. Storie (1984), for example, found that although police records intimated that five per cent of accident-involved goods and public service vehicles' drivers may have briefly dropped off to sleep just before their accidents "fatigue was manifest in 11 per cent of accidents at the time of which drivers reported being bored or sleepy".

More recently Haworth (1988) noted that on the basis of a rather conservative estimate of fatigue, i.e. "strong evidence that the driver was likely to have been asleep at the time of the accident", fatigue was identified by the Coroner as a contributing factor in 8.6% of accident fatalities involving trucks in Victoria during 1984 and 1986. Considering that the problem of fatigue in drivers of heavy goods vehicles has been fairly well established, it seems noteworthy that while the Coroner's report identified fatigue in "3.3% of drivers of articulated vehicles and 1.5% of drivers of rigid vehicles", for car drivers it was as high as 9.1%.

Haworth pointed out that, in view of the "high proportion of accidents in which attention was identified" i.e. 25.3%, the influence of fatigue on accident occurrence was probably underestimated. Noting that "a state of reduced attention may precede falling asleep at the wheel", she reasons that it is likely that "some of the 25% of accidents in which inattention was judged to have been present involved driver fatigue".

Similarly, McDonald argued plausibly that apart from the obvious sleep-induced accidents "there are a much larger number of cases where the driver has not responded adequately to the situation; and a range of factors in the 'fatigue' complex may well have contributed to such an impairment in the driver's functioning". He noted that the effects of fatigue in the form of driver inattention are compatible with the nature of a high proportion of goods vehicle accidents i.e. "single-vehicle accidents" and "rear-end collisions", particularly where the presence of alcohol has been excluded.

The contention that falling asleep at the wheel only accounts for a relatively small, albeit extreme, proportion of the problems involving the fatigue complex is further supported by the findings of McLean, Ryan, Wright & Hinrichs' (1988) in-depth study of 80 rural road accidents in South Australia, in which, 22 of the 205 participants were fatally injured, and a further 79 required hospitalization. McLean et al reported that whereas in 6 cases (7.5%) which involved the driver falling asleep, fatigue could be seen to have played a part in the accidents, almost one third of the drivers reported "some feelings of fatigue before the crash" while notably "fatigue was associated with an elevated BAC".

Alerting drivers to the dangers of driving when fatigued, road safety advisory bodies recommend simple, practical measures which can help to restore alertness. The Road Traffic Authority [Victoria] (1988) warns the driver that "tiredness may" not only "make decision-making harder and slower" but "worse still, you may fall asleep behind the wheel". Similarly, the Police Drivers' Manual, HMSO [UK] (1990) noting how readily the onset of fatigue may occur, especially during night driving, recommends complete concentration at all times, suggesting that "once a driver realises that his driving skills are deteriorating he should reduce speed and, if necessary, stop until he has regained his faculties fully".

Lack of attention and awareness due to fatigue impairment may not be apparent until they result in an accident or near miss. The importance of the whole range of factors within the fatigue continuum as risk factors may therefore be relatively underestimated, not least when they interact with other impairing factors such as stress (Gulian, 1987), alcohol (McLean et aL, 1988; Gawron & Ranney, 1988; de Waard & Brookhuis, 1991) or other drugs, such as antihistamines (Starmer, 1985), or the residual effects of hypnotics (Roth & Roehrs, 1985). Although impairing factors not infrequently occur together, any consideration of their effects may not necessarily reflect this. However it should be noted that when any combination of potentially impairing factors occur together, even though individually they may not necessarily be unsafe, together they may nonetheless prove risky or even lethal. Safety has been found to be compromised whenever driver skill, judgement and the capacity to respond adequately to sudden changes in the driving situation are impaired.

STRESS

A considerable body of research suggests that stress, and stress-related problems such as alcohol dependence, may seriously compromise road safety by impairing driver performance and/or negatively affecting attitudes to, and social interaction with, other road users. Drivers may experience stress within the driving situation, or in other life circumstances unrelated to driving which nonetheless impact on driver performance. Stress may have pervasive and sustained effects, or be specific to particular events or stages of life. It may be inherent in the personality development of individuals as suggested by a predisposition to respond to the environment in particular ways, or integral to a particular way of life. Stress reactions may be amenable to change or highly resistant; welcomed as challenging, attenuated by coping strategies and resources, or experienced with little relief or support. Exposure to intense, frequent, or unremitting stress may encourage employment of defence mechanisms which are equally extreme (Gergen & Gergen, 1981). The association between stress, risky driving behaviours, and drivers' awareness of their relative contribution to accidents, is one of the issues examined within the current study.

Driving-related stress

Stress incurred while driving may be associated with: inexperience, lack of confidence (Hunt, Dix & May, 1968; Lisper, Laurell & Stening, 1973 cited by Gulian, 1987); post-accident trauma (Kuch, Swinson, & Kirby, 1985); sustained attention demands (Hancock & Warm, 1989); the perception of other road users' actions as risky (Knapper & Cropley, 1980), frustrating or irritating, in relation, for example, to overtaking manoeuvres (Gulian, Matthews, Glendon, Davies & Debney, 1989); or the effects of traffic congestion (Schaeffer, Street, Singer & Baum, 1988; Golob, Recker & Levine, 1990), and perceived lack of control (Evans & Carrere, 1991).

Gulian et al found that specific driving behaviours, especially "tailgating when in a hurry", were predictive of aggression and more generalized measures of stress, while "driving to a schedule" allowed prediction of a generalized driver stress response. Duration of driving experience was found to be predictive of loss of enjoyment or "dislike of driving". Such dislike was also associated with frequent motorway driving, particularly with increasing age of the motorist. Both the perception of traffic situations as stressful, and the strategies employed to cope with them, were found to be age-related.

Driving styles characterized by aggression and lack of enjoyment were also found to be significantly predictive of stress in drivers ($p < 0.001$). Gulian et al pointed out, however, that factors external to the driving situation appear to influence driver stress to a far greater degree than do those which are intrinsic to it.

The influence of external stressors on driving

Any negative experiences which occur in people's daily lives may potentially affect how they function in their many and various roles, that of driver being no exception. The frequency, intensity and duration of exposure to stressors, as well as the cumulative effects of multiple stressors, may all be expected to influence stress-impairment potential (Gergen & Gergen, 1981; Folkman, Schaefer & Lazarus, 1981), qualified by the degree of control they perceive themselves to have over potential stressors (Gergen & Gergen, 1981). Such perception may be influenced, not only by the extent of exposure to stressors, but also the availability and accessability of coping resources and strategies, and the ability to employ them (Folkman et al, 1981).

Specific personality and/or lifestyle-related factors, such as Type A time-urgent behaviour (Evans, Palsane & Carrere, 1987), or binge drinking (Bradstock, Forman, Binkin, Gentry, Hogelin, Williamson & Trowbridge, 1988), have been identified as being related to both stress and accident involvement.

Gulian et al (1989) noted more general concerns of the driving population, identifying both redundancy and retirement as important factors relating to driver stress. However their finding that "higher life stress was associated with higher driver stress", although hardly surprising, is of particular importance.

A considerable body of evidence implicates life stress in a reduced capacity to maintain physical and psychological well-being, constructive social interaction, performance potential (Johnson & Sarason, 1981; Gergen & Gergen, 1981), and the perceived and/or actual capacity to effect positive life changes. As Johnson & Sarason note, "individuals who report having experienced high levels of negative change appear to be more externally oriented, perceiving themselves as being less capable of exerting control over environmental events".

Factors which considerably compromise the control that drivers perceive themselves to have over aversive stimuli within their everyday lives may have serious implications, not only for their own well-being, but for the safety of all road users. The degree to which stress may potentially impair driving performance will depend on the nature, severity, frequency, and duration of drivers' exposure to stressors, their perception of what is stressful, and the internal and external coping resources available to them, as well as their awareness of such options. The degree to which coping strategies available to and utilized by the individual are sufficient to deal with the stressors they encounter and/or provoke in their daily lives, appears to have implications for all skilled performance and social interaction.

Analogous to the cycle of deprivation (Bowlby, 1974), it seems that exposure to stressors which are beyond the individual's coping capacity and/or resources may precipitate events which are themselves stressful, thereby exacerbating the effects. Such a result however, seems far from inevitable. The degree to which individuals may be exposed to events or situations which they perceive as stressful, as well as the availability of internal and external resources to help mitigate the effects of stress, are open to the possibility of change. Such change may be instigated by the individual, people within his/her social network, and/or at a broader communal level, including the allocation of sufficient resources by the appropriate policy makers (Weil, 1989), but perhaps most effectively at all levels simultaneously.

Some Consequences of Stress Impaired Driving

The cognitive and emotional effects of any problems which are inadequately coped with may influence behaviour and its consequences in various settings, not least the driving situation. For the emotionally volatile, young drivers in particular (Schuman, Pelz, Ehrlich & Selzer, 1967), driving may itself be used as a means of coping, albeit a risky one, with a fast spin on the road being employed to diffuse unpleasant, emotional arousal. When alcohol is also employed as a means of coping (Farrow, 1987), the risks may be considerably increased.

The relative anonymity of the driving situation and the non-verbal mode of expression which driving allows may appear to offer a means of dissipating negative emotions without involving any direct or immediate threat to self-esteem or interpersonal relationships. Difficulty in coping with negative feelings and their expression in an appropriate and constructive manner, and/or limited possibilities for doing so, has implications for a disrupted lifestyle both for the individual and all whom he or she encounters, potentially compromising safety in many settings, not least the driving environment.

The way in which people tend to respond to life's contingencies may also influence their own and others' safety. The implications of Type A behaviour within the driving situation for example, are suggested by a cross-cultural study conducted by Evans, Palsane & Carrere (1987). They found that in both India and the United States "Type A bus drivers in comparison with their Type B counterparts have more accidents, absenteeism, official reprimands, and self-reports of occupational stress". However their sample focus, on 200 male bus drivers, suggests that generalizability should be similarly restricted.

Numerous studies, including many reviewed by Gulian (1987), suggest that life stress is heavily implicated in accident involvement, not infrequently with serious consequences. Stress may increase the accident risk of affected drivers, their passengers, and any fellow road users. Both recency of exposure to stress and the presence of psychopathology appear to influence culpable accident involvement, especially when they occur together.

Brenner & Selzer (1969) evaluated data relating to 96 drivers deemed responsible for accidents involving one or more fatality, reporting that drivers who had experienced recent social stress: "serious and disturbing personal conflicts with significant others; personal tragedy" such as "death or serious illness of persons close to the driver; and job and financial stress" within the "12 months preceding the fatal accident or interview...are estimated to be five times as likely to cause a fatal acident as drivers without such stress". Further risk increments were associated with alcoholism and psychopathology.

Accident involvement has been found to be significantly related to "life changes and subjective stress" occurring within the preceding 12 months, regardless of drivers' status with respect to treatment for alcoholism (Selzer & Vinokur, 1974). They noted that the situation was exacerbated by "excessive alcohol consumption" rendering the alcoholic driver particularly unsafe at such times. Similarly Selzer & Vinokur (1975) noted that "the effects of psychopathology and stress are stronger among alcoholic drivers than among nonalcoholic drivers".

Further illustrating the importance of recency to stress effects, McMurray (1970) noted that 410 drivers undergoing divorce proceedings had significantly more speeding, failure to stop violations, and especially more accidents, during the six months prior to, as well as following such proceedings, than the population average excluding "male plaintiffs", and their own average over seven years. Violations and accidents peaked within three months of the divorce petitioning.

A broader approach by Jeffrey, Foley & Waller (1973), revealed that drivers experiencing "a recent sharp increase in traffic accident or violation involvement", according to their criteria of "either three accidents or three violations", differed significantly from a control group similar in "age, sex, race, education" and "socioeconomic level", with a greater percentage of stress than control drivers being "separated, widowed, or never married" ($p<.01$), and reporting involvement in verbal conflict ($p<.001$), and both a higher mileage ($p<.01$), and health problems ($p<.01$) during the previous year.

A carefully controlled study by Mayer & Treat (1977) examined test differences between "30 young drivers who reported being involved in three or more accidents" within the previous three years, and 30 accident free drivers, "matched for age, sex and exposure to driving". The accident group exhibited significantly higher levels of personal maladjustment in the form of psychopathology ($p<.05$, 2-tailed t-test, discriminant function coefficient [DFC] +0.61); social maladjustment in antisocial tendencies ($p<.05$, 2-tailed t-test, DFC +0.80), and reduced clerical speed/accuracy performance in numerical comparison ($p<.05$, 2-tailed t-test, DFC -0.56).

Mayer & Treat argued plausibly that despite the limited generalizability of small sample study findings, a discriminant function which allows correct prediction of "over 85% of the validation sample" affords some confidence in results which are "consistent with the idea that personal maladjustment (problems with one's self) and social maladjustment (problems with society) are related to extreme accident rate" with more modest effects associated with information processing and impulse control.

They reasoned that the personal maladjustment of high accident drivers could be interpreted as relating to confusion, possibly involving the cluttering of "their information processing system...with non-driving information" which may render them more susceptible to information failure or misinterpretation. They note that "the fact that poor clerical ability was related to auto crashes is also consistent with the information processing idea that people who are poor at processing perceptual information are likely to make recognition errors while driving".

The implications of negative life events for culpable accident involvement examined by Holt (1982) revealed that "those who are primarily responsible for an accident are likely to have experienced a much larger number of life events, including a large proportion of undesirable ones, than those involved in, but not responsible for, a road traffic accident". This was particularly noticeable during the three months prior to accident occurrence. Holt concluded that drivers are more susceptible to causing accidents during periods when they experience numerous life events, particularly those which "signal disruption of close personal relationships". He reasons that the "life events approach" allows "drivers and road users who are at risk" to be easily identified, without "negative or socially undesirable connotations", thus potentially allowing people "to alert themselves to the need to drive, ride or cross roads with more than the usual care at certain periods in their lives".

Stress in the form of aggression was also found to be related to both traffic violations and accidents by several studies reviewed by Gulian (1987), including Goldstein & Mosel's (1958) finding that aggression, as expressed by competitive speed, was associated with a higher rate of traffic violations and accidents, "for men, but not for women", and Parry's (1968) report that "both high aggression and high anxiety" in drivers, increases the risk of culpable accident involvement, especially when both occur together. Gulian suggested that "a relatively large proportion of British" (Parry, 1968), American (Turner et al, 1975), and "probably drivers of other nationalities too" appear to "engage in...aggressive thoughts and actions" which seem to "fall along an intensity continuum ranging from swearing under one's breath at another driver to edging another car off the road".

The findings of Turner, Layton & Simons' (1975) investigation of aggression in a naturalistic setting suggested that many individuals who drove 'frequently' admitted to feeling angry or irritated "sometimes" in response to other drivers' on-road behaviour. They noted for example that "77% of males and 56% of females reported 'swearing under their breath' at other drivers, while 50% of males and 15% of female drivers reported 'flashing their lights in anger' at other drivers". Turner et al suggested that although blatant hostility was not necessarily prevalent, "there does appear to be evidence that hostile reactions to other drivers are a frequent occurrence".

However, Goldstein (1964), who identified an increased accident risk associated with "aggressiveness, social irresponsibility and/or high instability", acknowledged that "these groups account for but a slight portion of the accident total". Thus it seems that determining, not only the relative importance of impairment factors which are associated with accidents, but also their manner and degree of contribution in interaction with other pertinent factors, may offer considerable safety benefits. Accident prevention may also be facilitated by strategies designed to identify and reduce individual and communal sources of stress, while actively developing coping potential.

Coping with Stress

Impaired self-control and judgement are not conducive to constructive social interaction or effective functioning. Such impairment due to the effects of stress and/or alcohol intoxication, may result in the individual having to deal with the consequences of behaviour which may be unwise, asocial, disruptive and/or violent. It may therefore involve both internal turmoil and interpersonal conflict, disruption of relationships with important others, and also quite possibly conflict with those who maintain societal rules.

Development of a personal value system which is antagonistic to that of the society within which one lives may not only be a response to stress, but also potentially a source of considerable stress, in particular perhaps where the prevailing societal values are perceived as unjust. Perception of society as rejecting, hostile, disrespectful and undeserving of respect, may lead the individual to seek support and acceptance elsewhere, such as within smaller, alternative groups, whose values may be deemed more compatible than those of the dominant, mainstream society.

The degree to which individuals have control over their exposure to stressors, or the possibility of attaining resources which may mitigate or abort their effects, varies considerably. Similarly, there is considerable variance in access to conditions conducive to the development of effective strategies for coping with the arousal of negative emotions. The role of stress in compromising safety seems therefore to demand evaluation within the context of the dynamic and continual interaction of the individual and the environment, with the quality of environmental response during the formative years playing no small part in development of the ability to cope with potential stressors (Malatesta & Wilson, 1988).

Folkman, Schaefer & Lazarus (1981) suggest that stress and emotional response result from evaluation of the implications for personal well-being, of current and future interactions with the environment, real, imaginary or anticipated. They explain that "whether the environment is viewed as generally unmanageable and hostile, or as supportive and readily subject to control, should affect the appraisal (e.g. threatening or challenging), and the consequent emotional impact".

They point out that people can draw from both internal and external coping resources, including "**health/energy/morale, problem solving skills, social networks, utilitarian resources** (e.g. money, social agencies), and both **general and specific beliefs**", with availability fluctuating in accordance with life stage, experiences, exposure to stress, and lifestyle. They suggest that "it would be unwise to underestimate the value of utilitarian resources in making it possible for a person to cope more effectively in many types of life crisis ...People who have an abundance of utilitarian resources, especially if they are aware of their existence and of how to use them, generally fare much better than those without ".

Folkman et al conclude that "it seems sensible to assume that persons who believe that they can master most demands and threats by doing what is needed or by discovering what to do and how to do it are less likely to be threatened or to feel helpless or hopeless in stressful transactions". Conversely, "the greater the personal insecurity the greater the intolerance of ambiguity, and the need for predictability, certainty and order within the surroundings and routines", emphasizing that "at the least, a stifling of creativity is likely to occur, in the extreme obsessional-neurosis, or even loss of reality-awareness presenting as psychosis". This illustrates the basic need to develop the potential to cope with stress constructively.

It has been well established that interaction between the individual's genetic predisposition and the environmental influences to which he or she is exposed, have a profound effect on emotional, social and cognitive development. Malatesta & Wilson (1988) suggest that during the course of development, the response to emotions which are frequently experienced and/or observed tend to become central to that development, finding expression in the emotional traits which represent the essence of the individual's personality, interacting with perceptual awareness, cognitive function and behavioural response, and influencing subsequent interaction with the environment. Early experiences appear therefore to influence the range of the individual's emotional repertoire, while subsequent interaction with the environment may modify or exacerbate any harmful effects of early experiences, just as it may either enhance or attenuate any positive ones.

Malatesta & Wilson point out that "even seemingly maladaptive behaviour" may have been adaptive at some time in the individual's life, and "may even continue" to be. They emphasized that stressful situations provide the conditions which are most likely to reveal the nature of such organization "since stress tends to prompt the retrieval of patterns that have, at some point, been functionally adaptive in the life of the individual".

The degree to which the young child's environment constrains rather than facilitates physical, emotional, intellectual, and social development has implications for both the self and the society, for the capacity to contribute to well-being, effective functioning and constructive interaction. Persistent exposure and susceptibility to stressors have been found to affect physical and psychological health and well-being, job performance potential, the nature and quality of social interaction, as well as susceptibility to accident involvement. Concern about stress and its implications for both developing individual and society seems therefore to require a serious commitment to enabling families to adequately provide for their needs. The widely held view that mature individuals should take responsibility for the consequences of their actions, in the driving situation no less than elsewhere, with variable regard to volition and intention, implies that collectively we should at least try to ensure that every person is enabled to develop the potential to do just that. The individual driver's awareness of responsibility for his/her own actions has considerable implications for safety. However such awareness would seem to be essentially related to our collective awareness of responsibility as a society.

ALCOHOL

An outline of the problem

Alcohol has been well established as a major contributory factor in road accidents internationally. Considering the integral roles which motorised transport and alcohol often play in work and social life, this is perhaps hardly surprising. As alcohol consumption and vehicle use have increased in many countries over the years, so too have offences involving alcohol, including driving while under the influence (Benjamin, 1987). The prevalence of both drinking and driving behaviours can be expected to include impaired driving, unless drivers' values, motivation and awareness direct them otherwise and/or the circumstances make driving after drinking unnecessary.

The serious consequences which may result from alcohol-impaired driving are of particular concern. The considerable contribution of alcohol impairment to both RTA fatalities and accidents resulting in severe and permanent disability has been well established. Evans (1990), for example, calculated that a reduction of 43-51% in traffic fatalities in the USA could be achieved by the total separation of driving from alcohol impairment (i.e. without reference to legal limits).

Young drivers are over-represented in accidents involving alcohol (Jonah, 1986), thus presenting a similar pattern to that which prevails for road accidents in general. Therefore, if we are concerned about the waste of life and quality of life, especially of the young, active intervention seems to be indicated. Driving after drinking not only compromises the safety of the impaired individual, but of all whom he/she encounters on the roads. Drivers need therefore to be made aware of the problems associated with alcohol and to be provided with whatever help is necessary to enable them to separate alcohol impairment from driving.

Alcohol-impaired driving has been demonstrated both experimentally and in field studies to occur at comparatively low blood alcohol concentration (BAC) levels (e.g. Bungey & Sutton, 1983). Albery (1991) found alcohol-related deficits of both speed and accuracy of response in an experimental study involving a sample of young males, at BACs as low as 60mg/100ml. Such findings seem especially relevant to both young drivers, (Drummond, 1987; Simpson, 1987) and females, (Popkin, Rudisill, Waller & Geissinger, 1988), who appear to be accident-involved at lower BACs than the driver population in general, although causation remains controversial.

A rising degree of impairment increases, not only the risk of accident involvement, it also appears to reduce the likelihood of survival in the event of a crash. Stewart (1989) noted that BACs "greater than .10 were consistently found to be associated with survival times of less than one hour". This may be partly due to failure to wear a seatbelt (Mannering et al, 1987; Bradstock et al, 1987). However whether directly or indirectly, high BACs appear to be strongly related to the risk of accident fatality.

The vulnerability to accidents, of intoxicated pedestrians (Stark, 1988; Patrick, 1988) and cyclists (Olkkonen & Honkanen, 1990) suggests that recommendation of alternatives to driving after drinking should follow careful consideration of the implications. The impact of impairment effects on the transport network seems to require comprehensive examination in order to achieve reduction, rather than simply transposition, of the problem.

It seems worth noting that alcohol, like stress impairment, is not exclusive to the role of driver, and can be expected to be influenced by, and impinge upon, many activities and roles. This suggests the potential benefits of a multidisciplinary approach to at least try to evaluate the interaction between the person and their wider environment. To this end, it seems likely that co-operative exchange between those who are concerned with drink driving, alcohol in the workplace and domestic violence, could prove fruitful for the alcohol-impaired, for all who may be affected by alcohol-impaired behaviour, and also the wider society in which alcohol-related problems are both developed and expressed (Waller & Waller, 1987).

Perceptual impairment

Alcohol impairs many functions under the control of the central nervous system, which are essential for safe driving. This has been demonstrated in both closed circuit and driving simulator conditions. Gawron & Ranney (1988) reported impairment on "multiple measures of vehicle control, tracking and information processing", with marked BAC effects. They found a strong relationship between alcohol impairment and: "accident" occurrence, according to their criteria of "road departures of at least four feet"; difficulty in maintaining correct road position (i.e. lane deviations); and to a lesser degree, speed fluctuations. Drivers' failure to slow down prior to attempting curve negotiation during a trial at 0.12% BAC, seems to demonstrate the inappropriate response which may be expected with the impaired driver's limited perceptual and cognitive awareness (Gawron & Ranney, 1988).

The interactive and compounding potential of impairment factors was demonstrated by de Waard & Brookhuis (1991), who conducted an on-road test involving alcohol. They found evidence of significant alcohol-induced impairment effects, i.e. "19% impairment by alcohol compared to baseline" during the car-following component of their study. During the standard driving test component they noted that subjects' control over the lateral position of the test vehicle was reduced, not only by alcohol, but also by the sustained effort of driving, i.e. fatigue. The impairment attributable to these two factors was reported as being "about 30%".

Gawron & Ranney (1988) also found that driver performance was impaired by both alcohol and fatigue, with the stronger effect being due to alcohol. They concluded that their findings suggested an interactive alcohol/fatigue effect, illustrated by an increasing rate of both departure from the correct lane as well as speed variation, with a reduction in the mean speed during a two-hour drive. They noted that changes in curved-road speed also suggested an interaction between fatigue and BAC.

The latter two studies illustrate some of the serious implications of alcohol-impaired driver performance, especially where the effects are compounded by any other factor which may diminish effective functioning. This raises concern about the interactive effects of all co-existent impairing factors. Lack of awareness that driver performance may be impaired by mutually potentiating effects of stress, fatigue, alcohol and/or other drugs, may be expected to increase the on-road risks still further. Accident risk may also be influenced by continually changing situational and task demands. Safety has been found to be compromised in particular by alcohol impairment involving complex, or multiple tasks (Moskowitz, Burns & Williams, 1985).

Cognitive impairment

While perceptual impairment may involve considerable risk, the cognitive aspect of alcohol-impaired driving is perhaps of even greater concern. Impaired drivers may be unaware of their perceptual deficits until they become overtly demonstrable, by which time a relatively high BAC level may well have been attained, and/or possibly accident involvement. Realization and acceptance by drivers that alcohol impairment increases the risk of accidents is essential, but not necessarily sufficient, for compensatory behaviour to be invoked to reduce such risk.

Speed perception deficits were not detected in drivers who had to deal with modest task demands in closed circuit conditions following moderate consumption of alcohol (Kearney & Guppy, 1988). This finding held even amongst relatively inexperienced drinkers who would be expected to have a lower alcohol tolerance. This seems to illustrate drivers' difficulty in becoming aware of the effects of low to moderate impairment, until it is too late, i.e. when the situation demands complex integration of skills and/or decision-making processes which they are unable to meet. However Stein & Allen (1986) found that, even under conditions where drivers exhibited perceptual deficits relating to both speed and distance due to alcohol impairment, they remained unaware of those deficits. This is consistent with Allen, Schwartz, Hogge & Stein's (1978) findings that despite performance deficits which were apparent at 0.10% BAC, subjects failed to exhibit risk awareness until 0.15% BAC was achieved, when risk compensation measures were invoked. Thus it appears that impairment awareness may not occur until the driver is well over the legal limit, making the likelihood of such awareness even more remote in relation to low BACs, at which impairment effects may nonetheless occur.

Furthermore, Flanagan, Strike, Rigby & Lochridge (1983) noted that 76% of drivers exhibiting performance deficits, such as failure to avoid striking hazards due to poor vehicle positioning and excess approach speed, were not only unaware of such deficits after drinking alcohol, but actually thought that their driving performance had improved. This seems to illustrate well the known effects of alcohol, i.e. the sedative effect which impairs many central nervous system functions and the euphoria which gives a sense of well-being, regardless of objective reality relating to driver ability or control.

Perceptual and cognitive impairment may not only allow underestimation, or even total lack of awareness of any deficits relevant to the driving situation, they may encourage an illusion of improvement in driver performance until fairly considerable impairment has been reached. Thus, awareness of alcohol-induced driving risk may not be apparent to the impaired driver until the moment at which failure to avoid a problem occurs, e.g. leaving the road, or crashing into fixed objects, other vehicles, or vulnerable road users.

The decision to drive after drinking

The implications of perceptual and cognitive impairment acting in concert are illustrated by the considerable evidence that drink-drive offenders lack concern about driving while impaired, largely because they consider themselves to be perfectly fit to drive. Clayton, McCarthy & Breen (1980) found that high alcohol consumption was clearly linked with the risk of drink-driving conviction, especially where "driving after drinking" was a regular occurrence. However, drivers frequently had the intention to drive after drinking, and knowingly drove while over the limit, virtually dismissing the drink-driving laws as irrelevant in view of their subjective assessment of being "perfectly fit to drive".

The discrepancy between drivers perceptions of safe and legal limits seems to be highly influential. Clayton, McCarthy & Breen (1984) suggest that "while this difference remains, it is likely that exceeding the prescribed limit will be regarded purely as a 'technical offence' and that the motorist concerned was 'just unlucky'". They further point out that those who are most likely to commit drink driving offences are also "most likely to overestimate the amount of alcohol that they can drink and still remain fit to drive".

Similarly, Guppy (1987, 1988) found within a large sample of male drivers that "those who drank excessively before driving felt that they could consume significantly larger amounts of alcohol without it affecting their driving". Such drivers also estimated the quantity of alcohol which could be consumed without exceeding the legal limit to be higher than those who avoided driving after excessive drinking. Furthermore, they also considered themselves to be less likely to be apprehended by the police when driving after drinking than did their more temperate counterparts. Albery's (1991) findings, consistent with the above two studies, suggested their applicability extended to females.

There seems to be little incentive for motorists who consider their driving to be safe, legal, and unlikely to incur detection by, let alone the disapproval of, the law, to change their drink driving behaviour. It seems a problem of no small importance in relation to drink driving as well as other unsafe driving practices, that drivers need to be provided with information which is not only accessible, but which is presented in a manner which they will find relevant to themselves and not just to 'other' drivers. Unless this occurs then such communication is unlikely to inform drivers' decisions and will therefore remain ineffective.

It seems that all drivers who consume alcohol need to know that they will be impaired to a greater degree than they feel they are. They also need to be enabled to acknowledge and cope with any existent or potential problems such as alcohol dependence, including whatever difficulties underlie any such dependence. The latter point seems particularly relevant in light of McLean et al's (1988) findings following an in-depth investigation of 80 rural road accidents which resulted in 22 fatalities and 79 hospital admissions.

Their study revealed that "about 15% of drivers and riders had a BAC over the [South Australian] legal limit of 0.08 g/100 ml. The prevalence of elevated BAC was highest in males aged 20-24 years and 30-49 years. Those with higher BACs drank alcohol more often, drank more on each occasion, and drove after drinking more frequently. They grossly under-estimated the effect of alcohol on their driving ability". Thus there seems to be considerable evidence that drivers who are most likely to be involved in accidents while alcohol impaired, are also least likely to be aware of, or concerned about, the potentially negative consequences of driving after drinking, until perhaps they are faced with such consequences, but not necessarily even then. This suggests a need to examine causal attribution processes, the availability and awareness of viable alternatives to drink-driving, and strategies which facilitate replacement of reliance on alcohol with effective coping strategies.

The perception of viable alternatives to driving after drinking

Although awareness of the risks relating to impaired driving may be expected to influence any decision to drive after drinking, viable alternatives need to be both apparent and acceptable to the potentially impaired driver for their selection to be even possible, let alone likely. The prevalence of driving after drinking, and the lack of alternatives apparent to drink drivers was raised by Clayton, McCarthy & Breen (1984). They found that 59% of their driver sample, none of whom had been convicted of drink-driving offences during the preceding ten years, "admitted to drinking away from home on an average of 2.4 occasions in the week prior to being interviewed". The return journey usually involved driving for 63% of these drivers, and walking for 17%. However, as they point out, the intoxicated pedestrian is also notably open to accident risk.

Mannering, Bottiger & Black (1987) suggest that any decision to drive after drinking, with whatever risks drivers' perceive this to entail, will be made because no alternative means of transport is considered to serve equal utility. They found that increasing BAC had a strong negative influence on the decision to drive. However this was the case for drivers who were in a sober state considering a hypothetical situation, whereas they noted that previous research involving a decision whether or not to drive on an actual drinking occasion found no such effect.

Thus it seems that decisions relating to driving after drinking, including arranging alternative transport, designating a sober driver, setting limits on quantity of alcohol to be consumed and/or the appropriate time lapse before driving, are best taken before the occasion arises, i.e. before drinking commences. For this to occur however, it seems necessary to address the issues in a manner which is relevant and meaningful to individuals who drive while impaired. Evaluation of drivers' beliefs about alcohol, driving, and accident causation would seem to facilitate this process.

Partially addressing this problem, Clay (1987) found that accident-involved drivers attributed more importance to lack of anticipation as a causal factor in accidents in general than did non-accident drivers, while considering alcohol, stress and fatigue to be less important. This was consistent with the slightly negative attitudes to "other drivers" revealed in this study, explicable in attribution terms in relation to the salience of the other driver's observed errors by comparison with those of the self. Thus it is possible that problems encountered while driving may be misattributed to other drivers' inadequate anticipation, rather than the accident respondents' greater inclination to drive while impaired. However a moderate sample size (n=295) constrained comprehensive evaluation of drivers' belief structures, whereas a larger sample would allow distinction to be made on the basis of subjective culpability as well as accident involvement. Clarification of such issues is one of the purposes of the current research.

Problems underlying drink-driving

Mannering et al (1987) found that young drivers, females and seat-belt users were less likely to drive after drinking than drivers in general. It is of particular interest therefore that young drivers and females, are also more likely to be accident involved at any given BAC level than are older drivers or males. Although this does not preclude intentional risk-taking, particularly on the part of young drivers, it does suggest the importance of other factors in their impaired accident involvement.

The issue of inexperience in driving, drinking, and driving after drinking seems to link these two groups to some extent. However, it seems that experience and exposure tendencies may be expected to cancel one another out to some extent, i.e. the greater the exposure to risk, the greater the experience and vice versa.

It seems possible that the habitual pattern of drinking and its effect on alcohol tolerance may influence accident risk at any particular BAC level. The problem may relate to irregular consumption of relatively large quantities of alcohol i.e. binge drinking as a means of coping with stress. Bradstock et al (1987) for example, found that drink-driving was strongly related to "both binge drinking and chronic heavy alcohol use". However, the role of experience in relation to impaired driving appears to remain equivocal and it seems possible that the underlying reasons for greater impairment at lower BACs may differ in these two groups, and if so, countermeasures should reflect this.

Female drink drivers

Although the problem of drink-driving relates predominantly to males, Popkin Rudisill, Waller & Geissinger (1988) point out that this is very slowly changing. Traditionally male alcohol consumption, both frequency and quantity, has been greater than that of their female counterparts. This is analogous to their vehicle usage, with males tending to drive more often, greater distances, as well as starting to drive earlier than females.

Such divergent patterns have evolved over time, as part of a wider process of social and technological change, resulting in a gradual redefinition of traditional male and female roles, and slowly increasing equality of opportunity for females. One negative by-product of such changes has been an increase in the number of women who drive after drinking. Therefore, while the incidence of alcohol-impaired driving by women is relatively low, it is increasing slowly, despite the fact that the reverse trend has been achieved for men. Popkin (1991) notes that while both the vehicle and alcohol industries have been quick to recognize and exploit a potential market, particularly amongst younger females, research indicating this significant change in female behavioural pattern also suggests a need for development and "implementation of educational, deterrence, enforcement and rehabilitation programs specific to the needs of women to counter their increasing involvement in drink-drive offences".

Concern about accidental injury, as with any other problem, needs to reflect changes over time, to address patterns of social change and their implications. Following a review of the relevant literature, Popkin et al (1988) reported evidence suggestive of cyclical fluctuations in female hormone levels, including those induced by oral contraceptives, which may result in variations in metabolism and elimination of alcohol which could result in variations in the impairing potential of alcohol of which women may be unaware. They point out that, "if it takes less alcohol for women to become legally intoxicated, they need to know it".

Young drink drivers

Young drivers, as a group, have been identified by many studies as being riskier drivers than their older counterparts. They are over-represented in road traffic accidents, particularly those occurring at night and involving alcohol, including accidents resulting in one or more fatalities (Simpson et al, 1982, cited by Bungey & Sutton, 1983). This effect seems to be, not infrequently, associated with a normal, active social life, often involving considerable night driving, as part of the usual pattern of living for the young (Jonah, 1986).

However, Banchevska's (1980) survey of driver opinion in Victoria, Australia, found that young drivers "who are so often involved in alcohol related accidents" considered drink driving to be "the most important cause of accidents". Thus, as a group, young drivers do not appear to be unaware of, or unconcerned about, the accident risks attributable to driving after drinking. This raises such questions as whether or not the belief that drink driving is a major factor in accident causation is a critical factor in decision-making and behavioural response? And if it is not one of the deciding factors, why not?

Several possibilities arise here. Firstly, Banchevska's findings may not generalize to other populations, however the large, randomly-selected sample involved, and the very high response rate argue against this. Secondly, drivers who are deemed responsible for accidents may underestimate risk to a greater degree than those who are not. Thirdly, drivers may contribute considerably to their own accidents without awareness of doing so. They may therefore assume that the risks pertaining to drink-driving involve risks taken by other drivers, while considering their own driving to be safe, particularly in light of their subjective feelings of being fit to drive. The latter two possibilities do not appear to be, necessarily, mutually exclusive.

Phelps (1987) found evidence of risk underestimation in a young, undergraduate driver sample, in which the risk of driving after drinking six or more drinks was estimated as "about 7.5 times the risk of driving sober", whereas the actual risk value, calculated according to impairment and accident data, contrasted starkly at "nearly 100". Unfortunately this study provides little context in which to examine such useful findings. It leaves open to question whether young drivers differ from older drivers in their tendency to underestimate the risks associated with consuming specific quantities of alcohol. It also allows no estimations of the risks which young drivers associate with other aspects of driving, such as speeding or overtaking, by way of comparison.

However it seems quite feasible that drivers, young or otherwise, may be aware of the potentially serious consequences of impaired driving, and even concerned about them, while considering their own contribution to this problem to be negligible, given their subjective feelings of being unimpaired and their assessment of their own abilities. This may be particularly so in light of their being relatively unaware of the precise risks associated with their usual alcohol consumption, and the interactive effects these may have in the event of their feeling angry, upset or fatigued. In other words, drivers may express genuine concern about drink driving, but the relevance of this concern to their own level of alcohol consumption or driving decisions may not have been established in a way which they find meaningful.

Given the information deficits relating to impaired driving identified by numerous studies, accident involvement does seem an unnecessary, as well as a particularly harsh way for the young to learn about driving-related risks, including the impairing effects of alcohol. Furthermore, all drivers may not learn from such experience, and not all will survive to do so. There seem to be other, more constructive and humane means by which such knowledge could be imparted and the issue of relevance addressed,

However risk is not imparted solely by information deficits. Stein & Allen (1986) tested the assumption that impaired drivers may be more inclined to make intentionally risky decisions than non-impaired drivers using a repeated measures design to evaluate any changes in decision-making while subjects were sober and then at various levels of intoxication, with both ascending and descending BACs. The subjects were male, heavy drinkers "defined as being able to reach a peak BAC of 0.15 percent". They found that drivers appeared to act consistently in accordance with perceived risk, i.e. proceeding when risk appeared to be low and stopping at signals when they perceived risk to be high. Evidence of perceptual failures relating to speed and distance judgements were detected. Stein & Allen concluded that impaired driver risk appeared to be a product of misperception, rather than increased daring. Although employment of a small undergraduate sample suggests that restrictions should be applied to the findings accordingly. If risk is being taken, in the main unintentionally, by drink drivers, then this suggests a vital role for dissemination of information, with care being taken that this should be done in a manner which such drivers will find relevant, credible and acceptable.

However even Stein & Allen's small study yielded some evidence of intentionally risky behaviour, and they acknowledged that irresponsible behaviour may be evident in some drivers at high BAC levels. It is also quite possible that intentional risk-taking may be more readily expressed in real as opposed to test situations, the absence of negative affect such as anger, fear and/or upset being more likely in the latter situation. There is also the possibility that young drivers who find themselves dealing with considerable conflict and tending to exhibit risky, acting-out behaviours may be less likely to participate in observational studies, or may simply avoid displaying overtly risky behaviours when their behaviour is open to scrutiny and evaluation.

For those drivers who are inclined to take risks after consuming alcohol, the question arises whether or not they are also more inclined than other drivers to take risks when unimpaired. There seems to be considerable evidence to suggest that intentional risk taking may be a correlate, rather than simply a product of, alcohol consumption, particularly when such consumption tends to be frequent and/or excessive (Donovan, Marlatt & Salzberg, 1983; Bradstock et al, 1987; Jessor, 1987). The role of alcohol may be to potentiate existent tendencies, rather than to initiate them. Where risk appears to be taken intentionally, with at least some awareness of the consequences, then it would seem that the underlying motivation and difficulties need to be explored and carefully evaluated if constructive change is to be effected and perpetuation of the problem avoided.

Lifestyles associated with alcohol-related problems

Jessor (1987) recommends that impaired driving, by the young in particular, should not be evaluated as an isolated behaviour, but rather within the broader context of a risky lifestyle. He found that risky driving was one of a cluster of behaviours that tend to be exhibited by the same individuals, particularly adolescents, such as indulgence in alcohol and other drugs as well as delinquency. He found that "psychosocial risk factors" within Problem Behaviour Theory (PBT) were able to account for "approximately 25% of the variance in risky driving behaviour for both sexes".

This is compatible with Albery's (1991) finding that although significant sex-related differences in "drink-driving perceptions, beliefs and behaviours" could be identified by simple, univariate analyses, sex was not found to be predictive of drink-driving behaviour when interrelationships were accounted for by the more comprehensive, multivariate technique, path analysis. Albery points out that this indicates that "other variables are more important in the prediction of DWI" and should therefore inform countermeasure strategies, such as restriction of opportunity to drink and drive and deterrence measures.

Bradstock, Forman, Binkin, Gentry, Hogelin, Williamson & Trowbridge's (1988) broader perspective argues that treatment and preventative programmes for alcohol-related problems need to take into consideration "sociodemographic and health lifestyle factors that initially predispose an individual to engage in health-risk behaviours". They reason that this will facilitate identification of factors common to the various addictive behaviours which appear to be related to alcohol misuse, thus helping to avoid their recurrence, or substitution with other behaviours which may be an expression of the same underlying problems.

Jessor contends that "problem behaviour - like any other learned behaviour - is functional, purposive, and instrumental toward the attainment of goals". He argues that such behaviour in adolescents can be explained with reference to their "psychological, social, and behavioural characteristics", their social climate and the nature of the situation in which the behaviour is expressed.

He defines problem behaviour as "behaviour that departs from the norms - both legal <u>and</u> social - of the larger society....behaviour that is socially disapproved of by the institutions of authority and that tends to elicit some form of social control response, whether mild reproof, social rejection, or even incarceration". However, it seems that such a definition fails to acknowledge the necessity for youth to question the prevailing values in order to determine and assert their own. On the contrary, it implies that any deviation from the established values may constitute, or at least be perceived by society as constituting, a potential threat or problem with which society has to deal. However, history provides many examples which run counter to such an assumption. Indeed the questioning of prevailing values may be considered an essential component within the evolution of social and legal norms, with the behaviour of the young potentially indicative of the need for change, as well as acting as catalyst for such change.

What does seem harmful to any society is the unquestioning acceptance or rejection of the prevailing mores, with denial of both the rights and the responsibilities they involve. Where either occurs, then an examination of the underlying problems seems to be indicated. However, rejection of prevailing values, "acting out" behaviour, tends to attract more attention. Unfortunately such behaviour is not infrequently misperceived to be the problem in itself, rather than acknowledged as an expression of needs and problems which individuals fail to articulate in other, perhaps more generally acceptable, ways.

Although Jessor acknowledges the influence of the social environment on adolescent behaviour, he seems to specify the problem behaviour as belonging solely to the adolescent, without addressing the issue of society's behaviour towards, and collective responsibility for, the young, i.e. the developmental and social climate within which young people attempt to mature.

An alternative, but nonetheless complementary approach to that of Jessor, taken by Farrow (1987A, 1987B), identified some differences in life circumstances which distinguish groups of adolescents and the ways in which they come into conflict with the legal system. This sheds some light on the problems discussed by Jessor, as well as some of the constraints with which young people have to cope, regardless of their ability to do so, or the degree to which help may be available to them. Farrow's emphasis seems to be on the problems with which young people have to deal which may contribute to their behaviour, rather than simply viewing their behaviour as the problem.

Farrow evaluated differences between three groups of adolescent drivers: driving while intoxicated (DWI) offenders; other (non-DWI) offenders; and non-offenders (high school students). He found that "DWI offenders were more minority represented, were generally not married, had a lower parental income and were more likely to come from divorced or separated family situations and had their licence longer. They were also likely to have a lower grade point average than driving high school students without citations". This suggests that DWI offenders may have less life opportunities available to them and also less resources or support with which to cope or to implement change. Farrow points out that "this characterization fits descriptions of older DWI offenders described in previous research".

Farrow also identified an important impediment to the seeking of constructive alternatives to drinking and driving by adolescents. He found "a common perception on the part of DWI offenders that parents or other significant adult persons should not be relied upon to extract them from dangerous driving situations without undue criticism". Whereas in contrast "students without DWI citations appear to be much more willing to rely on adults to help them out of such situations".

He emphasized that "it is also striking that DWI offenders are much less willing to change their drinking patterns in the face of having to drive, and much less often reduce their alcohol intake in anticipation of driving home after social events. Students without DWI are more willing to accept the question about driving ability from peers than those cited for DWI". This appears to reflect a tendency of DWI offenders to be reliant on alcohol as a means of countering negative affect. And in fact Farrow concluded that his study "confirms previous research suggesting DWI offenders more often resolve conflict and act out aggressively by drinking and/or using the automobile in a dangerous manner ". It seems, therefore, that countermeasure development, if it is to be effective, needs to include consideration of the constraints under which individuals perceive themselves to be, as such perceptions will inform the decision-making of the driver.

Farrow found that DWI offenders were far more reliant on alcohol in social situations than were non-DWI offenders, noting that "increased working hours and other identified stressors were common among DWI offenders who often find themselves driving alone and driving after conflict or driving in a fatigued state". It is perhaps not surprising therefore that DWI offenders were more likely to "drive at high speed" on the open road. However, Farrow's finding that "regardless of respondent group, most adolescent drivers would take personal responsibility in a dangerous driving situation if they were to be cited by the police" is heartening in relation to countermeasure development, suggesting the potential for constructive help to produce positive results.

Waller & Waller's (1987) public health stance takes the issue of communal responsibility further, suggesting a need to examine the factors within society which influence the lives of the young, increasing the likelihood that they will exhibit risky, problem behaviours. They suggest that this would not only be fairer, but also more effective than attributing responsibility solely to the perpetrators of behaviours which provoke social disapproval. Similarly, Mannering et al (1987) point out the potentially interactive influence of attitude change with the various other communal strategies already in place, or currently under consideration such as "server intervention".

The young at risk group may be subjected to considerable stress with limited support or modelling of constructive roles or help to attain values which would be of help in dealing with the many problems which are an integral part of the social milieu and circumstances which they have inherited. While it is necessary to contain, modify and attempt to eradicate such behaviour as persistent drink-driving offences, particularly in light of the potentially violent consequences, it is surely also essential to alleviate the distress which is often demonstrated, albeit inappropriately, by such behaviour.

While the individual, on attaining an age of maturity, must be considered responsible for his or her own actions, natural justice would seem to require that the society which influences, encourages, and constrains the individual's behaviour, must share responsibility and concern for it. If we are to require from individuals, concern about the community as a whole, it seems that, equally, the community should be concerned about the quality of life of all its individual members. Culpability and influence need to be evaluated not only individually, but also collectively, so that responsibility may be facilitated and encouraged at both levels.

Summary: The importance of impairment factors, both individually and in combination within the driving environment, appears to be well established. However, it is the relative importance of impaired driving and other factors such as speeding, anticipation, and attitudes to other road users, which seems especially pertinent to driving safety and accident prevention. Such other factors will therefore be examined within the next two chapters. The interaction of impairment and many such risk factors with experience/exposure, age, sex, accident involvement, but in particular subjective culpability, seem to have received limited attention to date. They are therefore a focus of the current study.

CHAPTER 4: DRIVER ATTITUDES

Preamble: This chapter is concerned with driver attitudes regarding: risk, specific risk-related behaviours such as speeding, self and other perception, and social interaction on the roads. Research into attitudes seems to offer a means of evaluating, understanding, and predicting driver behaviour, facilitating development and implementation of effective accident countermeasures, thus enhancing the safety of all road users. Previous research suggests that accidents are associated with many factors potentially under the voluntary control of drivers. The current study examines drivers' estimations of their personal influence on, and culpability for, accidents, in relation to such factors.

THEORETICAL CONTEXT

Ajzen (1988) defines an attitude as "a disposition to respond favorably or unfavorably to an object, person, institution, or event". Traditionally, attitudes have been discussed in terms of the three components of which they are comprised: cognition, affect, and behaviour, with a focus on the components as either separate entities or essentially parts of a whole (Ajzen, 1988).

Fishbein & Ajzen (1981; Ajzen & Fishbein, 1980) emphasized the strength of the beliefs underlying attitudes and the expected consequences and favourability of their behavioural expression. Fishbein & Ajzen's theory of reasoned action (TRA) holds that human behaviour is essentially based on rational consideration of both available information and the implications of action. The theory proposes that behaviours which are largely under volitional control tend to follow an intention to act which is determined by consideration of both the anticipated consequences of the action and the influence of normative pressure (the opinions of important others), which together determine the degree to which performance of the action is considered favourable. They assert therefore, that to understand behaviour we need to examine the beliefs which motivate it and "since people's beliefs represent the information (be it correct or incorrect) they have about themselves and about the world around them, it follows that their behaviour is ultimately determined by this information" (Ajzen, 1988).

However, as not all behaviours are determined solely, or even primarily, by intention and will, the theory of planned behaviour (TPB) was designed to conceptually incorporate behaviours which are subject to limited volitional control, while retaining the principles of the TRA, thereby extending the original theory. Thus Ajzen concludes that strength of intention tends to be affected by the degree to which attitudes and normative influence favour performance of a behaviour and perceived behavioural control facilitates its occurrence. Such perception is assumed to be influenced by both past experience and anticipated constraints, thus allowing for factors beyond the perceived and/or actual control of the individual, which may affect attempts to perform particular actions. Therefore "to the extent that people have the required opportunities and resources, and intend to perform the behaviour, they should succeed in doing so".

Ajzen suggests that acquisition of the skills and information essential to the successful attainment of particular behavioural goals may be the easiest prerequisites to satisfy, whereas impediments due to the effects of "other factors, such as intense emotions, stress or compulsions" may be less readily countered. Furthermore the achievement of behavioural goals may be either helped or hindered by circumstantial factors. Illustrating the importance of volition, Ajzen points out that new information may effect a change in intention via influence on beliefs, attitudes and/or normative pressures, whereas behavioral goals and immediate intentions may be abandoned, despite motivational factors remaining constant, where "lack of opportunity" suggests they are not viable. He concludes that "lack of opportunity and dependence on others often lead only to temporary changes in intentions", however, in the event of repeated lack of success "more fundamental changes in intentions can be expected".

Drivers' self-perceptions, attitudes to various driving behaviours, and expectations of their potential consequences, have been the subject of many previous studies, with a variety of approaches. The current study examines such factors in relation to age, sex, driving experience, and subjective culpability.

RISK

Accident statistics clearly indicate over-representation of young drivers and males. However the reasons why this should occur, and the precise manner and degree of their contribution, is less clear.

Barjonet (1988) pointed out that men not only have a higher exposure to risk than women, they also consider risk to have more appeal and greater positive value, while having a greater inclination to take risks and a lower perception of threat from accidents. He suggests that risky driving behaviours persist partly because "risk has a value that the traffic system allows to be realized", with the advantages sometimes afforded by such behaviours tending to reinforce them. He points to the influence of socialization and conformity in the moulding of male and female behaviour as well as "the attraction to risk or safety", asserting that "man's positive image in our society is as much related to risk as woman's image is related to safety".

However, although risky driving is more prevalent amongst males, it is not their province exclusively. Baxter et al (1990) for example, found that, not only males, but drivers under the age of 30 of both sexes, were more inclined than the over 30s, to exceed speed limits and to follow the car directly ahead too closely. The tendency to close follow was less pronounced in males over 30 than in younger drivers, however it was a significantly more frequent occurrence than in females over 30.

Awareness of Risk

Finn & Bragg (1986) suggested that the young male's high accident involvement is largely attributable to "excessive risk taking by young drivers" due to a greater willingness to take risks, relative lack of awareness of potential road hazards, or a combination of both. They concluded that "young drivers perceived their own chances of an accident to be significantly less than those of both their peers and older males, while older male drivers saw their chances of accident involvement as comparable to those of their male peers and less than those of young male drivers". They noted that this supports the hypothesis that failure to perceive particular driving situations as hazardous, contributes to some extent to the over-involvement of young male drivers in road accidents.

Matthews & Moran's (1986) results both supported and qualified the above findings, suggesting that, whereas young male drivers tended to make higher estimates of driving risk in general than did older drivers, specific situations requiring very fast, skilful driver responses usually prompted lower estimates of risk.

They noted that by comparison with older drivers, young drivers tend to have greater confidence in their driving abilities. The resultant effects give rise to considerable concern: "a notable dissociation between perceived and actual ability and...a tendency to view themselves as immune from the effects of higher levels of risk, which they are prepared to ascribe to their peers but not to themselves". The advantages of fast reactions and optimism characteristic of the young may, ironically, contribute to the risks which a significant proportion of young drivers, albeit for the most part inadvertently, expose themselves. Contrasting the risk perceptions of young and older males allows valuable, but restricted, insight. However a fuller understanding of young male risk may be offered by a multidimensional approach, i.e. contrasting the target, at-risk group with other age, sex, and accident groups, with particular emphasis perhaps on their less risky peers.

Sivak et al (1990), examining different aspects of risk cross-culturally, i.e. risk perception, risk taking (with simulated driving tasks), and self assessment, found that their American respondents reported the lowest risk perceptions, accepted the smallest safety margins together with the Spaniards, and were most inclined to rate their driving positively. This may reflect a greater propensity for risk taking, greater confidence in driving ability, warranted or otherwise, and/or generally good driving conditions. However without reference to accident history, or the real consequences of accepting small safety margins in any situation, this question is difficult to resolve.

Age differences, discussed in relation to young (18-21 years), middle-aged (35-45 years) and old (65-75 years) drivers, revealed that, regardless of country, younger drivers tended to have the lowest risk perceptions. Although the likelihood of successful manoeuvre completion was not found to be age-related, younger drivers were more inclined to attempt to cross intersections and to allow smaller gaps.

A linear relationship seemed evident in relation to age effects for the majority (12 out of 14) of the self assessment items, with older drivers tending to rate themselves most positively, and age and positive ratings both decreasing together. However after controlling for driving experience, only wisdom, in absolute and relative terms, and consideration, in relative terms, still exhibited significant age effects.

Sivak et al identified cross-cultural distinctions between driving-risk-related behaviours in Spain, the USA, Brazil and West Germany, regarding "perceived risk, target risk-level of performance on a simulated intersection crossing task, and driver self-assessment", whereas "age and sex effects" revealed fairly stable patterns across the participating cultures. Notably across all four countries surveyed, "younger and male subjects tended to have smaller safety margins on the intersection-crossing task".

Although such studies allow useful insights into social and cultural patterns of risk taking, they do not address the issue of accident-involvement. Clay (1987), on the other hand, while omitting evaluation of age/sex patterns relating to driver risk, found that accident-involved drivers attributed greater importance to lack of anticipation than did a non-accident group, but less importance to impairment due to alcohol, fatigue, and stress in relation to accident risk. This was compatible with the slightly negative bias towards "other" drivers found in this study, which could perhaps be explained in terms of observer attributional bias and the salience of "others'" behaviour (Jones & Nisbett, 1972; Jones, 1976; Hewstone, 1989) in the event of accident involvement.

Thus it seems possible to obtain information pertinent to safety from studies which incorporate groups defined according to social, cultural, and accident groups. However, as there may be considerable variance in drivers' contributions to accident occurrence, the current study seeks to evaluate the relative importance, not only of the above factors, albeit with a minor cross-cultural focus, but also to distinguish between accident-involvement per se, and subjective culpability.

Reason, Manstead, Stradling, Baxter & Campbell (1990) approached the problem of accident risk with a focus on the degree to which behaviours which may contribute to accidents differ according to intent. They found that drivers could be readily distinguished according to age and sex on the basis of the frequency with which they reported committing various traffic violations, dangerous errors, or fairly trivial slips. The three distinct factors they identified, "violations, dangerous errors, and relatively harmless lapses" accounted for "33% of the total variance", of which Factor 1, relating to mostly intentional and dangerous violations, accounted for 22.6%. Notably, "the extent to which mood was perceived as having an adverse effect on driving performance was a predictor of all three factors" and seems to qualify the issue of intent for all three (Ajzen, 1988). This seems to have considerable implications for accident prevention given the influence on driver stress by factors external to the driving situation (Gulian et al, 1989), and the finding by numerous studies that life stress is strongly associated with accidents, including road traffic accidents (ref. Ch.3 -Stress).

Reason et al found that violations were reported more frequently by men, whereas women reported significantly more harmless lapses. Violations became less prevalent with age, whereas errors did not. They concluded therefore that errors and violations seem to be "mediated by different psychological mechanisms", the former being explicable in terms of the cognitive processes of the individual, and the latter, social and motivational issues relating to behavioural norms, laws etc. They describe slips as unplanned, or unintentional actions; mistakes as errors of judgement and/or goal selection process, or the means of goal approach, or both; and violations as intentional but "not necessarily reprehensible...deviations" from safety norms, formal or informal.

Violations were found to be associated with deviation from the law, youth, high annual mileage, and individuals whose driving was more affected by mood, and were prevalent amongst males and drivers who rated themselves as "better drivers". It would be of interest to examine the degree to which this reflects a realistic appraisal of skill or relative lack of awareness of risk in relation to the consequences of behaviour, i.e. culpable accident history. Being affected by mood was the most significant predictor of dangerous errors, which was also associated with low motorway usage and driver self -ratings of being relatively unsafe and accident-prone. Similarly, "silly slips and lapses" were characterized by a negative effect of mood on driving, and self-reported error-proneness, which unlike the other factors was more prevalent amongst women.

They found that "women of all ages were more evident among those low on both dangerous errors and violations, particularly in the mid-30's age range. For both sexes, representation in this 'safe' group increased with age, the trend being more evident among men than women". Women and older drivers were also more evident amongst those low on violations but high on errors. Conversely men and the young were predominant amongst drivers exhibiting high violations/high errors and high violations/low errors. However, although young and male drivers admit to committing dangerous errors, but especially violations, far more frequently than women and older drivers, they may be oblivious of the degree to which their behaviour puts them at risk.

Reason et al suggest that the deviant behaviours and dangerous errors of males may reflect overengagement with driving, whereas women's driving errors suggest their being "absent-minded" or distracted "by things other than the driving task". Noting that those "who report the most violations also tend to rate themselves as particularly skilful drivers" they speculate on whether such drivers may "believe that a good driver is someone who can 'bend the rules'" or perhaps consider themselves "skilful enough to take risks" or consider their actions "risky only for 'less skilful' drivers" or infer that they must be "good drivers because they get away with what they do". Given the importance of violations in this study and the prevalence of violations amongst young males, a subsequent study addressed the issue of underlying motivation

Parker, Manstead, Stradling & Reason (1992) employed Ajzen's theory of planned behaviour (TPB) to explore the underlying motivation to commit driving violations. They measured the attitudes and intentions of 881 drivers towards the commital of four driving violations, using an interview format involving "four standardised, hypothetical scenarios" which "depicted drink-driving, speeding, close following, and dangerous overtaking." They found that drivers could be easily distinguished according to age and sex, but to a considerably lesser degree according to accident involvement within the previous three years, on the basis of their beliefs about the committal of four hypothetically presented violations, their anticipated consequences of committal, estimation of approval or disapproval of committal by their significant others, and their intentions to commit or avoid committal of the violations.

Younger drivers, and to a lesser degree males in general, emerge from this study as being the most vulnerable to accident risk on the basis of their driving behaviours, however with limited appreciation that such behaviours may endanger themselves or anyone else. Parker et al concluded "the general picture that emerges is that the younger drivers are less aware of or concerned with the negative outcomes (for themselves or others) of violations; are more attuned to the potentially positive outcomes, as compared to older drivers; see their friends and intimates as less likely to expect them not to commit violations; and find it difficult to resist commiting the violations....there was a general trend for males to evaluate the outcomes of the violations less negatively than females did, to report that they had less control over committing the violations (especially drink-driving) than females did, and to have significantly weaker intentions not to commit the violations. At the level of individual measures, males tended to see negative outcomes (being stopped and fined; having an accident) as less likely to ensue
from speeding than did females, to evaluate putting the lives of pedestrians at risk through speeding less negatively than did females, and to see male friends as having weaker negative expectations regarding speeding than females' perceptions of their female friends' expectations. Thus, the general pattern for males is a weaker echo of the pattern for younger drivers: less awareness of or concern with the negative outcomes of violations, especially speeding, and greater difficulty in resisting commission of the violations"

However in relation to accident-involvement the only differences related to "four normative belief items". By comparison with "respondents who were accident-involved during the previous three years...those who were accident-free over that period... believed that significant others would be less likely to expect them to commit the violations...The exception to this general trend concerned beliefs about the expectations of the 'typical young male driver'with regard to close following, where the accident-free drivers were **more** likely than the accident-involved to see this referent as expecting them to drive close to the car in front...the findings suggest that those who are accident-involved may see others as having less negative expectations with respect to the commission of violations".

In light of the wealth of detail regarding the risks to which young males in particular expose themselves, albeit largely unwittingly, and the impression that this may be largely a product of social conditioning, the distinctions regarding accident involvement seem rather weak, possibly because their criterion of accident involvement during the past three years fails to unconfound accident culpability from innocent involvement. Within the current study it is to hoped that addressing the issue of culpability, albeit subjective culpability, will allow sharper distinctions to be drawn within the accident groups.

West, Elander & French (1993), found evidence of safety being compromised by "mild social deviance" in the form of self-interest taking precedence over shared interest within the driving situation, with such social deviance being "predictive of accident risk". In accordance with their social motivation questionnaire (SMQ), they reported that "the 25 per cent of highest scorers on the SMQ reported more than four times the number of accidents than did the 25 per cent of lowest scores" They noted that "the model that emerged was one in which the number of accidents was independently associated with faster driving speed, higher annual mileage and higher levels of mild social deviance. Faster driving speed was in turn a function of lower thoroughness, higher social deviance and higher annual mileage". They describe "low thoroughness" as being characterized by "a tendency not to plan ahead, not to approach decision making in a logical and systematic manner and to make decisions without considering the costs and benefits of the alternative courses of action". They noted that males scored higher than females in social deviance.

West et al concluded that "this study has presented evidence that a new scale of social deviance, which focused on motivation to pursue self-interest at the expense of others, was associated with raised traffic accident risk. This was partly mediated by faster driving. The most likely explanation for the link between social deviance and faster driving was considered to be the subordination of possible adverse consequences of an accident to immediate journey-related motives. Social deviance may also be related to accident risk through increased tendency to engage in deviant driving styles".

These findings appear consistent with those of Reason et al and Parker et al with regard to the prevalence of socially deviant behaviour of males which places themselves and others at greater risk of accident involvement. However, any behaviour which is prevalent within large sections of many communities, and within successive generations of such communities, must raise questions about the nature and consequences of social conditioning. Although this issue is beyond the scope of the current study, it is nonetheless an issue which the premature death or serious injury of many young people, young men in particular, suggests needs to be addressed within the broader context of accident analysis, not necessarily confined to road accidents.

Driver Motivation

Wilde's (1986) risk homeostasis theory seems in essence to suggest that attempts to reduce risk without addressing the problem of driver motivation and preferred level of risk will be ineffective. Within this context, Lund & O'Neill (1986) examined the hypothesis that increased car design safety may be offset by a greater propensity for risk. They point out, however, that most car designs offer the driver no "immediate feedback" on which to base any decision to take greater risk, and should therefore not be influential. Furthermore, whereas greater perceived driver vulnerability seems to encourage greater caution, the converse will not necessarily apply.

There are logical advantages to reducing vulnerability as a driver which do not seem to apply to increasing it. The tendency of young drivers to take risks seems to be more closely related to a sense of urgency, and a desire to test and demonstrate judgement, skill, and daring, especially in comparison with peers, than it does to increase the risk of damage to person or vehicle. This is suggested by the greater pleasure experienced by young drivers in general, by comparison with older drivers, in travelling fast (Quenault, Golby & Pryer, 1968).

Wilde's (1986) emphasis on motivation, in keeping with that of many other researchers, is of no small importance. However this does not seem to preclude the possibility of allowing motivational and non-motivational strategies to coexist and complement one another. If the argument that risky practices cannot be effectively countered by safety measures which fail to influence motivation, is tenable, this does not explain why such practices should necessarily migrate to some other time or place within the transport system. Wilde, in fact, explicitly acknowledges that risk expression is not necessarily confined to the driving environment, but seems to occur in other spheres of the lives of drivers who exhibit risky practices. Thus, a broad perspective seems to be required to effectively address the issue of accident risk and any related problems in a comprehensive and integrated fashion, reflecting the complex interrelationships between the many and various spheres of people's lives, of which driving is but one.

Blomquist (1986) raises the important issue of drivers' diverse goals, many of which are not safety oriented. He notes that because of "time, energy and money" constraints, people must make choices about their goals and the means by which they may be achieved. He suggests that "the individual will seek a utility-maximizing set of goals and means within the limits of the personal resources constraint", which implicitly suggests at least some awareness of the many and various pressures and constraints with which people may have to deal, as drivers, no less than in other roles. However he contends that "drivers have sufficient information to make decisions" that they "realize that accident severity increases with speed, tyres affect handling, and road conditions affect stopping". He further assumes that "drivers are competent in their decision making in that they can process information even when uncertainty is involved".

Thus Blomquist appears to view risk taking as being essentially a product of rational selection following consideration of the factors involved in a trade-off between utility and safety. However, some of the assumptions underlying his model seem to be open to challenge on several counts. Firstly, he concedes that drivers may be subject to multiple constraints such as time, energy and finance. While such constraints may encourage rational and informed decisions to take risks due to utility considerations, equally they may be interpreted as constituting stress potential compounded by fatigue.

Secondly, as discussed in the preceding chapters (Ch 3 in particular), there is considerable evidence of information deficits and their role in driver risk. A rational decision does not seem readily equated with one based on inadequate knowledge, misinformation, or defensive refusal to accept facts. And perhaps most importantly, the assertion that drivers' competence to make decisions is not diminished by uncertainty, seems to run counter to the view that stress susceptibility tends to induce intolerance of ambiguity, or difficulty coping with uncertainty, and that such vulnerability may be aroused and/or potentiated by stress (Folkman et al, 1981).

Financial constraints, with the pervasive implications they can have for people's lives, particularly in a persistently subdued economic climate, appear to play no small part in the stress to which drivers acknowledge themselves to be subject (Gulian et al, 1989). Similarly time and energy constraints may have wide implications for the degree of control which people retain over their lives, and any potentially resultant stress. While such considerations do not necessarily argue against rational decision-making, they do suggest that emotional factors may qualify this process (Ajzen, 1988), which accident countermeasures may therefore need to reflect.

Wilde (1986) asserts the possibility of a relationship between accident-involvement on the roads, in other spheres of life, and lifestyle-related ill-health, which may reduce the quality of life, or even threaten its premature cessation. Pointing out the considerable individual variation in optimum arousal level which may be experienced with comfort, Wilde notes the relationship between arousal and propensity for taking risks, inferring that attempts to reduce risk-taking in one sphere may simply increase the likelihood of risk-taking in another. He therefore suggests that some incentive may be required to motivate those groups of people who are inclined to take risks, to encourage less risky behaviours and healthier lifestyles.

However, the relationships identified by Wilde and various other researchers, may not involve an essentially motivational problem, in the sense of lack of concern about, or even enjoyment of risk-taking. To reiterate points made in relation to young drivers (Ch.2) and stress (Ch.3), risk-taking may illustrate one of the means, appropriate or otherwise, by which some people attempt to cope with their life circumstances, including reducing negative affect or feelings of discomfort, reducing the constraints to which they feel themselves to be subject, and/or responding to a perceived lack of control within various spheres of their lives, including insufficient challenge or direction which may be experienced and articulated simply as boredom.

The relationship between negative life events/circumstances and risky lifestyle strongly suggested by numerous studies (refer Ch.3), together with identification of specific risk factors such as binge drinking (and then driving) and/or speeding to dissipate negative affect, do not appear to unequivocally support Wilde's and Blomquist's assumption of a rational selection of preferred risk level. Even where such risk-tasking can be shown to be intentional, this does not seem to diminish the issue of compulsion.

After all, risk taking in the extreme, i.e suicide, may involve an intentional and volitional act, but it does seem to be widely acknowledged as being made under duress, i.e. where considerable choice constraints are perceived. It is not generally considered to be a rationally preferred choice except in the narrowest sense of appearing to be the least undesirable course of action. The compulsive elements of risk-taking need to be examined and the underlying problems addressed.

Beirness & Simpson (1990), reporting findings from the initial two years of a longitudinal, prospective study involving students aged 13 to 19 years, identified "high-risk lifestyles that are predictive of subsequent crash involvement". Confirming the predictive value of Jessor's Problem Behaviour Theory, they found that "a variety of social, psychological, and behavioural factors" allow distinction between accident-involved and accident-free drivers, with young accident-involved drivers exhibiting several other very risky and troublesome behaviours.

Most importantly, they were able to demonstrate that "the distinguishing characteristics were...present prior to crash involvement", that such characteristics tended to become more pronounced in the accident group over time, usually becoming more deviant, such as drinking more alcohol, more frequently during the span of one academic year. Thus "large changes in key psychosocial variables" may allow, not only identification, but prediction of which young drivers are most likely to have accidents in the absence of effective preventative strategies.

The ability to distinguish between groups of young people on the basis of their likelihood of accident involvement, in accordance with psychosocial and health-related factors, supports Beirness & Simpson's suggestion that "young driver crash involvement represents part of a more general syndrome of adolescent problem behaviour that is also manifest outside the driving situation. Young people who engage in risky driving also tend to engage in a variety of other health and safety-compromising activities. This pattern of behaviour may prove to be useful in identifying youth at high risk of crash involvement even prior to the age of driver licensing". It also seems to suggest a need to address the underlying causes of the problems faced by the young, and the potential efficacy of co-operative, multidisciplinary efforts to this end. One risky behaviour frequently associated with young drivers is speeding.

SPEED

There is considerable evidence that speeding behaviours are not infrequently associated with accidents which may have serious, or even fatal, consequences. Haworth (1988) for example, noted that speed was identified as a contributory factor in 22% of 186 accident fatalities involving trucks, according to Victorian Coroners' reports for 1984-1986.

Several studies evaluated the effects of increasing the speed limit (from 55 to 65 miles per hour in the USA), assessing the consequences of a limited return of the speed limit to that which had been operative prior to the oil crisis which necessitated reduction in fuel consumption. Despite some regional or segmental disparity, the overwhelming consensus of findings was that increasing the speed limit from 55 to 65 mph was concurrent with an increase in road accident casualties, including both serious injury and fatalities.

On roads where the legal limit was raised to 65 mph, Garber & Gadirau (1988) noted a "39.8% increase in serious injuries and a 25.4% increase in moderate injuries" while the median effect in rural interstate fatalities in 40 US states was an increase of about 15%. Similarly, Wagenaar, Streff & Schultz (1990) reported "significant increases in casualties...including a 19.2% increase in fatalities, a 39.8% increase in serious injuries, and a 25.4% increase in moderate injuries".

However casualties were not confined to the roads which were directly affected by the 65 mph limit. An increase in fatalities on 55 mph limited access freeways suggested spillover effects attributable to the speed limit increase affecting portions of the freeways on which the limit remained unchanged (Wagenaar et al, 1990). Spillover effects on roads retaining the 55 mph limit were also strongly suggested by the increase in fatalities reported on limited access highways (Garber & Gadirau, 1988) and on "rural noninterstates" (Garber & Graham, 1990).

The British Parliamentary Advisory Council for Transport Safety (PACTS), (1991) points out that it is acknowledged world-wide that "vehicle speeds and accidents" are closely associated and that "accidents are likely to increase in numbers and severity as the speeds of vehicles involved in them increase". Illustrating the potential dangers associated with speed in everyday encounters on the roads, PACTS emphasizes that "the chances of a pedestrian being killed when struck by a vehicle rise dramatically with an increase in the impact speed. At 20 mph very few pedestrians are killed, and most injuries are slight...at 30 mph many pedestrians are seriously injured, and half are killed...at 50 mph most pedestrians are killed". In rural areas, where higher speed limits apply "accidents tend to be more severe...and twice as many car occupant casualties sustain fatal or serious injuries than in urban areas". However, the speed/risk relationship is similar to that involving pedestrian/vehicle encounters on urban roads, i.e. "the higher the impact speed the greater the likelihood of car occupants sustaining fatal injuries." (PACTS, 1991).

Speeding has been found to be associated with a variety of factors, suggesting a need to ascertain the implications of such associations. Wasielewski (1984) identified greater frequency of higher speeds in younger drivers, solo drivers, those in new and heavier cars, and drivers with a history of accidents and/or traffic violations. Baxter et al (1990) found, similarly, that drivers under 30 years tend to exceed the legal limits while allowing insufficient stopping space between vehicles. Passengers who were aged over

30, or in the presence of an alcohol impaired driver, were associated with an increase in safety, although reduced signalling behaviour suggests some loss of attention due to in-car distraction.

Although there is ample evidence of risk being associated with speeding behaviours, acknowledgement of this by drivers in general, and high-risk groups in particular, is far from apparent. It is a matter of some concern that not only do young drivers appear to exhibit risky speeding behaviours, they also tend to attribute less importance to speed as a causative factor in road traffic accidents (Jonah & Dawson, 1982, cited by Jonah, 1986), suggesting that they are less aware of the associated risks and/or that they consider the benefits they identify with speed to outweigh them. However, there may be many speed-related hazards of which young and novice drivers are relatively unaware.

PACTS (1991) concluded that "many drivers tend to have a complacent attitude towards fast driving that tends to be reinforced by a large number of outside pressures, especially the use of advertising images and language which link high speed to the desirability of driving particular models. In several studies, drivers rated speed offences as minor and unlikely to cause accidents. Public perceptions of the effects of speeding need to be enhanced if widespread support for the implementation of a range of proven measures is to be secured".

Public Perceptions of Speeding Behaviours

The need to treat vehicle speeds with due respect, affirmed by both accident statistics and those who help drivers to achieve an advanced level of expertise and awareness (HMSO London, Police Drivers' Manual, 1990), seems to be implictly acknowledged by experienced drivers, females and people over 40 years, who appear to consider speed "a major concern". Similarly rural, as compared to city dwellers, were considerably more inclined to cite speed "as the main reason behind the majority of fatal road crashes in the country" (McNair, 1988). McNair's triple-stage, telephone survey of community attitudes to road safety, conducted Australia-wide over three consecutive years (1986-1988), noted that speed was considered by 27% of participants to be a major cause of road accidents in general, and judged largely responsible for the majority of rural road fatalities by 49%. However, a notably higher proportion, 58%, thought speed was "by far the main reason for motorists being stopped by police". Thus it seems that drivers may be more aware of the risks of legal apprehension than of accident involvement as a likely consequence of speeding.

Although 44% of drivers claimed general compliance with legal speed limits, the majority of drivers admitted selecting speeds according to beliefs about safety rather than legality. Those reporting compliance with the legal limits included 52% of the women and 59% of drivers over 60 years. Those most likely to select speeds according to their own awareness of safety included drivers who were: "licensed to drive vehicles other than cars (61%)...better educated (61%)" and white collar workers (64%). The tendency to abide by legal speed limits was found to increase with age, while 48% of men and 41% of women reported that they "exceed the speed limit".

Amongst those who admitted driving according to their own evaluation of safety rather than statutory speed limits, exceeding the speed limit (45%) was more prevalent than driving below it (19%), with a more flexible approach suggested by the 36% who claimed to vary their speed according to the conditions. As McNair points out, "this suggests that, in favourable conditions, some 80% of these self-regulating drivers drive above the legal speed limit", thus amongst then current licensees, they noted that "43% drive at the legal speed limit, 46% drive faster than the limit (in favourable conditions) and 10% drive slower than the legal speed limit".

McNair reported that "the majority of drivers claim they drive at a speed considered safe (irrespective of the legal speed limit), which for most is at a speed faster than the legal limit", while "one in five people have been in a recent crash as a driver, passenger or other road user". It is therefore of some concern that "those who have been in a recent road crash are more likely to claim they drive faster than the legal limit (57%)". Similarly, Clay (1987) found that significantly greater self-reported speeding tendencies distinguished accident from non-accident drivers, although no such difference was detected in the importance they attributed to excess speed as a causal factor in accidents. Noting that "crashes were more common among males, young people (under 25 years) and newly licensed drivers", McNair suggested that "as these sub groups were also the most likely to drive at a speed faster than the legal limit, the need for directing media awareness campaigns at young male drivers is still evident".

The prevalence of excessive speeding behaviours, which both necessitates and compromises safety campaigns targetting young males, is further supported by an observational study conducted in Israel by Ben-David et al (1990) who found that "there are very large numbers of drivers, both professional and private, who are driving at excessive speeds, or at short headways, or both, for a large fraction of the time". A reduced ability to cope effectively with contingencies makes the combination of high speed and short gaps potentially lethal.

Thus it appears that many drivers exceed the legal speed limits while assuming that to do so is safe. Furthermore, neither the tendency to speed nor the assumption of safety seem to be diminished by accident involvement, suggesting that drivers may tend to attribute causality to factors other than their own speeding behaviour, thereby raising the question of what speeding drivers do attribute accident causation to. While speeding may not necessarily compromise safety, many drivers appear to be unaware that they drive at speeds which are inappropriate for their personal level of skill and judgment in relation to the prevailing conditions.

Raising a major problem relating to speed, of which young, inexperienced drivers may be relatively unaware, PACTS notes that "the higher the speeds of vehicles the less accurately road users are able to estimate them. The research has shown: drivers seriously underestimate their speeds when slowing down after a period of high speed driving and tend to travel faster than other drivers when they move to connecting roads with lower speed limits...Pedestrians' judgement of vehicle speeds deteriorates progressively as speed increases...Children have a lesser ability than adults to assess speeds...Older road users assess speeds incorrectly often because of poor hearing, failing eyesight, and slower reactions and movements".

Driver Awareness and Adaptability

Speed has been well established as a major accident risk factor, however, as emphasized in the advanced drivers' guide (HMSO London, Police Drivers' Manual, 1990), it is inappropriate speed, rather than speed per se, which is dangerous. Safety may be compromised by speed which is inappropriate for the prevailing conditions, or which exceeds the individual driver's capacity to control the vehicle in relation to the changing demands of the environment, including interaction with other road users.

Drivers are advised that speed which is safe and appropriate for an experienced driver may be dangerous and inappropriate for a novice. Furthermore, the onset of fatigue, whether due to high attentional demands associated with sustained high speed travel or any other cause, may render an otherwise appropriate speed unsafe. Similarly, it is important to recognize that legal speed limits can only provide guidance as to what is considered the maximum safe speed for the majority of drivers in fairly optimum driving conditions. It does not give drivers licence to drive at the maximum legal speed without due regard for the prevailing conditions, their personal level of expertise, or current capabilities which may be reduced e.g. by illness, fatigue, stress, or alcohol. Neither can legal speed limits allow for the capabilities of the particular vehicle being driven, or the degree to which the driver is familiar with them. As the Police Drivers' Manual (PDM) emphasizes, "the onus is always on the driver to select a speed appropriate to the conditions" because the maximum speed allowed by law will often be "too fast for safety".

Drivers are cautioned never to exceed speeds at which they feel "perfectly safe and comfortable in any given situation", because, whereas at 30 mph it is possible to correct "a minor driving error...at 70 mph the same error can have disastrous consequences", i.e. the greater the speed the less the potential to cope effectively with contingencies.

The PDM also emphasized that "speed must be governed at all times by the amount of road that can be seen to be clear, therefore high speeds are safe only when a clear view of the road ahead is possible for a considerable distance". However, "many people drive too fast where hazards exist because they do not recognise actual or potential danger and in the belief that they will be able to stop whatever happens". Drivers need to be aware, not only of the distance required to stop at any given speed, but also that in the event of a potential conflict it is necessary to take into consideration the "combined speeds" of the vehicles involved and the fact that, together they may halve the "distance available for braking".

One of the objectives of the current research is to examine the relationship between speeding and other potentially risky behaviours, the causal importance attributed to such behaviours, and drivers' estimations of their own culpability for any accident involvement. Two potentially risky behaviours which are not infrequently related to speeding, close following and overtaking, will be briefly discussed next.

CLOSE FOLLOWING

Evans & Wasielewski's (1983) study, involving 12,000 observations, found that "close following behaviour in freeway traffic" was clearly associated with having a history of road accidents and violations, being young, being male, travelling alone, and driving without seatbelts. They also found that drivers of "newer cars and cars of intermediate mass (1600-1900 Kg)" were often found to be close following. Evans & Wasielewski concluded that their study "demonstrates that several classes of drivers known to have high accident involvement do differ in everyday driving behaviour from other drivers. It thus serves to focus attention on the role of the driver, and particularly on attitudinal factors related to risk, in accident causation".

The prevalence of close following behaviour was revealed by another observational study (Edwards, 1986), which examined the gap allowed by more than 1700 drivers in traffic, randomly selected from 10,000 vehicles videotaped while moving on the M1 motorway. Edwards found that 47% of the vehicles observed allowed a time gap of less than 2 seconds between themselves and the vehicle directly ahead. Thus almost half of a large subsample of drivers, drawn randomly from a very large sample, exhibited close following behaviour involving less than the 2 second gap which is recommended as safe, including 12.5% who allowed less than 1 second. Furthermore, the above figures include 25% of HGVs allowing less than 2 seconds, of which 9% allowed less than a 1 second gap; and 32% of articulated HGVs following with less than a 2 second gap, of which 11% involved a gap of less than 1 second.

The above findings are particularly sobering in light of the fact that not only does close following behaviour which contravenes the recommended safe gap appear to be prevalent, but there is evidence to suggest that the recommended safe gap is also insufficient. Edwards points out "that there is a need for a reassessment of the presently recommended following distances which should include a factor based on the differential braking characteristics of HGVs and cars", thus highlighting the degree to which risky following behaviour seems to occur.

OVERTAKING

Illegal overtaking is widely acknowledged to be a major contributory factor in injury accidents. The frequency of risky overtaking behaviour is suggested by the findings of Wilson & Best (1982) that, of 400 overtaking manoeuvres observed, fourteen percent involved drivers allowing too small a gap for safe completion of the manoeuvre.

A comprehensive two-part study concerned with overtaking conducted by Harris (1987), involved observation of overtaking behaviour in a natural on-road setting in "five different types of site with four different properties", graduating from low risk (on a straight stretch of road with no sight restrictions) to high risk (in a junction with a vehicle present, with obvious conflict potential). A questionnaire study which complemented this was essentially concerned with gauging drivers' awareness of risk relating to overtaking. Both studies involved large samples (n=over 4500, n=778).

Harris concluded that a discrepancy existed between drivers' perceptions of safe opportunities for overtaking and the actual risk involved in their manoeuvres, with such misperception constituting a major risk factor. Drivers of less powerful (lower power to weight ratio) vehicles were found to be over-represented in "near accidents". This seems to suggest lack of awareness, or acceptance, of actual vehicle potential.

A further problem, creation of a "third lane" for overtaking at junctions, was found to occur despite awareness of the risks involved. "Professional drivers" in particular were observed to overtake in this manner at junctions. The latter manoeuvre involved high risk, however drivers who elected to perform such behaviours were not found to be significantly less aware of the risks than those who negotiated the junction in a legitimate manner.

Given the drivers' level of awareness and the low levels of enforcement on the roads, Harris recommended an engineering solution to the problem, i.e. a physical obstruction to prevent third lane creation, while conceding that the benefits to be obtained may be tempered somewhat by risks relating to the barrier structure. Such a solution may offer considerable immediate relief of the problem, while identification of 'professional drivers' as a target group seems of no small importance, suggesting that evaluation of factors which encourage such risks, perhaps time and financial constraints, may facilitate the easing of pressure and development of alternative strategies.

Harris identified another risky overtaking strategy involving deliberate risk-taking in drivers who overtake as they pass beyond the speed restrictions of a town. Thus there is evidence that drivers may expose themselves to considerable risk, inadvertently or deliberately, when overtaking. The question arises therefore of how they analyse any subsequent accident involvement. Acceptance of their own contribution to any ensuing accident may perhaps lead to increased awareness of risk and development of active accident avoidance strategies. Alternatively if culpability is attributed primarily to the 'other driver', the arousal of anger and hostility may result, rather than safer overtaking practices. To address such issues, relationships between risk awareness, general driving behaviour tendencies, and accident culpability are examined in the current research. The implications for social interaction on the roads seem to be considerable, therefore an analysis of how drivers view themselves in relation to others on the roads seems particularly relevant.

PERCEPTION OF SELF AND OTHER ROAD USERS

Comparative Driver Self-Perception

A considerable body of research seems to suggest that there is a general tendency amongst drivers in many countries to consider themselves to be more skilled, less risky, and less likely to be accident involved than the general driver population. For example, the majority of subjects in Svenson's (1981) multicultural study conducted in the United States and Sweden, considered themselves to be "more skilful and less risky than the average driver in each group respectively". Similarly McCormick, Walkey & Green (1986) reported that "up to 80%" of 178 New Zealand drivers rated themselves as being "above average on a number of important characteristics", although below the "very good driver" category. These findings are consistent with the conclusions of Sivak, Soler & Trankle (1989C) in their cross-cultural study, that a majority of US, Spanish and West German drivers "rated themselves positively on all driving-related scales studied".

Similarly Goszczynska & Roslan (1989) found that a majority of drivers in their sample in Warsaw, Poland tended to rate their own driving abilities more positively than those of the "average" driver, within samples of both "amateur" (general driver population) and professional (taxi) drivers. The level of positive ratings was found to increase in accordance with experience in both samples, with some evidence of a decline with advancing age, particularly for less experienced drivers.

Goszczynska & Roslan, in consultation with Svenson, made a cross-cultural comparison between their own (general population) findings and those of Svenson. They found that 69% of Swedish drivers rated their driver skills as being above average, by comparison with 77% and 93% respectively for Poland and America, suggesting the potential for both cultural disparities and similarities to yield information of value for road safety strategies.

They also raise the interesting point that "the education system in these two European countries (especially in Sweden) attaches little importance to rivalry with others and to individual success". Although anything more than a mention of this issue is beyond the scope of the current thesis, an awareness of the interdependence of all social beings seems pertinent to the driving situation, and the relative emphasis within different cultures on competitiveness/co-operation and independence/inter-dependence, does seem relevant to the "process by which the individual acquires knowledge about himself" and develops attitudes towards others (Goszczynska & Roslan,1989).

While an assumption of above average ability and below average risk and accident propensity contains logical consistency, obviously it cannot reflect reality within a considerable majority of drivers. The practical implications of a tendency to make more positive estimations of one's personal abilities, qualities and invulnerability as compared to drivers in general suggest a need for concern, as identified by the findings of a small but carefully designed study by Preston & Harris (1965). They reported that fifty drivers "whose driving involved them in accidents serious enough to require hospitalization" rated their driving performance similarly to the matched non-accident control group, despite their having a "higher incidence of previous traffic violations".

More importantly, Preston & Harris reported a marked discrepancy between the drivers' own estimations of their accident liability as well as their "driving competence at the time of the accidents" and those same evaluations according to police records. A fuller discussion of the findings and implications of the above study will be made in the next chapter (Ch.5) where is has particular relevance.

De Joy (1989) considered optimism bias to be a problem in relation to assumed driving competence and accident risk, which he suggested appears to arise "because people persistently overestimate the degree of control that they have over events". He pointed out that this phenomenon is not confined to the activity of driving.

In light of Preston & Harris's findings, it seems that within the driving context at least, optimism may tend to be the rule rather than the exception, even in the face of personal experience involving negative consequences and culpability, suggesting that denial or external attribution of responsibility may have occurred.

De Joy reported that his study, like earlier ones, found that "substantial optimism was...evident for the global measures of driving safety, driving skill, and accident likelihood". However, drivers' optimism relating to the latter, "over which they have limited direct control" was the least pronounced. De Joy observed that his finding that optimism appears to increase with age is contrary to the findings of earlier studies such as Matthews & Moran (1986) and Finn & Bragg (1986). Such a discrepancy may be due, at least in part, to the fact that different research instruments were employed to measure various aspects of drivers' self assessment of driving performance and ability, which although similar, may not be directly comparable.

Some insight into the nature of driver self evaluations may be obtainable by more comprehensive studies, such as that of Delhomme (1991), whose findings were consistent with the general trend reported above, that about 60% of 454 drivers in France considered their driving to be superior to that of drivers in general. This finding was not restricted to experienced drivers, but included "the 18-22 age group, who are more likely to be involved in accidents". A tendency for drivers to believe that they committed less driving offences than drivers in general was also revealed, irrespective of whether they rated their own driving as superior, equal, or inferior to that of others.

Together, the above studies seem to suggest a general tendency amongst drivers from many countries to make relatively similar, positive estimations of their own abilities and risk levels. There is some evidence to suggest that level of experience may have a moderate influence on such estimations, whereas a history of driving offences, or accident involvement resulting in injury, even of a serious nature, and for which the drivers have been deemed culpable, may be regarded by drivers as less relevant. It seems that most drivers, regardless of their personal capabilities or transgressions, rarely seem to consider them to be worse than those of the general driving population, suggesting some degree of dissociation and/or lack of awareness by many of those individuals who appear to be inclined to drive dangerously. However it should be acknowledged that such a conclusion is dependent on dangerous driving having been correctly identified by violation and culpable accident history, and there is evidence that such identification may involve some socially-engendered difficulties (Klein, 1972).

In contrast, Wilson & Wilson's (1984) comprehensive observational study found that drivers tended to rate their own driving less highly than did two observer-raters. Having derived three levels of driving from a factor analysis: "simple vehicle manipulation, vehicle manipulation in relation to the road and...interaction with other road users", they found that the latter "social components" level accounted for over fifty percent of the total observed variance among drivers. The discrepancy between the findings of Wilson & Wilson's study and that of much previous research may possibly be due to drivers' awareness of the risk of having to face the reality of any failure to demonstrate their abilities on a particular occasion, with potential loss of public and/or private esteem.

Such a possibility is consistent with the findings of Regan, Gosselink, Hubsch & Ulsch (1975) which suggested "self-derogation by actors as a defense against possible loss of self-esteem". However this does not necessarily invalidate all the previous findings, rather it suggests that a discrepancy may occur between an individual's public and private evaluations of ability, perhaps when restricted to a single occasion in particular. However, for the purposes of increasing safety, it is the driver's private self-assessment of ability which is crucial. It is what drivers believe themselves to be generally capable of which can be expected to inform their approach to driving. Thus it seems that problems associated with public image and embarrassment may be minimized by ensuring anonymity.

The complexities of public and private self image, with all their temporal and situational variation, may perhaps help to explain the fact that in a further observational study, Wilson (1987) found on the whole, that subjects rated themselves more highly than did observer-raters, with some performance items resulting in high accord between subjective and objective ratings. The comparison between ratings of subject and observer was found to offer useful insights into the complex relationship between "drivers' attitudes and beliefs and observed on-road performance". It also suggested quite a considerable degree of honesty and self-awareness on the part of subjects who considered themselves to be "self-centred and ill-mannered", while being rated similarly by the observers as "self-centred and short-tempered" and "hazardous, negligent and asocial in their driving".

Dimensions of Driver Self-Perception

Guppy, Wilson & Perry (1990) found evidence suggesting that the dimensions of driver self-rating identified by Wilson & Wilson (1984); and Wilson (1987) appear to represent stable dimensions which have potential explanatory value in relation to driver experience, and accident involvement. Four factors were derived: "self-centred and ill-mannered...nervous and indecisive...inattentive and lax" and "reckless and irresponsible". In view of the bi-polar structure of the scale, Guppy et al point out that the dimensions may be equally well described in terms of their polar opposites. Thus, the factors identified by Clay (1987) when the same scale was employed, i.e. "patient/ cautious...responsible...anticipating" and "unpredictable" with the latter relating to being "nervous...lax" and "indecisive", appear to be essentially consistent with the dimensions described above.

Guppy et al found that experienced drivers perceived themselves as "much more confident, precise and experienced in their driving and as polite, considerate and courteous towards other road users" while less experienced drivers saw their driving as "compliant...fast and rash". The second study reported inexperienced drivers as seeing themselves as selfish, irresponsible, nervous and inattentive. The same factors, with the exception of inattention, were also found to discriminate between drivers according to accident experience. Controlling for driving experience allowed an even stronger relationship to emerge between "accident experience and self perceptions of selfishness and irresponsibility".

This seems to suggest that a particular style of interaction on the roads which tends to be characteristic of the maturing, inexperienced driver, may be especially in evidence in those who are most likely to be accident involved. It seems that whereas accident involved drivers may be aware of the relevance of driving skills to accident avoidance, the same may not apply to skilled social interaction on the roads.

Employing the same driver self-rating scale, Clay's (1987) findings, broadly consistent with the above results, revealed group means' differences which suggested that accident involved drivers considered themselves to be less patient, cautious, responsible and anticipating, but more predictable (on the basis of confidence, precision and decisiveness). The sole factor with univariate significance in a discriminant function ($p=.04$) suggested that accident-involved drivers rated themselves as more impatient, intolerant, irritable, and selfish, than the non-accident group. However limitations imposed by sample size combined with diversity of age and accident experience, allowed relatively poor differentiation of drivers' self-perception on the basis of such groupings. Furthermore, as accident involvement does not necessarily imply culpability, this may account for a further blurring of self-perception distinctions.

This seems to illustrate the rather qualified utility and crudeness of measure of accident involvement per se, suggesting the potential benefits of more comprehensive evaluation of accident data, employing large samples or targeting strategies. Although the potential to control for such factors as accident recency and culpability, and driver experience/exposure existed within the above study, its exploratory nature with rather modest sample size (n=295), would have seriously undermined the reliability and validity of such controls. A considerably larger sample size allows the current study to address such issues.

Labiale (1988) identified ten factors relating to reported driving behaviours within a representative sample of 1006 French drivers. A complementary observational study in "real traffic conditions" (n=52) revealed a high degree of correspondence between observed and reported behaviours which Labiale suggested adds credence to the "validity of survey methods which use questionnaires to study driver behaviour". Five types of general driver group were distinguished: "Class I (26.3%) calm, disciplined and fuel saving drivers; Class II (23%) moderate and fairly fuel saving drivers; Class III (23%) fast and anticipatory drivers; Class IV (15%) high performance, sporty, uneconomical drivers; Class V (7.7%) aggressive, flamboyant, pushy drivers". Labiale described the latter group as essentially asocial in their interaction with others on the road, while having a high regard for their own driving style.

Thus Labiale identified a group of drivers who seem to have little if any awareness of, or regard for the needs and constraints of either their vehicles, or of other people on the roads; whose priorities are competing, rather than co-operating with others; and for whom consideration seems to be more or less irrelevant. There appears to be a striking similarity between the image presented by Labiale and that of Guppy et al's (1990) selfish and irresponsible accident-involved driver, although Labiale does not examine accident involvement. Perhaps we need to examine the social conditions and priorities which allow, or perhaps even encourage the development of such attitudes.

The relevance of perceptions of self and others to potential accident involvement seems evident. However, as Risser (1985) points out, "a person's accident history does not necessarily reflect the quality of his driving habits". Accident involvement appears to be neither a necessary, nor a sufficient indicator of culpability. The nature and degree of relationship between perception of self/others and culpable accident involvement/risky driving practices, may be of particular interest.

Awareness of Others on the Roads

Safe interaction on the roads would seem to require adequate awareness of, and consideration for, the differing needs and constraints of other road users. The risks to the more vulnerable road users, such as pedestrians, cyclists and motorcyclists are often attributed to their own behaviour, e.g. the unpredictability of pedestrians or the inconspicuity of riders. However, failure to see others on the roads does not appear to be solely a product of the behaviour of the object of perception, there is evidence which strongly suggests a failure on the part of motorists to employ anticipatory and active searching strategies which are adequate for the prevailing conditions. As Neisser (1976) pointed out, we perceive and recognize more readily that which we anticipate seeing. It follows that awareness would considerably enhance effective anticipation and perception of other road users. Several studies serve to illustrate the problem.

Egberink et al (1986) reported a significantly higher failure rate of detection of child cyclists and pedestrians on the part of young drivers (18-24 years) than older drivers (30-56 years) in residential areas. However, in high access streets where the risks are more readily apparent, this discrepancy was considerably reduced and no longer statistically significant. This suggests that failure to anticipate the presence of children on residential roads, possibly mediated by speed which is inappropriate for the driver's abilities and/or the prevailing road/weather/traffic conditions, may contribute to the problem of a failure to adequately observe children within the driving environment.

Provision of facilities which allow physical separation of pedestrians and cyclists from motorised transport (Lay, 1988; Bracher, 1989) offers a partial answer. However, interaction between various categories of road users, who differ considerably e.g. on speed, manoeuvrability, road-holding ability, and vulnerability to injury, cannot be avoided altogether. Therefore, awareness of such differences and their implications seems to be an essential and very basic safety requirement.

Such issues were comprehensively evaluated in relation to motorcyclist/motorist interaction by Brooks (1988, 1991; Brooks & Guppy, 1990), who questioned the traditional view that motorcyclist risk is largely attributable to lack of conspicuity of the rider. Brooks found, on the contrary, that motorists' lack of technical and social awareness in relation to motorcyclists contributed significantly to rider risk, concluding that "a very high proportion of motorists can be expected to be lacking in Technical Awareness and/or Social Awareness" (Brooks, 1991).

Such lack of awareness may be expected to increase the probability of failure to look for or to see motorcyclists, and/or of inappropriate response to their presence, on the part of some motorists. Brooks & Guppy (1990) suggest that, if this issue is to be addressed effectively, then drivers need to know, not only that sufficient care is required, but also how this objective may be achieved, i.e. they need to be enabled to make informed judgements in relation to the needs and constraints of riders. Similarly, riders themselves conceived driver error as a product of both inadequate knowledge and disrespect (Brooks, 1988).

There seems to be considerable scope for addressing the problem of information deficits, and lack of awareness on the part of motorists with regard to the limited visibility of child pedestrians and cyclists (Egberink et al, 1986), technical factors relating to motorcycle riding, as well as lack of courtesy on the part of some, and perhaps many, motorists (Brooks, 1991). The responsibility of drivers to actively employ effective searching strategies and to show respect for all whom they may encounter on the roads seems to require emphasis.

Another issue relating to self/other perception concerns awareness of the problems which may be faced by aging road users, such as reduced mobility in pedestrians and difficulty making speed/distance judgements at junctions for all classes of elderly road users, particularly when oncoming vehicles are travelling at high speed, or simply at a speed differing greatly from their own. Such problems seem to relate to specific loss of ability such as reduced dynamic visual acuity (refer Chapter 2). However, as Brouwer, Rothengatter & van Wolffelaar, 1988) point out, "if increased physical vulnerability is accounted for...the elderly do not appear to behave in a particularly accident prone manner". They confirmed a capacity on the part of elderly drivers to compensate for even "very slow information processing" where "supervisory functions" remained at a high level. Thus, anticipation and moderate speed for example, may help to avert problems requiring fast reactions and/or rapid decisions.

Brouwer et al concluded that if appropriate and specific information "regarding their psychological abilities and driving skills" was made available to older drivers, they could then "decide to change traffic habits and/or to follow additional driving lessons aimed at improving compensatory driving behaviour".

However, the problem of safety for any relatively vulnerable group of road users seems to revolve essentially around the issue of awareness, including both a realistic appraisal of one's own abilities and vehicle potential as well as awareness of the needs and constraints of others on the roads. Brendemuhl, Schmidt & Schenk (1988) found that "whilst elderly motorists correctly solved only 5.1% fewer driving tasks than the 30 to 50 year olds, they observed the priority regulations 13.6% less frequently than the drivers from the middle age group" leading to "almost double the amount of involvement in traffic conflicts which resulted in driving instructor intervention". They also noted that "differences in the observation of signposts and traffic signs...lane discipline, hesitant driving behaviour and technical handling of the vehicle show a tendency at the 10% level". Brendemuhl et al concluded therefore that "there can be no doubt that future traffic concepts will have to be orientated towards elderly motorists on the roads more than before. These concepts will have to include improvements in road construction, vehicle construction and traffic regulations with a view to elderly motorists. Above all, future traffic concepts will have to place greater emphasis on the development of a new traffic awareness in the younger road users in their attitude to more senior motorists".

The problem of allowing adequate care and consideration in interactions with other road users seems to depend, at least partly, upon the expectations that people have of one another in their many and varied encounters on the roads. For example, Rothe (1990) reports that the majority of collisions between motorists and pedestrians occur at intersections, i.e. points in the road network where we should anticipate the presence of other road users. Rothe found however, that motorists' and pedestrians' expectations of one another suggest that whereas each group displays human fallibility in the form of distraction or preoccupation, often due to factors totally unrelated to the on-road activity, they nonetheless expect a high level of awareness of the on-road situation on the part of all other road users, including clear communication of their intentions, and compliance with the road laws (e.g. relating to stop signs, and traffic lights).

In other words, unintentional lack of vigilance and awareness on the roads, sometimes resulting in transgression of road rules and compromise of the safety of others, does not necessarily diminish the expectation that other road users should remain vigilant, aware, and compliant with the road rules at all times. Rothe suggests that it would be more useful for people to have a realistic awareness of what does happen on the roads, rather than tailoring their level of caution in accordance with what they consider legally "ought to happen" as regards the behaviour of other road users. There seems to be considerable evidence that social interaction would be improved by greater respect for, and awareness of, the needs, constraints and abilities of others on the roads.

SOCIAL INTERACTION IN A DRIVING CONTEXT

Wilde (1980) pointed out that we may expect social interaction on the roads to be influenced by the principles which influence human behaviour in many other contexts. Thus the degree to which road users are guided by similar rules will influence the predictability of their behaviour as well as that of all whom they encounter on the roads. Failure to communicate intentions clearly, unambiguously, while allowing others sufficient time to respond, may be expected to compromise safety. Differences within traffic flow of duration and diversity of driving experience may be expected to influence anticipation and awareness of potential risks, and the way in which individuals drive. The greater the experience mix, the higher the likelihood that intentions and responses will be misinterpreted, unless drivers have awareness of the needs, abilities and difficulties of drivers who have experience which differs from their own.

The individual's expectations and driving style seem to have no small influence on the manner of interaction with others on the roads. Bliersbach & Dellen (1980) developed a two-tier evaluative scheme of driver behaviour involving "driving patterns" and "interaction patterns and interaction effects of driving".

"Driving pattern of the 'thrill'" relates to the pleasure experienced by high speed driving which allows the testing of both driver and vehicle to their limits. This is described as consisting of "a peculiar mixture of fear and ....pleasure".

Driving pattern of power display" is characterized by "displaying" the car's potential and power. The driver's behaviour is described as identification with the vehicle's potential and power, with the implicit assumption that other drivers should therefore show due respect.

"Driving pattern of self-testing" involves testing of driver skills in demanding traffic conditions or manoeuvres, with a "tendency to measure oneself against other drivers". Effort is expended to "confirm one's own driving competence" as well as demonstrating the ability to cope with traffic more skilfully than other drivers.

"Pattern of smoothly driving along" involves emphasis on a "relaxed journey" free of obstacles, or conflicts with other drivers.

"Driving pattern of piloting" is demonstrated by the ability to "cope with traffic as masterfully and as close to the rules as possible".

"Interaction pattern of exchanging insults" refers to the expectation that other drivers will be aware of and conform to one's own intentions as demonstrated by driving style. The specific driving pattern dictating the pattern of interaction with other drivers, and the degree to which other drivers (or other road users) are likely to realize and be prepared to conform to, the individual driver's wishes, requirements, and mood.

Bliersbach & Dellen suggested that "the egocentricity of a driving pattern, occurring when a driving purpose is asserted, is the reason why the anger and rage at being held up are always fixed on the other driver, but not relativized by considering the intentions of others". They concluded that drivers seemed to be able to verbalize how they felt in tense driving situations, but unable to comprehend "the intensity of their feelings". They suggested that "drivers are not aware of the processes which cause their driving behaviour" and that such an awareness is necessary if accident involvement is to be reduced. They note "the appeal to keep at a safe distance for example will not be effective if, as the driver approaches closer than it is safe to, he is not aware of his impatience to overtake---which is in fact the cause of his manoeuvre". Lack of insight by drivers into their emotions and behaviour on the roads and the effects these might have on other road users, may increase the potential conflict they induce and encounter. Thus a need for greater awareness seems apparent.

Hauber (1980) observed that various emotions may be expressed uninhibitedly by means of the car, notably aggression, which was reported as being in evidence at high levels in many countries. He suggested therefore that people need to be made more aware of their own feelings and encouraged to express them appropriately. He recommended that attention should be given to planning the driving environment, such as the positioning of pedestrian crossings, to reduce or remove unnecessary impediments to traffic flow. The implementation of policies demonstrating foresight such as this, would probably help to reduce the level of frustration experienced by drivers, thereby diffusing potential levels of aggression. Thus Hauber recommends "an interactive model of driving behaviour, employing an integration between personal and environmental factors", which he reasons "offers the most promising starting point for an overall improvement in traffic safety".

Michon (1980) suggested that in order to increase awareness and understanding of driving behaviours, and to influence safer driving practices, "effective and plausible causes" of driver behaviour need to be formulated, in a form which can be readily communicated to drivers, and which "will fit the conscious belief structure of the person".

Knapper & Cropley (1980) conducted a study concerned with how people perceived "traffic risks" which they had personally encountered, differentiating "three kinds of hazards" relating to: "road and weather conditions"; "actions of people other than drivers"; and "errors of omission or commission of drivers". They concluded, on the basis of comprehensive factor analyses, that "respondents regarded other people, and especially other drivers, as a major source of risk on the road. This was largely attributed to qualities of the other driver such as carelessness, aggressiveness, discourtesy, selfishness, arrogance and the like". These findings are consistent with Clay's (1987) reported differences in self and average driver ratings, as well as the tendency to attribute greater responsibility to others for accident occurrence.

Noting a tendency for drivers to respond to other road users according to the "attitudes and values" attributed to them, Knapper & Cropley suggested "that reactions to driving situations are not fully determined by the objective facts" but rather by the participants interpretation of them, including whatever motives they consider other participants actions to reflect. They therefore recommended that "potential drivers could be made aware of their role as a source of social psychological cues, of their own continual subjective imputation of properties to other drivers, and of their probable reaction to these factors as much as to the objective details of a particular situation". They point out that this approach seems to have practical value for driver training.

Kelley (1972) points out that "it is a special feature of social interaction that each participant is both a causal agent and an attributor". Thus, the individual's "own behaviour may be a cause of the behaviour he is trying to understand and explain". Kelley asserts that the way in which the behaviour of others is interpreted and whatever causation it is attributed to "undoubtedly affects" the individual's "subsequent behaviour in the interaction and his attitudes toward the other person". Jones (1976) elaborates this point further, emphasizing that "the major implication of the observer bias in attitude-attribution studies is that such a bias sows the seeds for interpersonal misunderstandings".

Summary: There appear to be many aspects of the behavioural expression of drivers' attitudes which may compromise both their own safety and that of others they encounter on the roads. Thus it seems that a greater understanding of what drivers attribute accident causation to, as well as some of the reasons and processes which influence their attributions, may offer enlightenment to strategies designed to encourage safer driving practices.

CHAPTER 5: DRIVER ATTRIBUTION

Preamble: This chapter examines the relevance of attribution processes to the driving situation, self/other causal attribution in particular. Previous research has identified drivers' causal misattributions (Preston & Harris, 1965), and tentative evidence that this may be a general tendency (Clay, 1987), the safety implications of which are considerable, albeit in moderate-sized samples. The current research examines the evidence for driver misattribution more stringently in a large driver sample, while exploring the relationship between drivers' relative level of awareness of accident culpability and factors which may predispose them to accident involvement.

The degree to which drivers are aware of their own potential influence on accident occurrence or active avoidance, seems not only directly relevant to safety, but also to the social climate within which all road users interact. Such awareness can be expected to affect the likelihood of accident involvement as well as any prospect of behaviour modification. Attribution theory seems to offer the possibility of addressing these issues, as Jones (1976) suggested, "the hope is that if we can better understand how people perceive the causal structure of their social world, we can better predict their responses to that world".

Attribution processes seem pertinent to the way in which we anticipate (Jones, 1986), perceive, and interpret (Jones & Nisbett, 1972) events such as road traffic accidents, the likelihood of involvement in these and similar events, as well as the nature and quality of social interaction within such contexts (Kelley, 1972; Jones, 1976). The possibility of bias within these processes (Jones & Nisbett, 1972; Hewstone, 1989; Fiske & Taylor, 1991), seems therefore of no small importance.

The processes of attribution by which we apprehend reality appear to illustrate how such bias may not only occur, but actually be encouraged. Causal attributions become more sophisticated as the ability to deal with complex and comprehensive data increase with maturity and experience (Fiske & Taylor, 1991). Thus the causal attributions of relatively immature, novice drivers may be less appropriate than those of their more experienced elders. However attribution bias may also develop during the maturation process via expectations and perceptual salience of available information, in accordance with cultural norms (Hewstone, 1989), encouraging the behaviour of self and others to be interpreted differently, regardless of similarity, in the event of negative occurrences such as accidents. Nonetheless, awareness of such biases should allow considerable potential for constructive intervention. While a comprehensive synopsis of the broad field of attribution theory seems unnecessary here, aspects of particular relevance to driver behaviour will be raised.

ACTOR/OBSERVER AND SELF/OTHER EFFECTS

Jones & Nisbett (1972) reported "a pervasive tendency" for actors and observers to differentially attribute the same actions, the actor revealing a greater awareness of the action's context, and the observer a greater awareness of the behaviour itself and the individual exhibiting it which Jones & Nisbett suggest encourages observers to "attribute the same actions to stable personal dispositions".

Differential perception of behaviour according to whether it is being exhibited or observed seems conducive to dissention, social disharmony, and a failure to learn from experience. Within the driving environment misattribution may invoke or increase aggression and safety compromise, whereas a more realistic and appropriate situational appraisal may encourage greater awareness and safer practices. Thus the explanatory potential of drivers' causal attributions in accordance with self/other status seems worth exploring.

Jones & Nisbett's rather sweeping, and by their own admission rather "risky" assertion, provoked considerable interest, controversy, and research. Watson (1982) responded, after a thorough review of the research and the various methodologies employed, that they may have overstated their case somewhat. Noting a predominant causal ascription to traits, Watson suggested that the evidence supported a divergence involving a tendency for self-raters to attribute more causal importance to situations than do other-raters. However he considered that the case for differential trait ascription was not supported, partly due to methodological insufficiency for this purpose. He also suggested that in some instances a self/other distinction may be more appropriate than one based on actor/observer status, although this would seem to offer more utility as a potential enhancement of, rather than an alternative to, differentiation according to actor/observer status, encompassing as it does other issues such as motivation, which Jones & Nisbett raised separately.

Although Watson's evaluation qualifies Jones & Nisbett's conclusions, it does not appear to challenge the possibility of causal misattribution, or the negative implications for social interaction, and as Watson concludes "the basic Jones-Nisbett effect now appears to be firmly established". While reporting "a strong attribution type main effect" indicative that "both self- and other-raters consistently ascribe more causal importance to traits than to situations", Watson noted that "the Target x Type interaction predicted by Jones and Nisbett" has been demonstrated in numerous studies which measured attributions in a variety of ways. Although further studies "tentatively suggest that this interaction is largely due to the differential tendency of self- and other-raters to attribute causality to the environment, rather than a differential preference for trait attributions".

Differential self/other attributions are considered to be a product of differences in available information, the context in which individuals interpret events, and their attentional focus, with emphasis on the latter. As Jones & Nisbett suggest "perhaps more importantly, the tendency is a result of the differential salience of the information available to both actor and observer". Similarly, Hewstone (1989) concluded after a thorough literature review that "at present the actor-observer or self-other difference is best understood in terms of perceptual salience, although categorical conclusions are unwise, in view of the widely different methods and measures used (see Watson, 1982)".

Jones & Nisbett explain that although knowledge about the immediate surroundings and events may be comparable, interpretation of such information will usually differ because, while the actor may draw on a broad perspective of events over time, the observer is usually limited to the confines of a narrow temporal focus, and "as with feeling states, knowledge of intentions is indirect, usually quite inferior, and highly subject to error". They reason that the divergent viewpoints of actor and observer result largely from distinctions between the observer's assumed, generalized history and the actor's actual, specific history, so that whereas "the observer...compares the actor with other actors", the actor compares his behaviour on this particular occasion with his own actions on other occasions. Thus a single instance of observed behaviour may encourage a belief that it is characteristic of the actor in the absence of acceptable evidence to counter the assumption, whereas the same behaviour compared with many other behavioural examples may lead the actor to draw a rather different conclusion.

Jones & Nisbett contend that "actors and observers differ fundamentally in the processing of available data" because their attention is drawn to different aspects of the information to which they have access, and that such differential awareness influences the progress and result of "the attribution process". They suggest that whereas for the observer the environment provides a backdrop against which action tends to command attention, conversely for the actor environmental factors which may affect his/her behaviour tend to be prominent. They maintain that "these attentional differences should result in differences in causal perception", with the actor seeing his/her behaviour largely as situationally determined, while the observer's attention is dominated by the actor's behaviour, with minimal awareness of context. "This leaves the actor as the likely causal candidate, and the observer will account for the actor's responses in terms of attributed dispositions".

The Inferential Process

Such biasing effects may be exacerbated by "the tendency to regard one's reactions to entities as based on accurate perceptions of them". Thus belief may be influenced by sensory information, without awareness of the degree to which inferential process intercedes between the available information and its interpretation. As Jones &

Nisbett argue, "rather than humbly regarding our impressions of the world as interpretations...we see them as understandings or correct apprehensions of it".

Inference may be such an integral part of perception, cognition and social interaction that we may tend to be barely aware of its employment, thus complicating our appreciation that our own personal construction of events or situations may differ, sometimes considerably, from that of others (Kelly, 1955), involving referent points which may be markedly divergent, without necessarily differing in validity. Jones & Nisbett suggest that "the illusion that our reactions are perceptions is sustained in part by the apparent consensus accompanying most of our reactions, a consensus that may rest as much on transmitted cultural norms as on the compelling features of objective 'reality'". Furthermore, the way in which we use language may both express and encourage cultural norms, thus "language probably facilitates the inference of traits in several ways. Once we have labelled an action as hostile, it is very easy to move to the inference that the perpetrator is a hostile person".

Jones & Nisbett point out that, to the degree that they are unaware of their own biases, both actor and observer may be prone to misattribution. Whereas for those who both observe and act, which seems particularly relevent to the driving situation, they reason that "the tendency toward heightened salience of action should become more pronounced", because participation in an interactive process will involve time constraints and a climate which is not conducive to empathic and objective assessment of the relative personal and situational influences. On the contrary, the actor-observer will tend to be concerned with processing cues to which he/she may need to respond, thus increasing the relevance of the other person's behaviour in comparison to "the situational context evoking it". They contend that within a mutually interactive situation, any differences in the behaviour of the other participant "in the same situation" may be considered by each active observer to be characteristic of the other, even though such behaviour may be determined to a greater degree by differential circumstances relating to temporal, social role and personal history factors and/or constraints.

The differential tendencies of actor and observer are not, however, immutable. As Jones & Nisbett (1972) note "it is possible to affect the amount of empathy shown by the observer for the actor by simple variations in observational instructions". Similarly Hewstone (1989), following a thorough appraisal of the literature, reported that a change in orientation can reduce situational attributions in actors while increasing them in observers, although personal attributions remain consistently very high, while "heightened self-awareness tends to increase self-attributions".

ATTRIBUTION DEVELOPMENT: MATURATION & EXPERIENTIAL EFFECTS

A more comprehensive awareness of the many factors which may relate to an event, and their implications, tends to occur with increasing maturity as well as the acquisition of knowledge pertinent to such events, i.e. transitional changes related to maturation and the acquisition of experience and/or expertise. This may perhaps contribute to the relatively low-risk estimates of high-risk, young and inexperienced drivers. Following a thorough appraisal of the relevant literature, Fiske & Taylor (1991) concluded that factors which are perceived to: precede an event, have close proximity in time and space to it, and/or have contextual salience, seem to induce "automatic" causal attribution processing. Such basic principles appear to be characteristic of children's reasoning, but may also occur in adults whose ability and/or motivation to cope with perceptual and cognitive complexity is insufficient for the prevailing circumstances.

Fiske & Taylor note that "principles of covariation are acquired somewhat later and do not appear to be as fundamental to causal perception". Although adults are generally considered to have the capacity to comprehend "distal or delayed causality, multiple causality, and other, more complex causal rules", such capability appears to remain within the confines of their knowledge and experience, thus "in domains in which they are not well-informed" their causal reasoning may be limited accordingly. Fiske & Taylor suggest that "these developmental principles are important not only because they characterize the causal thinking of children, but because adults continue to use them, particularly in situations about which they may be poorly informed".

COLLECTIVE ATTRIBUTION: CULTURAL INFLUENCES

The influence of culture on attitudes and thus attributional tendencies, which becomes interwoven with developmental change, may encourage the search for a person to whom blame can be attributed in the event of an occurrence with negative consequences, i.e. a tendency to blame others may be culturally primed to some extent. Reiterating Ichheiser's (1943, 1949, 1970) views, Hewstone (1989) asserts that "as perceivers, we have a tendency to overestimate personal factors and underestimate situational factors", which Ichheiser suggested occurs because "we tend to overestimate the unity of personality, overlooking inconsistent information once an impression has been formed and underestimating our own role in the situation in which we observe others".

Hewstone pointed out that "in contrast to subsequent work, Ichheiser emphasized that this was a collectively conditioned misinterpretation of personality, not a personal 'error', and one that was a consequence of the social system: 'We all have the tendency - conditioned...by the ideology of our society - to interpret in our everyday life the behaviour of individuals in terms of specific personal qualities rather than in terms of specific situations. Our whole framework of concepts of 'merit' and 'blame', 'success' and 'failure', 'responsibility' and 'irresponsibility', as accepted in everyday life, is based on the presupposition of personal determination of behaviour (as opposed to the situation or social determination of behaviour). (Ichheiser, 1943, p151)'".

Hewstone's thorough literature review yielded evidence of culturally-determined differences in the development of attributional tendencies, with an increasing tendency towards dispositional attributions in an American sample and in western cultures in general, in contrast to an increasing awareness of context in an Indian-Hindu sample. Hewstone concluded that these findings "strongly imply an explanation at the societal level". Reporting evidence of a more positive perception of internal than external attributions, Hewstone noted Nisbett & Ross's emphasis on the societal influence: "'There is reason to suspect...that a rather general, "dispositionalist theory" is shared by almost everyone socialized in our culture. Certainly, it is part of the world view of the so-called Protestant ethic...The "dispositionalist theory", in short, is thoroughly woven into the fabric of our culture.' (1980, p31)"

Hewstone's analysis of the nature and implications of causal attributions illuminates the fact that attributions, no less than many other human processes, occur simultaneously on many levels, which may require of the individual the ability to cope with both increasing complexity and decreasing control within any given situation. Thus, in accordance with "Willem Doise's notion of four **levels of explanation**...intra-personal, interpersonal, intergroup and societal", Hewstone examines the variety of factors and dynamics which may influence the nature of explanations or interpretations of actions or events, noting that "we may make more sense of people's explanations, especially when given in social contexts, if we distinguish reasons from other internal causes, and acknowledge that, as accounts, commonsense explanations often serve to excuse and justify, and not merely to explain".

Thus, what seems to be of particular importance, and consistent with Ichheiser's emphasis on social awareness, is the need to recognize that neither responsibility nor control are restricted to the sphere of the individual, they also have collective facets with graduations from the interpersonal to the universal. Thus, whereas individual responsibility may remain a consistent factor, both logic and natural justice suggest that it should be tempered by awareness that having free will is far from implying absolute control, and that people have variable control within the variety of circumstances with which they must contend. It seems necessary therefore, to acknowledge the complex interaction between individual and collective influence, responsibility and control, in order to examine attribution tendencies appropriately.

CAUSATION, RESPONSIBILITY AND BLAME

The issue of attributing causality, with all its social implications relating to responsibility and blame, is far from simple. Addressing the issue of volition and responsibility regarding actions, Jones & Nisbett (1972) suggest that, to the degree that a situation consistently elicits a particular sort of behaviour from many people, it will tend to be seen as causal, whereas a similar behavioural response by an individual on a variety of occasions implicates the disposition causally. Thus while acknowledging the actor's fallibility, they nonetheless argue that "the observer's interpretation of behaviour" has often been found to be "simply wrong" where an inference is made that an observed behaviour is characteristic of the actor, when in fact it is fairly typical of many people of differing dispositions within that type of situation.

While acknowledging the importance of motivation, especially "the motive to maintain or enhance one's self-esteem", Jones & Nisbett (1972) point out however, that actor/ observer bias does not appear to be simply a product of differential motivation. "However powerful motivational factors may be, it should be noted that here, as in other psychological contexts, there is an inherent conflict between the 'pleasure principle' and the 'reality principle...We may want to believe that we are responsible for our good acts, always and exclusively, but such a belief is not very adaptive in the long run". They emphasize that many motives may "interact with attribution processes. The individual, whether he is an actor or an observer, is a self-esteem enhancer, a balance maintainer, a dissonance reducer, a reactance reliever, a seeker after truth, and more". Similarly, Elliott (1989) found that "although people may wish to present themselves in a uniformly positive light, they will often temper their self-aggrandizement in the interest of credibility".

Fincham & Jaspars (1980) also argue persuasively, on the basis of a comprehensive review and analysis of the literature on attribution of responsibility, that although a desire to present the self in a good light and to deflect blame is one possible explanation for attribution bias, and the "defensive attribution hypothesis" has received considerable attention, "there is virtually no unambiguous support for the hypothesis despite its continued dominance in the accident literature". They suggest that it may be more appropriate to examine attribution processes as they relate to responsibility within a legal rather than a scientific framework, considering the social relevance and implications of legal responsibility.

They point out that although attributions of causality and responsibility are related, they are not synonymous. Thus "in the case of legal, moral, and role responsibility it appears that we are talking not about different meanings of the general concept of responsibility but about different forms of answerability or accountability regarding to whom one is responsible". The factors which appear most relevant to responsibility are capacity, volition, intent, and consequence. The capacity to take responsibility may be considered a precondition to its assignment. Noting that responsibility is attributable in accordance with "the act or outcome" to which it relates, Fincham & Jaspers explain that in commonsense terms, causal determination is considered to relate to actions or conditions which "make the difference" between the occurrence of something untoward such as an accident, or the maintenance of relative normality. They note however, that "which conditions are treated as abnormal is to some extent dependent upon the context of the inquiry". They also point out that a special case of 'causality' exists when one human being by words or deeds influences another's action", however the concern then is primarily with "reasons for actions" rather than "causes of events" in the more basic sense. This seems especially pertinent to Waller & Waller's (1987) concern about the criminilisation of young males rather than collective responsibility for, and concern about factors which influence the perpetuation of relatively asocial behaviour which many exhibit.

Fincham & Jaspers reason that "the extent to which an act is perceived as intentional is the inverse of the extent to which it is seen as determined by situational or incapacitating factors". Thus, to the degree that self/other bias does exist, it may be expected that lack of awareness of situational constraints on other drivers in traffic conflicts or accidents, including those due to the actions of oneself, may encourage an interpretation of intent or at least negligence on the part of the "other" driver. Fincham & Jaspers, while noting that "the central meaning of responsibility (i.e. accountability) is...closely related to the question of causation because perceived causality appears to be a crucial factor in determining a person's responsibility both in the law and common sense". They suggest however, that "in many real-life situations" other "attributional questions" may need to be addressed, relating to "intervening causes, the perception of intentionality, the importance of reasons and opportunities, and so on" They assert that in the event of an accident, it is generally "the connection between behaviour and its outcome that is of direct concern".

They contend that attributions which have been labelled as defensive may be explicable in information-processing terms, which they suggest may be more appropriate than an interpretation of self-serving bias. They point out that "severe outcomes, almost by definition, have a low probability of occurring. Hence, the marginal impact of specific actions is potentially quite large, which would account for increased attributions of responsibility in such cases. In contrast, it may be that a severe consequence is seen as less congruent with the act, which should have a negative effect on the attribution of responsibility". Thus when severe consequences are observed this may encourage considerable responsibility to be attributed to the alleged perpetrator, whereas the person involved may consider his/her actions insufficient to have resulted in severe consequences and thus assume that other factors must have intervened between the action and its ultimate result, and that such other factors must therefore have influenced that outcome.

Fincham & Jaspars point out that "the fact that attributions often take place in a social context emphasizes in addition that 'attributions of responsibility' may not only be influenced by social factors but that such a judgment is itself a social act with certain consequences". Thus in relation to events such as accidents, "the exact purpose for which one is attributing responsibility, and to whom, may be relevant".

THE SELF-SERVING BIASES DEBATE

Hewstone (1989) reports evidence suggestive of "self-serving attribution bias" i.e. that "people are more likely to attribute their successes to internal causes such as ability" and conversely "failures to external causes such as task difficulty". He contends that "there are, in fact, two biases - a 'self-enhancing bias' (attributing success to internal, relative to external, causes) and a 'self-protecting bias' (attributing failure to external, relative to internal, causes)".

Miller & Ross (1975) argue that there is "some support for the contention that individuals engage in self-enhancing attributions under conditions of success, but only minimal evidence...to suggest...self-protective attributions under conditions of failure". Consistent with Fincham & Jaspers' conclusions, they considered this effect explicable in information-processing terms, involving factors such as expectation and awareness, which they suggested did not necessarily involve motivational factors. However, Hewstone reports that motivation was considered of no small importance in later research, supported perhaps by Ross & Sicoly's (1979) experimental findings of "consistent evidence for egocentric biases in availability and attribution".

Tenenbaum & Furst's (1986) study involving competitive team and individual sports, found partial support for the egocentric bias, with winners giving "more internal, stable and controllable reasons than losers". Initially losers made external attributions, but "by the third cause they began to give internal reasons". Individual competitors, regardless of the outcome "consistently gave more internal attributions" than did team participants, which may have been due to "individuals taking more responsibility for the outcome and to the wider range of possibilities for group subjects to give attributions to external elements such as the group itself". They noted that generally "high ability subjects listed all three causes as internal, stable and controllable (such as their ability)", whereas the results of "moderate and low perceived ability subjects...are...less stable". Tenenbaum & Furst concluded that "respondents may make an initial attempt to protect their egos but, when allowed to express additional reasons, they show an understanding of the multitude of factors and, in the case of winners and losers, losers begin to take responsibility for the loss", thus "it may...be more appropriate to discuss the egocentric bias using all three dimensions than just the traditional dimensions of locus of causality".

There is also some evidence that men and women both make more positive attributions for male success than female success, and less negative attributions for male failure than female failure. Sousa & Leyens (1987) found that "when both [male and female] competitors succeeded in their task, the male performance was explained by stable factors and the female one by unstable attributions. When only one of them succeeded, the man's failure as well as the woman's success were attributed to unstable causes; this was not so in the case of the woman's failure and the man's success". However, they emphasize that both "female and male subjects discriminate between the sexes in exactly the same fashion". However, there is some evidence that "women discriminate less between male and female successes than men do" although, whereas men describe the female achiever as being "rather lucky and very laborious...women report her as inferior and speak more about her status and expected role than about her performance". However this effect may be determined to some extent by the task, which may invoke differential interest and effort.

Hewstone's (1989) comprehensive appraisal of causal attribution research yielded the conclusion that the causal explanations to which task outcomes are attributed are directly influenced by self-esteem needs, and the degree to which they are aroused. Positive and negative mood resulting from success and failure was also found to influence the cause to which results were attributed. Attributions were also found to vary in relation to the public or private nature of the context to which they related. Hewstone suggests that both "cognitive and motivational perspectives" in relation to self-serving tendencies "are surely correct...As Ross and Fletcher concluded: 'People are both rational and rationalizers' (1985, p105)". Suggesting "a need for more research on how various biases are interrelated," the influence of context, and "the behavioural consequences of attributional bias", Hewstone points out that there is "mounting evidence that people...often make judgements quickly, on the basis of quite minimal information, and show clear biases" such as those relating to actor/observer or self/other status, success/failure of task outcome, and both self-enhancement and self-protection.

LOCUS OF CONTROL EFFECTS

Lefcourt (1976) notes that, the extent to which people believe that they "can determine their own fates within limits" seems to be a vital contributory factor to "the way in which they cope with stress and engage in challenges". Thus the balance the individual perceives between self-determination and environmental constraints seems to be relevant to behaviour in general, including driver behaviour. The degree of actual control which people are able to exert over their own lives appears, not surprisingly, to influence the expectation of control over future events. Where effort tends to result in effective change or goal attainment, it can be expected to induce rather different interpretation and future expectation than will lack of success despite even considerable effort. Lefcourt notes that "to people who live in continuously adverse circumstances, life does not appear to be subject to control through their own efforts....When an individual is deprived of his sense of self-determination he is less able to learn about himself from his own experiences; he is less able to develop a definite measure of his own worth". This may help to explain the role of driver stress in accidents as well as subsequent causal attributions.

Weiner, Frieze, Kukla, Reed, Rest & Rosenbaum (1972) suggest that "achievement-related" events tend to be explained according to "four causal elements: ability; effort; task difficulty; and luck". They hold that "future expectations of success and failure are based upon the assumed level of ability in relation to perceived task difficulty...as well as an estimation of intended effort and anticipated luck". Generally ability tends to be considered a stable internal factor, effort an unstable internal factor, task difficulty a stable external factor, and luck an unstable external factor. Weiner et al, citing other collaborations with some of their colleagues, reported that where "performance is consistent with the norms, that is success when others succeed or failure when others fail, the outcome is attributed to the external factor of task difficulty, and insufficient information is provided for self-evaluation. Conversely, performance which suggests either greater or lesser ability than the norm, is liable to invoke "internal attributions and self-evaluative judgements". It seems possible that such an effect may contribute to the confidence and low-risk estimations of young male drivers despite the prevalence of driving behaviours considered risky by others. Given the relative rarity of accidents, and the over-representation of young males in accidents and the consequently high insurance premiums of young drivers, they may well attribute "successful" risky behaviour to superior skill and "unsuccessful" risk-taking, i.e. accident-involvement, to bad luck or the "other" driver.

ATTRIBUTION STUDIES RELATED TO DRIVING BEHAVIOUR

Connors, Ranish & Maisto's (1982) study of undergraduate assessments of "fictional traffic accidents" found that, by comparison with those who drank only coffee, "drivers who drank alcohol were attributed more responsibility for the accident, were not seen as much as victims of bad luck, and received higher fines and longer prison sentences". But although victim compensation led to lower responsibility attributions, a tendency for "externally oriented subjects...to attribute the accident to bad luck", did not induce them to mete out milder penalties. These findings seem to suggest that responsibility assessments may be influenced by perceived control of the potential perpetrator, whereas penalties or punishment may be influenced by the consequences of action or inaction, irrespective of perceived control.

However, a comprehensive series of "three experimental studies" conducted by DeJoy (1985) which examined "the attribution of responsibility for alcohol-related motor vehicle incidents" suggested that alcohol consumption alone was not necessarily considered sufficient to account for accident causation. The format involved presentation of "specially prepared crash or event scenarios" to observers, "which varied according to the severity of the outcome, the level of unsafe driving involved, the degree of perpetrator-observer personal similarity, and the extent to which the victim contributed to the event". DeJoy's main findings were that "alcohol consumption per se did not influence responsibility attribution and punishment assignment independent of the circumstances of the event. These judgements were found to be sensitive to the severity of the outcome and whether the drinking and driving was accompanied by obvious unsafe driving. Observers appeared to deny any similarity to the drinking driver, and for uncomplicated drinking and driving, observer attributions were affected by the details of the event sequence and the presence of even indirect victim contribution". This may represent some acknowledgment that alcohol is neither a necessary nor a sufficient accident causal agent, however the influence of "even indirect victim contribution" seems to support DeJoy's suggestion that "misattributions of responsibility and causality" may be induced by defensive motivation in such circumstances.

The issue of intent however seems to invoke a rather different response. Darley & Huff (1990) found "in a series of studies assessing people's assignment of blame to harm-doers" which they conducted with various colleagues, that "people rated an intentionally committed harm-doing action as causing more damage than an identical but negligently or accidentally committed harm-doing action". This occurred despite the fact that the harm was described as "being of the exact same dollar cost" and that subjects were also "explicitly allowed to administer punitive damages over and above the actual damages caused by the harm". Darley & Huff suggest that "subjects may have been using all of the means at their disposal, i.e. all of the questions they were asked, to register their disapproval of the intentional harm-doer".

Foreman, Ellis & Beavan (1983) reported that "accident victims attending a casualty department", designated as culpable and non-culpable in accordance with their own account of events evaluated by five independent judges, "differed only in their tendency to perceive locus of control as being internal (causal group) or external (non-causal group)". Subjects were all "males aged 18-56 years" involved in accidents of which "35 occurred at work, 11 in the home, 8 while travelling and 8 during recreation". Foreman et al note that in contrast to Holt's (1982) study involving "road accident victims", neither positive nor negative life events were found to distinguish between "causals and non-causals". They concluded that "the only measure in any way predictive of accident behaviour involved patients' beliefs about Locus of Control". They suggested that "the most compelling explanation for this observation is that people who may be categorized as internalizers tend to give accounts of their accidents that show them to be culpable while externalizers produce stories that depict themselves as blameless victims of outside factors". However they note that it is also possible that the accident experience itself may have influenced the individual's response, "an avoidable accident making him aware of his control over the environment, and an unavoidable one suggesting to him that he is a victim of fate". However it is difficult to speculate on the influence which vastly different circumstances, and the varying degrees of control they may involve, may have on causal attributions for accidents, especially in such a small study.

Preston & Harris (1965) conducted a carefully designed study involving 100 drivers, fifty of whom were involved while driving "in accidents serious enough to require hospitalization" and fifty controls "without accident histories but matched according to sex, approximate age, race, and educational level". Their main findings were that "the accident victims differed from the comparison Ss in a higher incidence of previous traffic violations but were not distinguishable from the comparison Ss on any written tests. The accident Ss were similar to the 'safe' drivers in describing themselves as much closer to 'expert' than 'very poor' on a driving performance continuum. In fixing the responsibility for the accidents and in estimating their driving competence at the time of the accidents, the accident Ss' reports are at considerable variance with police reports".

The two groups were found to differ considerably in relation to skills and deviant driving behaviour, "11 of the accident drivers as compared to 2 of the control drivers admitted to failing driving-skill tests one or more times...drivers' licenses had been revoked at one time for 6 of the accident drivers but for none of the control...29 accident drivers as compared to 17 control drivers admitted citation for more than two traffic violations in their driving experience...11 accident drivers as compared to 1 control driver had been cited for negligent, reckless, or drunk driving in their driving histories". However no significant difference was found between the two groups' "knowledge of traffic rules and regulations". Nor did they differ in their estimations of expertise, "on a nine-point scale ranging from **very poor** to **expert** all of the Ss rated themselves much closer to the expert than to the poor driver area of the continuum. The mean scores for the two groups on this self-rating driving performance measure were almost identical".

The differential attribution of responsibility for the accidents by the police and the drivers themselves seems of particular importance. Preston & Harris pointed out that "fifteen of these Ss admitted responsibility for the accidents, describing themselves as 'careless', 'preoccupied', 'tired', 'speeding', etc., or as having made driving errors. Five acknowledged partial responsibility. Thirty blamed other drivers and conditions beyond their control or claimed inability to fix this responsibility. According to police reports, however, 34 of these drivers were responsible for accidents; other drivers or external factors for nine accidents and no responsibility was fixed for seven accidents. Thus there is a considerable discrepancy between the Ss' and the officials' evaluations of the responsibility for these accidents".

The drivers' evaluations of their "driving competence, that is, skill, ability,and alertness at the time of the accident" is also of interest. "Sixteen of the 50 accident drivers admitted to less than usual driving efficiency; 2 claimed 'not to know' ...thirty-two of these Ss claimed that their driving was 'normal', 'usual', 'good', '100%', and 'extra good'. Seventeen of these drivers who claimed to be driving efficiently were cited by the police for negligent driving in connection with their accidents and one with failure to yield the right of way".

Preston & Harris noted that in relation to the consequences, "the accidents studied resulted in many serious injuries and three passenger fatalities...property damage was extensive" and also "the legal and financial consequences of the accidents were often severe. Many of the drivers faced court proceedings, study by the police, and interrogation by insurance agents and/or lawyers" which included 3 drivers charged with reckless driving, 15 with negligent driving and 3 failure to yield right of way". This study seems to present considerable evidence of drivers lack of awareness of their own contribution to accident causation. It seems very likely that such misattribution may be influenced by both cognitive and motivational factors. However the issue seems to be rather that the implications of causal misattribution for road accidents seems to warrant urgent attention.

Clay (1987), examining drivers' beliefs about accident causation in general, found within a survey of 295 drivers in Bedford that accident-involved drivers "attributed greater importance to anticipation as a causative factor in accidents in Britain, which seemed to denote a need for other drivers to anticipate well, while attaching less importance to avoidance of driving while impaired due to alcohol, fatigue, or stress".

With regard to responsibility attributed for accidents in which they were personally involved while driving, the results suggested "a marked tendency for drivers in this sample to attribute a far greater percentage of responsibility for their own accidents to other drivers than to themselves". Amongst accident-involved drivers, 54% and 59.4% considered the first and second accidents they reported respectively, to be 'not at all' or 'minimally' "attributable to themselves and their own driving, while conversely 31% and 23.2% reported that they were 'totally' or 'considerably' responsible for the two accidents. This contrasts markedly with attributions of responsibility for the 'other driver' which appeared to be inversely related. In relation to the first and second accidents they reported respectively, 68% and 63.5% of respondents considered them to be 'totally' or 'considerably' attributable to the other driver, by comparison with 21.6% and 23.8% who reported that the other driver was 'not at all' or 'minimally' responsible for the accidents. It should be noted that these accidents included some in which no other vehicle or road user was involved. However, "Other [non-driving] road users, road and weather conditions, and mechanical failure were all held to bear little responsibility for self-reported accidents".

Consistent with the above findings, "a notably higher proportion of respondents considered that there was nothing which they could have done to avoid the accident(s) from occurring" 57.3% and 55.6% respectively, "as compared to those who felt they could have helped to avoid their occurrence", 42.7% and 44.4%. "Conversely, an even higher proportion considered that the other road user (driver) could have helped to avoid their accident(s)" 67.1% and 70% respectively, "by comparison with those who considered that there was no effective avoidance measures which the other road user (driver) could have made", 32.9% and 30%.

Clay concluded that "there appeared to be a marked tendency for drivers to attribute a high proportion, or all of the blame for the accidents in which they had been involved as drivers, to the 'other driver'. No other factors appear to be considered to have a comparable influence over personal accident involvement. This tendency is consistent with, and seems open to plausible explanation by, attribution theory as it relates to actor/observer differences. The driving situation appears to influence the focus of attention of the driver on 'the other driver', which seems to result in a general tendency, at least within this sample, to attribute accident responsibility and causation to 'the other driver'. The majority of drivers considered that driving tended to make them feel less, rather than more angry. In sharp contrast, however, the 'average' driver was considered to be more: aggressive, insistent, irritable, impatient, selfish, and intolerant, than they were themselves. Attribution theory plausibly explains this effect". The attribution tendencies suggested by a study of moderate size obviously require more rigorous testing on a larger scale. The possibility of artifactual bias being identified due to culpable drivers selecting themselves out, while improbable, also needs to be excluded. To this end, a control group of drivers deemed culpable by disinterested others would allow some comparison between objectively and subjectively culpable drivers. These issues are addressed within the current study.

Summary: Attribution studies reveal that there are many factors which may encourage biased interpretation of events. Such bias may be due in part to motivational factors, in particular the personal and social consequences of events. However the weight of evidence seems to suggest that information processing mechanisms and cultural norms may be even more influential. Within the driving situation this may have considerable implications for driver awareness of responsibility and potential for active avoidance of accidents and traffic conflicts. A further implication of attribution bias is the possible damage to the nature and quality of social interaction on the roads. It is therefore of some interest to examine drivers' self perception, emotional response, behavioural tendencies and risk perceptions in relation to subjective estimates of culpability for accidents. The anonymity of such reports may be expected to reduce concern about any private or public consequences of acknowledging responsibility.

GENERAL SUMMARY OF THE INTRODUCTION

Many studies have identified the human factor as an important contributor to accidents, however safety considerations need to allow for the human factor/vehicle/ environment interface (McKenna, 1982). It seems necessary therefore to appraise the role of human factors within the transport system as a whole in order to allow requirements of all road users, and perhaps drivers in particular, to be guided by realistic expectations. Therefore allowance for human fallibility needs to be built into the design of both vehicles (Whitfield & Fife, 1987; Evans, 1991) and the road transport system (Lay, 1988), as well as the laws and policies which guide and govern their use (Himanen & Kulmala, 1988; Allsop & Turner, 1986). Human factors not only influence road safety directly, but also indirectly via input to such policies and laws which influence the quality of the traffic environment and vehicles which traverse it, as well as factors which wield considerable influence over road user behaviour, particularly that of young drivers (IDBRA, 1987; Waller & Waller, 1987; Bradstock et al, 1987,1988; Jessor, 1987; Farrow, 1987A/B), such as social and cultural values and their reciprocal influence on alcohol and vehicle advertising.

Accident risk has been found to be mediated by different factors associated with age (McFarland, 1966; Brendemuhl et al, 1988) and experiential level (Brown & Groeger, 1988), the former relating largely to maturation (Schuman et al, 1967; Hilakivi et al, 1989; Finn & Bragg, 1986; Matthews & Moran, 1986; Jessor, 1987) and aging processes (Scialfa et al, 1988; Rabbitt, 1990) and the latter to acquisition of skill, information and judgement. This suggests that consideration of such influential factors may render evaluation of driver attitudes, attributions and behaviours which may compromise safety, more appropriate and effective.

Impairment factors, which influence driver control, have been found to be strongly associated with accidents (McLean et al, 1988). Fatigue (McDonald, 1984; Haworth, 1988), stress (Gulian, 1987; Selzer & Vinokur, 1974, 1975) and alcohol (Gawron & Ranney, 1988; DeWaard & Brookhuis, 1991) have been found both individually and in combination to reduce the capacity for adequate response within the driving situation. Drivers whose alcohol intake is heaviest and most frequent, appear to be relatively unaware of and/or unconcerned about the associated risks (Clayton et al, 1980, 1984; Guppy 1987, 1988; Albery, 1991). Considering the degree to which impairment may compromise potential control within the driving situation, the relationship between impaired and other risky driving behaviours and drivers' causal accident attributions seems an important focus of attention. The current study seeks to address such issues in relation to drivers' subjective assessments of accident culpability.

Drivers' attitudes, with their amenability to change, have been the focus of considerable research attention. The problem of accident risk has been approached from many perspectives. A major issue which emerges is the degree to which risk-taking is intentional (Reason et al, 1990), or involves relative lack of awareness

(Finn & Bragg, 1986; Matthews & Moran, 1986), lack of control over life events/ external pressures (Gulian et al, 1989), problems inherited and/or provoked during maturation (Jessor, 1987; Farrow, 1987; Waller & Waller, 1987; Beirness & Simpson, 1990) and/or involves social conditioning and motivational issues (Barjonet, 1988; Parker et al, 1992; West et al, 1993; Wilde, 1986). Several driving behaviours have been found to be strongly associated with accident risk, either alone or in combination, but especially speeding (Haworth, 1988; Garber & Gadirau, 1988). Evidence has been found of a generalized tendency for positive driver self-perception (Svenson, 1981; McCormick et al, 1986, Sivak et al, 1989C, Goszczynska & Roslan, 1989) which appears to persist regardless of risky driving behaviours, transgressions (Delhomme, 1991) or culpable accident involvement resulting in injury to self or others (Preston & Harris, 1965). Drivers' perceptions of their own driving abilities and qualities by comparison with those of others seems pertinent to social interaction on the roads and analysis of any accident involvement. Drivers' relative lack of awareness of the needs and constraints of others on the roads has been identified (Egberink et al, 1986; Brooks, 1988, 1991; Brouwer et al, 1988). The nature of social interaction in the driving situation and the potential for drivers to both provoke and misattribute negative affect (Knapper & Cropley, 1980; Kelley, 1972) raises questions about drivers' causal attributions, in the event of accident occurrence, to themselves, to others, and to situational factors.

Considering that causal attributions have been found to be prone to several biases (Jones & Nisbett, 1972; Jones, 1976; Watson, 1982; Hewstone, 1989), self/other causal attribution seems particularly relevant to interpretation of personal accident involvement. Preston & Harris (1965) found that a majority of drivers deemed culpable by police investigative teams attributed greater causal responsibility to other drivers than to themselves for the accidents in question. This is consistent with Clay's (1987) tentative evidence of drivers' generalized tendency to make differential self/other attributions for accidents in which they were involved, considering the "other driver" to have had greater influence on accident occurrence than they did themselves, and more potential to have avoided the accident(s) in question.

Previous research suggests that many factors of which drivers are relatively unaware may predispose them to accident involvement. Many studies have yielded useful insight into accident occurrence, but allowed no comparison with other factors which appear to be strongly associated. Many factors have been carefully examined in relation to either one or more of accident involvement, age, sex and driving experience, but relatively few studies seem to examine the relative importance of all such influences. Evaluation of the influence of culpability, allowing some control over the influence of accident involvement per se, albeit retrospective, seems to be far more rare. The considerable potential of many studies is constrained by limited sample size and/or unrepresentative samples, such as psychology undergraduates. The current study examines driver attitudes and causal attributions in relation to subjective accident culpability, while ascertaining the relative influence of age, sex, and driving experience/exposure. The self/other causal attributions for accidents of both subjectively and objectively culpable drivers are also evaluated.

RESEARCH OBJECTIVES

The main objectives of the current study are:

1 to examine drivers' awareness of their potential for active accident avoidance, via assessment of factors which they consider influenced personal accident involvement while driving, focusing in particular on differential self/other attributions, with regard to which an exploratory study (Clay, 1987) found tentative evidence of a tendency to attribute responsibility to others for accident causation, consistent with causal attribution theory and previous research (Jones & Nisbett, 1972; Watson, 1982; Hewstone, 1989; Fiske & Taylor, 1991).

The causal attribution tendencies are ascertained therefore, for:
(a) a large general sample of drivers
(b) drivers deemed culpable within police accident records

2 to identify factors which distinguish drivers according to self-reported accident-involvement and culpability in relation to:
(a) affect/state within the driving situation;
(b) driver self-perception;
(c) driver attitudinal/behavioural tendencies; and
(d) causal attributions for various risk factors relating to road accidents within the country of residence.

3 to identify factors which distinguish young subjectively culpable drivers from their non-culpable and non-accident-involved peers in relation to the factors detailed in 2(a-d) above, and to examine the stability of such factors across cultures (although the current study allows only qualified support for the latter - refer Procedure - Australian {Victorian} survey).

RATIONALE FOR THE CURRENT RESEARCH FOCUS

The main focus of this study is the nature and intensity of drivers' attributions of responsibility for accidents in which they were personally involved while driving in relation to attitudinal components, perceptions and opinions which may predispose them to accident involvement. The objective in essence is to identify and attempt to gain insight into factors which may, alone or in combination, predispose drivers and all with whom they interact on the roads, to accident risk, so that the problem of safety promotion may be effectively addressed.

This area of research was prompted by the complexity of objectively attributing cause and/or responsibility for an occurrence within an everyday social setting such as driving, the potential consequences of misattribution, in particular the implications for safety and constructive social interaction.

There appear to be many factors which may influence cognition and social interaction in such a setting, for example: the relative isolation of the individual from those with whom he/she interacts on the roads; the implications for self-esteem, both public and private, of the consequences of any actions or failure to act; and the problem of coping with blame in the event of a crash.

The severity of any negative consequences, especially injury, to self and/or others, may further complicate any evaluation of what has taken place, not least because of the speed and confusion often associated with events resulting in accidents. Similarly, legal, occupational and economic considerations may also colour any immediate impression and subsequent evaluation of what has taken place, and the apportioning of blame.

But perhaps one of the main problems is simply that accidents are relatively rare events which occur during the performance of what is often a commonplace and well-rehearsed task. This may, in the event of an accident, encourage deflection of attention from the individual's own performance, or factors which may influence or impinge upon it, to salient external factors, especially others within the driving environment (Jones & Nisbett, 1972; Watson, 1982; Hewstone, 1989; Fiske & Taylor, 1991).

Exploratory research in this area in the form of a moderately sized study (n=295) in Bedfordfordshire (Clay, 1987), provided tentative support for the hypothesis that drivers tend to attribute considerably greater responsibility for accidents to other drivers than they do to themselves. However this obviously required more comprehensive and rigorous testing before any firm conclusions could be made. Further surveys were therefore indicated to allow estimation of the degree to which such findings could be generalized to other populations, other regions and other cultures. A larger sample was also necessary to ascertain the respective influences of maturation, aging, sex, driver experience and exposure, and accident-involvement, including culpability, in relation to factors which may predispose drivers to accident risk. Thus to comply with its objectives, the current study, conducted in Britain and one state within Australia (Victoria), included both a broadly-based sample as well as specifically focused ones.

The degree to which culpable drivers may select themselves out of such samples also required assessment. It remained improbable, but not impossible, that drivers' self-attributions of non- or minimal culpability merely reflected objective reality. This would require, however, that the majority of accident-involved drivers who took part in Clay's 1987 survey were essentially the "innocent parties", with the majority of culpable drivers refusing to respond. It was therefore deemed necessary to exclude the possibility of such bias.

This objective could be achieved, with the co-operation of the Road Traffic Police, via official accident records. Drivers considered to be culpable by disinterested others (such as non-involved witnesses and the investigative team of Road Traffic Officers) would therefore provide a population for whom comparison of both objective and subjective culpability could be reasonably made. The confidence in objectivity would thereby be greatly increased by means of appropriate population selection.

The claim to minimal or non-culpability would appear more tenuous in the face of either a prosecution for negligent driving, or where a single vehicle accident was involved in the absence of factors which may impinge upon driver performance. However it should be acknowledged that such factors may be manifold and not necessarily immediately apparent, for example: oil slicks; black ice; sudden, unexpected illness; extreme road or weather conditions; obstacles on the road (particularly hazardous for cyclists and motorcyclists); or the need for emergency avoidance measures due to young children or animals suddenly appearing in the driver's pathway, or other road users acting in an unexpected manner due to inexperience, lack of skill, impairment, intentional risk-taking or simply momentary distraction or lack of vigilance.

However all drivers will be exposed to the unexpected, and therefore need to drive in a manner which will facilitate awareness of the driving environment, while allowing sufficient time and control to reduce the likelihood of accident involvement. The care, attention and awareness which drivers bring to bear on the ever-changing driving situation may be expected to influence any possible outcome. However, drivers' awareness of their own potential to actively influence accident involvement or avoidance may vary considerably.

It therefore seems of no small importance to attempt to examine drivers' awareness of their own role within the driving situation, with the help of self-assessments of their own influence on accident occurrence, as well as the degree to which they consider other road users and external factors in general to have contributed. The relationship between self-reported accident-involvement, subjective culpability and factors which may predispose drivers to accidents, according to accident statistics and a large body of previous research, seems particularly relevant to an evaluation of, not only drivers' potential for effective accident prevention, but safe, pleasurable and skilful driving.

METHOD

GENERAL RESEARCH CONSIDERATIONS

Various objections and concerns have been raised over the years with regard to employment of verbal or written accounts of attitudes, as opposed to direct observation of behaviour, as well as the problem of consistency, which seem to be effectively countered by Ajzen (1988). Firstly, it has been argued that non-behavioural responses provide an opportunity for deliberate misrepresentation, for offering what is considered to be a socially acceptable, rather than a true account of behaviour or its precursors. However, as Ajzen points out, it is also possible to misrepresent oneself behaviourally.

The issue seems to revolve around anonymity, confidentiality, and a perception of possible threat to public or private self-image, rather than the precise nature by which behaviour and intention are apprehended.

Secondly, with regard to the predictability of attitudes and behaviour, Ajzen suggests that many past difficulties were due, not to an essential lack of consistency in human behaviour and attitudes, but rather to a lack of awareness of how best to evaluate and demonstrate such consistencies. He points out the need to make comparisons which are at a similar level of specificity, and also the potential benefits which are obtainable by evaluating aggregates of attitudes or behaviour, rather than singular examples.

While single instances of a particular behaviour may not reflect general tendencies well, because of the potential diversity of circumstances which may prevail, Ajzen points out that "by aggregating observations of a given behaviour across occasions we obtain a stable measure of the disposition to perform the behaviour in question. Temporal stability is in fact found to become quite high with aggregation over a sufficient number of observations". Perhaps the problem of consistency can be described as essentially one of restricting inferences to the legitimate bounds of the available information, of giving due consideration to validity in both the design and interpretation of research.

Ajzen suggests that where appropriate methodology is employed, it can be demonstrated that in keeping with "intuitive observation" people appear to be "quite consistent in the patterns of behaviour they exhibit". Their actions do not generally tend to be determined either purely by whim or by external forces, but rather on the whole "to follow reasonably and consistently from relevant behavioural dispositions".

However, consistency also relates to flexibility of response (Fiske & Taylor, 1991) and whereas some people's behaviour may reflect rather rigid and inflexible, albeit stable, attitudes, others may equally consistently exhibit a potential for change and growth mediated by a more flexible approach to life events, and contingencies.

More specifically in relation to the current research, multivariate analyses were considered necessary to allow valid and useful evaluation of the complex interrelationship of variables involved in road accidents (Tabachnick & Fidell, 1983; Norusis, 1988). A large sample was therefore obtained (refer Results) to facilitate clear demonstration and interpretation of the implications of driver attitudes in relation to the relatively rare occurrence of road accidents, particularly when exposure has been controlled for, and culpability taken into consideration.

A self-completion questionnaire was considered less intrusive and more time effective, given the sample size, than researcher-administered. This also facilitated preservation of subjects' anonymity, an important principle in itself, while reducing the risk of social-acceptability response bias due to concerns about public image.

The major component of the British sample (from DVLA records), the police accident samples, and the Australian sample all involved postal distribution. The potentially good response rate which can be achieved by this means has been clearly demonstrated (Banchevska, 1980; Brooks, 1988). Clay's (1987) street survey involved personal distribution of questionnaires by the researcher in a shopping precinct carpark site in Bedford, yielding an acceptable response rate of virtually fifty percent.

However the street survey carried out during the current study yielded a more modest 40% response rate, possibly influenced to some degree by the effects of a prolonged, economic recession. While a considerably higher response rate is desirable, some degree of compromise is generally found to be necessary between the amount and quality of information required, the time involved in personal distribution, and the cost involved in sending reminders by post, especially with additional copies of a reasonably large questionnaire enclosed, in particular when the sample population is large.

Postal distribution, although yielding a relatively smaller response, allowed a wider survey of driver populations, without regional or socio-economic bias. Assurance of confidentiality and anonymity was emphasized throughout the study (ref. Appendix A).

SAMPLE SELECTION

All drivers eligible for sample selection held full driver's licences, with the exception of drivers obtained via police accident records for whom this stipulation was waived, although the vast majority of this sample were found to have full licences nonetheless.

With regard to accident involvement, the selection criterion for all stages of Clay's (1987) exploratory study was defined as "any accidents while driving which have resulted in damage amounting to £100 or more and/or any injury". This criterion was reviewed for the current study which was commenced approximately 2 years later.

Preparation for the Australian survey required adjustment of the previously set accident criterion, to allow, not only for currency equivalence and temporal, inflationary effects, but also the comparatively high costs of vehicle and parts purchases and repairs in a country which has a relatively small population which is isolated geographically from most of the major vehicle manufacturers and parts suppliers. A figure of $400.00 was therefore arrived at following brief consultations with research staff at the Accident Research Centre, Monash University, Melbourne, Victoria, and the Group Manager -

Driver Licencing of the Road Traffic Authority (the licencing body in Victoria, subsequently renamed the Roads Corporation following amalgamation with the Road Construction Authority in mid 1989).

Preparation for the British surveys required accident criterion adjustment mainly to allow for inflationary effects, a minimum of £150 damage was considered to be the nearest appropriate equivalent to that employed in the Australian sample.

For both countries, the nearest rounded approximation was considered to be more appropriate for use as an accident criterion, for ease of use by respondents in a survey, rather than precise adjustment for equivalent value according to the dictates of inflation, currency conversion or geographical price variation.

QUESTIONNAIRE DEVELOPMENT

The questionnaire employed in the current study was developed in several stages, involving two pre-tests and a pilot study prior to the conduct of an exploratory survey (detailed fully in Clay, 1987), initially in accordance with the literature search, and subsequently incorporating information gained from each preceding stage. Each revision resulted in modification or removal of components or items considered to be either unreliable or invalid for the purposes of the research, or presenting subjects with difficulty with regard to comprehension or response; with retention and/or development of areas which seemed to yield relevant information. At its earliest stages the questionnaire was exploratory and very open-ended, evolving by stages into a structured instrument which would facilitate quantitative analysis, while retaining sufficient flexibility to avoid constraining the wide variety of responses which drivers' may wish to offer, and allowing qualitative data to support, qualify, and/or explain more fully, precisely what the individual driver may wish to say. The questionnaire originally devised and utilized in 1987 was subsequently used in the current research, with minor modifications only, which are discussed in the appropriate section of the method.

QUESTIONNAIRE DESIGN

Assurance of anonymity and confidentiality were emphasized. A brief outline of the purpose of the survey and approximate time commitment required were also given.

Section A

This included personal details e.g. age, sex, marital status, occupation; details of the vehicle currently/usually used including engine capacity; some details of driving experience including trip frequency, weekly mileage (or kilometrage) and any other driving qualifications; and also details of traffic violations.

Government statistics and many studies cited in the introduction note the strong association between driver demographics and accident involvement (.e.g. Dept of Transport Statistics Great Britain, 1990), while others emphasize the fact that young drivers' accident involvement is confounded by their inexperience as drivers. This qualification is also suggested as relevant to the high involvement of young drivers in drink/driving accidents (i.e. limited alcohol tolerance by comparison with intake, and lack of awareness of the impairment effects of even a moderate quantity of alcohol on driving performance (Bungey & Sutton, 1983; Banchevska, 1980; Clayton, McCarthy & Breen, 1984). Driving exposure tends to be high in young males, both quantity (mileage) and frequency (trips weekly). This also tends to confound accident involvement of young male drivers (Pelz & Schuman, 1971). Vehicle size and performance potential have also been established as relevant factors in accident involvement (Lee, Glover & Eavy, 1980; Evans, 1985; Mahalel & Szternfeld, 1986).

Section B

This section required response to Likert-type (five point) scales involving the emotional component of attitudes, e.g. anger, fear, exhilaration; and physiological states e.g. fatigue, tension, alertness. Drivers were asked to specify the degree to which driving tended to increase or decrease their level of emotional response according to seventeen dimensions i.e. whether or not driving either aroused or reduced feelings of anger, confidence etc. and if so to what degree (Michon, 1980; Knapper & Cropley, 1980; Wilde, 1980; Hauber, 1980; Bliersbach & Dellen, 1980; Sivak, 1981; Donovan, Marlatt & Salzberg, 1983; McDonald, 1984; Wilson, 1987).

Bliersbach & Dellen (1980) suggested that an awareness of emotional response tends to exist amongst drivers, but not necessarily an appreciation of why feelings often appear to be so intense while driving. The tentative explanation offered was that the attention and anticipation requirements of driving induced physiological arousal, which served to heighten emotional response.

Other studies have suggested that some drivers tend to use driving to help reduce feelings of discomfort, e.g. upset due to interpersonal problems (Schuman et al, 1967; Brenner & Selzer, 1969).

Section C

This section involved questions about personal accident involvement according to the criterion stipulated, i.e. damage amounting to £150 ($Aus400) or more and/or any injury while driving, (refer p88 for discussion of criterion).

Indication of the number of accidents (as defined above) in which drivers were involved was necessary to allow differentiation between drivers according to accident involvement rate. Recording the year of the two most recent accidents (where applicable) would allow some evaluation of any tendency for change in rate of accident involvement over time, taking into consideration age, experience, and possibly change in vehicle choice. As accident site has been identified as a relevant factor in accident involvement, some evaluation of the importance of site as a factor influencing accident involvement rate was considered appropriate.

Attributions for possible causative factors in accidents which occurred while the subject was driving were assessed on 5-point Likert-type scales. This allowed some evaluation of the cues (albeit retrospectively) which were salient to the subject at the time of the accident, and the degree to which each contributed to the accident. Self/other differences in attributions (Jones & Nisbett, 1972; Jones, 1976; Watson, 1982; Hewstone, 1989; Fiske & Taylor, 1991) may possibly be more pronounced in high- than in low-accident involved drivers. As situational cues tend to be more salient for the actor than the observer, any differences which can be distinguished according to accident involvement may be contributing factors in accident causation, and therefore usefully examined as a means of reducing or preventing accidents.

The open-ended questions on personal accident involvement as a driver, were primarily intended to allow evaluation of perceived degree of control over the likelihood of accident involvement; including the degree to which locus of control appears to be associated with accident involvement rate (Jones et al, 1972; Lefcourt, 1976). The question on prevention of similar accidents also addresses the issue of locus of control (Banchevska, 1980; Connors, Ranish & Maisto, 1982).

Section D

This section was concerned with attributions for accident causation in the country of residence (Banchevska, 1980). Items were generated from: the relevant accident statistics; the pretests, pilot and discussions which resulted from these; and relevant literature.

The degree to which each of the factors offered contributes to accidents, in the opinion of subjects, was assessed on a 5-point Likert-type scale. The factors may be divided broadly into the following categories: driver error; driver impairment; other road user error; mechanical failure; road/weather conditions (Evans & Wasielewski, 1983; Wasielewski, 1984; Jonah, 1986; Harris, 1987; Edwards, 1986; Wilson & Best, 1982; Knapper & Cropley, 1980; McLean et al, 1988; McDonald, 1984, Storie, 1984; Haworth, 1988; Hancock & Warm, 1989; Mayhew et al, 1986; Jessor, 1987; Brooks, 1988; Hauber, 1980; Wilson & Wilson, 1984; Garber & Gadirau, 1988; Lay, 1988; Brodsky &

Hakkert, 1988; Gulian 1987; Gulian et al, 1989; Farrow, 1987A/B; Mannering et al, 1987; McFarland, 1966; Brenner & Selzer, 1969; McMurray 1970; Turner et al, 1975; Goldstein, 1964; Egberink et al, 1986).

These, like the attributions for personal accident involvement, seemed amenable to differentiation according to internal or external locus of control. As they involved potentially less sensitive issues (accidents in general rather than personal involvement), the responses in this section seemed to offer a useful point of comparison with the personal accident data for any tendency to attribute accident causation either to factors potentially within or beyond the driver's control, and the extent to which such control may be possible. This section also offered the opportunity to gauge, at least to some extent, drivers' expectations of road traffic behaviour, especially with regard to potential hazards.

Section E

This section involved three sets of attitude scales, all using 5-point Likert-type scales to indicate degree of response.

Q1) Required a profile of the subject's own style as a driver on 18 dimensions, each of which involved a particular attitude and its polar opposite e.g. aggressive-defensive, insistent-yielding.

Q2) Required a profile of the "dangerous driver", using the same 18-dimension, 5-point scale as that used for Q1.

These two sets of scales were developed and prevalidated in a comprehensive study by Wilson (1987).

The driver self-perception scale allows a fairly detailed description of the criteria on which drivers may base their global perceptions of self as a driver (i.e. above average as compared to average or below). When examined in conjunction with the importance attributed to various accident risk factors; drivers' emotional/state responses to driving; self-reported driving behavioural tendencies; and perhaps most important, subjective accident involvement, a fairly clear impression of the implications of driver self-perception seems to be obtainable.

All the dimensions included within the two scales above have been mentioned separately in many different studies as being of importance in accident involvement. However their combination within these scales allows comprehensive evaluation by multivariate analysis techniques.

Q3) This involved a series of attitude statements developed from the relevant literature relating to accident risk factors e.g. aggression, frustration, speed relative to manoeuvre, speed relative to conditions (road/weather/traffic), stress (e.g. Donovan, Marlatt & Salzberg, 1983; Lund & O'Neill, 1986; Evans & Wasielewski, 1983; Finn & Bragg, 1986; Jonah, 1986). The two attitude statements relating to drink/driving were adaptations of existing questionnaire items from a study by Guppy (1984).

THE CURRENT RESEARCH: 1989-1991

AUSTRALIAN (VICTORIAN) SURVEY (1989)

QUESTIONNAIRE REVIEW

Very minor changes only were made to the questionnaire prior to its use in a survey in Victoria, Australia. These related mainly to: cultural appropriateness e.g. vehicle categories differ slightly from those in use in Britain; the major road networks consist of highways and freeways rather than motorways; currency and cost of living differences were taken into consideration in determining accident criterion. One attitude statement was altered slightly to improve clarity.

SUBJECTS

Three hundred and thirty-six subjects responded, a response rate of 35%, allowing for 48 questionnaires which were never received by the addressees.

PROCEDURE

Licencing bodies were contacted in three states in Australia: Victoria, New South Wales and Queensland, with a view to obtaining driver populations from at least two of the above. A quick and very positive response was obtained from Victoria. However problems became evident in obtaining samples from the other two states which could not be resolved within the prevailing time and financial constraints, thus one Australian sample only was obtained (from Victoria).

The questionnaire was modified slightly for the Australian sample following brief consultation with research staff at the Accident Research Centre, Monash University, Melbourne and the Driver Licencing Manager at the Road Traffic Authority {RTA} (now the Roads Corporation following amalgamation with the Road Construction Authority in mid 1989). These changes were mainly concerned with licence categories (ref. Appendix A) and appropriate accident criterion for cost of damages.

The RTA selected 1000 Victorian drivers who had held full driver's licence for at least one year, via a computer programme, randomly selected on a 1:1000 basis. Thus the Victorian study was comparable to the original survey (Clay, 1987) with regard to ruling out novice drivers in a relatively small sample. It transpired that the sampling procedure used resulted in a considerable oversampling of drivers under 30 years of age, and a slight to moderate under-sampling of males. Thus no claim to generalizability to the Victorian driving population can be made. However, a cross-cultural focus on young drivers was thus possible.

Distribution and freepost return of questionnaires was arranged by the RTA, which guaranteed anonymity of respondents. A covering letter from the RTA encouraged drivers to respond, while giving assurance that there was no obligation to do so and confirming their anonymity.

BRITISH SURVEY (1990-1991)

QUESTIONNAIRE REVIEW

Minor changes only were made to reconvert the questionnaire for use in a large-scale Britain-wide survey to: make it culturally relevant; allow for currency and inflationary effects re accident criterion; improve quality of information on degree to which driving is a requirement of current occupation; simplify response on area of residence for wider sampling in a larger scale survey; assess drivers' perceptions of their vehicles as: small, medium, large, high performance (Wilson, 1987); add several brief questions on traffic violations (as indicated by the literature review, ref. Schuster, 1968; Chipman & Morgan, 1975; Chipman, 1982; Harano et al, 1975) using development of items obtained from Wilson's (1987) study; gauge frequency of driving while over the legal alcohol limit (ref. Guppy 1984); ascertain whether reported accidents involved injury to self and/or other; clarify whether or not reported accidents involved any non-driving road-users.

DVLA POSTAL SURVEY

SUBJECTS

Eight hundred and three subjects responded to a Britain-wide postal survey, i.e. 35% of questionnaires actually received by potential respondents. The 803 responses comprised 526 from the Britain-wide distribution, and 277 which resulted from a denser sampling of the Milton Keynes/Bedford area to facilitate comparison with at least one sample of drivers deemed culpable within police accident records.

PROCEDURE

The Driver Licencing Board (DVLC) (now DVLA) at Swansea co-operated with allowing access to a population of British drivers holding full driving licences from within a sub-population of drivers randomly selected from the total DVLC records. The population for this survey was randomly selected via a computer programme from this sub-population. A postal survey was conducted in mid 1990 involving distribution of 2400 self-completion questionnaires with freepost return. Twenty-five percent of the sample were also sent reminders with some effect.

BEDFORD STREET SURVEY

SUBJECTS

Four hundred questionnaires were returned following personal distribution by the researcher in a street survey in Bedford, a response rate of 40%. This involved a virtual replication of the original 1987 study.

PROCEDURE

This involved a street survey conducted in Bedford in mid 1990, utilizing the same site (shopping precinct carpark) and basic strategy as that involved in Clay's (1987) study, with the exception that no minimal driving experience was required, as this was part of a somewhat larger study than the original one, therefore potentially allowing evaluation of changes over time with increasing experience. A random distribution of 1000 questionnaires was carried out by the researcher who emphasized the confidentiality and anonymity of response as well as the freepost return. Details of age and sex were noted for all potential participants, including those who refused to accept questionnaires for whom an estimate of age was made.

POLICE ACCIDENT RECORDS POSTAL SURVEY

SUBJECTS

Two hundred and thirty-eight questionnaires were received following a survey of three populations of drivers drawn from police accident records. The criterion for selection was that they were deemed by the police accident investigation team to be at least partly responsible for their own accident involvement.

For the most part, drivers included in this sample were considered to be the most culpable participant, and sometimes also the only participant. The response rate was 33.54% of questionnaires actually received by potential respondents.

PROCEDURE

Warwickshire and Bedfordshire Police Forces allowed access to their road accident records for the purpose of obtaining accident-involved driver populations for inclusion in the survey. No minimal driving experience criterion was specified, so that the attitudes and accident history of novice drivers could also be assessed. Accidents resulting in injury, either slight or severe, in which the potential respondent was assessed as being at least partly responsible for the accident, were selected. However any with court proceedings pending were excluded for legal reasons, while ethical considerations led to the exclusion of all drivers involved in accidents resulting in a fatality. Three postal surveys involving a total of 750 questionnaires comprised 250 each distributed to potential respondents selected from police records of accident-involved drivers from Warwickshire North (in mid 1990), Warwickshire South (in late 1990) and Bedfordshire (in early 1991) with freepost return. Twenty-five percent of the sample were also sent reminders with some effect.

R E S U L T S

SAMPLE DEFINITION

A total of 1777 respondents took part in six surveys, comprising: a large Britain-wide survey; a medium-sized street survey in Bedford virtually replicating the sampling procedure employed in Clay's (1987) exploratory study; three small surveys in Warwickshire South and North, and Bedfordshire involving drivers deemed within police accident files to be culpably involved in injury accidents; and a medium-sized survey in Australia allowing a focus on young drivers in a cross-cultural context. The net overall response rate of 35.79%, was determined as follows:

ROAD TRAFFIC AUTHORITY, VICTORIA (AUSTRALIA) - POSTAL SURVEY

One thousand questionnaires were distributed by post during June, 1989 to randomly selected drivers registered with the RTA (now the Roads Corporation) as having full driving licences. Three hundred and thirty-six drivers (33.6%) responded. A further 48 questionnaires were returned to sender as addressees had moved, thus 35.3% of those who actually received questionnaires responded.

DVLA POSTAL SURVEY

Two thousand, four hundred questionnaires were distributed by post during mid 1990 to randomly selected drivers registered with the DVLA as having full driving licences. One thousand, six hundred of these were addressed to drivers throughout Britain, while the remaining 800 involved a rather denser sampling of drivers in the Milton Keynes/Bedford (MK/B) area. One hundred and forty-one questionnaires were returned to sender unopened as addressees had moved, thus, a total of 2184 questionnaires were actually received by potential respondents. Respondents totalled 35.3% of those who actually received a questionnaire. A total of 803 questionnaires were received, 526 from the Britain-wide portion of the survey and a further 277 from MK/B.

BEDFORD STREET SURVEY

One thousand questionnaires were distributed personally by the researcher during mid 1990, to randomly selected, fully licenced drivers, near a shopping precinct carpark. Four hundred questionnaires were returned, a response rate of 40%.

POLICE ACCIDENT POSTAL SURVEYS

Seven hundred and fifty questionnaires were distributed in postal surveys during mid 1990 to early 1991, to drivers assessed within police accident records in Warwickshire South, Warwickshire North and Bedfordshire to be mainly or solely responsible for the accidents in which they were for the accidents in which they were involved, which resulted in injury. Two hundred and thirty-eight questionnaires were returned, a response rate of 33.54% of questionnaires actually received by potential respondents.

SAMPLING ADEQUACY/REPRESENTATIVENESS

The Australian postal survey (1989) yielded a sample in which 77.5% of drivers were aged under 30 years, and 55.7% of drivers were female, thus involving considerable over-sampling of young drivers and a moderate over-sampling of females, thus no claim to this sample being representative of Victorian (Australian) licenced drivers can be made. However it should be noted that, within the above constraints, the sample was selected on a random basis via computer program, and it is therefore considered that no assumption of selection bias should necessarily be made. Sampling limitations will nonetheless be taken into consideration in the interpretation of results involving the Victorian sample.

Details of the age/sex distribution of each of the three British samples listed below, including a combined police accident sample, suggest that the samples are representative of the populations from which they were drawn.

TABLE 1: DVLA POSTAL SURVEY (1990) AGE/SEX DISTRIBUTIONS

	RESPONDENTS	DRIVER POPULATION DISTRIBUTION (DVLA RECORDS 1990)
	%	%
AGE (YEARS)		
16-20	5.3	4.7
21-30	25.1	22.3
31-40	24.6	21.6
41-50	21.8	20.1
51-60	11.0	14.4
61-70	8.0	11.7
71+	4.2	5.2
SEX		
Male	58.4	61.0
Female	41.6	39.0

Although minor discrepancies are evident, this sample seems to represent the DVLA population quite well.

TABLE 2: BEDFORD STREET SURVEY (1990) AGE/SEX DISTRIBUTIONS

	RESPONDENTS %	SURVEY POPULATION %	REFUSALS %
AGE (YEARS)			
16-20	3.3	3.5	NIL
21-30	34.8	30.2	15.5
31-40	19.5	23.4	29.7
41-50	23.0	23.5	26.2
51-60	12.8	13.3	15.5
61-70	5.3	4.6	11.9
71+	1.3	1.5	1.2
SEX			
Male	49.6	48.5	54.8
Female	50.4	51.5	45.2

No marked bias seems evident in this sample by comparison with the population from which it was drawn, or those refusing to consider taking part, except perhaps for the refusal rates of drivers under 30 years (relatively low), and the 61-70 years group (relatively high), who did however, constitute a small percentage of potential respondents.

TABLE 3: POLICE ACCIDENT SURVEYS (1990/91) AGE/SEX DISTRIBUTIONS

	Respondents %	Combined Police Accident Pops. (Beds., W/shire N, W/shire S) %
Age (years)		
16-20	16.5	18.0
21-30	29.7	34.9
31-40	19.5	18.3
41-50	12.7	12.7
51-60	8.0	7.1
61-70	8.1	4.9
71+	5.5	4.1
Sex		
Male	74.7	79.3
Female	25.3	20.7

Apart from a slightly lower rate of respondence from drivers under 31 years, and males, this sample seems to represent the population from which it was drawn quite well.

DEMOGRAPHICS

TABLE 4: BRITISH/VICTORIAN SAMPLES - DEMOGRAPHICS

AGE (YEARS)	All British samples (combined) RESPONDENTS %	Victorian (Australian) sample RESPONDENTS %
Under 20	4.2	NIL
20-29	28.3	77.5
30-39	22.6	12.0
40-49	21.0	6.6
50-59	11.9	2.7
60-69	7.7	0.6
70 and Over	4.3	0.6
SEX		
Male	58.6	44.3
Female	41.4	55.7
MARITAL STATUS		
Married/Cohabiting	71.5	43.5
Single	21.9	54.4
Divorced	4.7	2.1
Widowed	1.9	NIL

DRIVING QUALIFICATIONS

A little over half of the British respondents (53.4%) obtained a driving licence on the first attempt; a further 29.8% passed on the second attempt; with only 9.8% and 3.1% requiring three and four attempts respectively.

A majority of Victorian respondents (80.5%) obtained a driving licence on the first attempt; a further 14.4% passed on the second attempt; while only 3.9% and 0.3% respectively required three or four attempts. It should be noted however, that driver licencing was reviewed in 1989 and an additional written component incorporated in the basic driving test.

The most common driving qualifications in addition to a full driving licence amongst British drivers were: motorcycle 39.5%; 25.2% heavy goods vehicle (HGV); 6.8% public service vehicle (PSV) licence; and 7.7% were members of the Institute of Advanced Motorists (IAM). A further 4.4% had Police driving qualifications, including 2.4% who had Advanced Police Driver accreditation.

Similarly, amongst Victorian drivers, the most common driving qualifications in addition to a full driving licence were: motorcycle 31.4%; articulated vehicle 17.1%; forklift 8.6%. A further 5.7% had CAMS (Confederation of Australian Motor Sport qualifications); 5.6% were licenced to drive non-articulated motor trucks; 5.7% had both heavy articulated truck and motorcycle licences; and 2.9% had completed defensive driving courses, while 5.8% had Police Dept. Licences.

ACCIDENT DATA

TABLE 5: NUMBER OF ACCIDENTS

According to the accident criteria (ref. Method) 54.8% of the British drivers and 40.2% of the Victorian drivers were accident involved. The quantity distribution is as follows:

NO. OF ACCIDENTS	BRITISH SAMPLE (COMBINED)		VICTORIAN SAMPLE	
	%	N	%	N
0	45.2	649	59.8	201
1	31.1	447	26.5	89
2	14.7	211	10.1	34
3	4.3	62	2.7	9
4	2.6	37	0.9	3
5	1.0	14		
6	0.4	6		
7	0.1	1		
8	0.1	2		
9	0.1	2		
10	0.2	3		
12	0.1	1		
18	0.1	1		

TABLE 6: YEAR OF ACCIDENTS - COMBINED BRITISH SAMPLE

ACCIDENT 1 (N = 752)	%
pre 1950	0.1
1950-1959	0.7
1960-1969	4.2
1970-1979	12.1
1980-1989	58.1
1990 +	24.9

ACCIDENT 2 (N = 330)	%
pre 1950	NIL
1950-1959	0.3
1960-1969	4.8
1970-1979	11.1
1980-1989	64.0
1990 +	18.5

TABLE 7: YEAR OF ACCIDENTS - VICTORIAN SAMPLE

ACCIDENT 1 (N = 135)	%	ACCIDENT 2 (N = 46)	%
1950-1959	0.8	1950-1959	NIL
1960-1969	0.8	1960-1969	2.3
1970-1979	2.4	1970-1979	4.5
1980-1989	96.0	1980-1989	93.2

TABLE 8: SELF/OTHER INJURY - COMBINED BRITISH SAMPLE

ACCIDENT 1					
Self injured	(N=775)	YES	16.6%	NO	83.4%
Other injured	(N=766)	YES	18.8%	NO	81.2%
ACCIDENT 2					
Self injured	(N=336)	YES	13.7%	NO	86.3%
Other injured	(N=334)	YES	12.3%	NO	87.7%

ATTRIBUTIONAL ISSUES

Drivers' relative awareness of their contribution to accident involvement and their potential for active avoidance/ prevention is a major focus of the current study. It is therefore of some concern, that a far from trivial degree of blame may be misattributed to salient others in the driving situation (Jones & Nisbett, 1972; Hewstone, 1989), the implications of which are addressed in the discussion. Clay (1987) drew the tentative conclusion that drivers tended to attribute considerably more influence for the occurrence of accidents in which they were involved to 'other drivers' than to themselves. While it is entirely possible that to a considerable degree this effect is due to the attributions of drivers who were essentially the 'innocent parties', and that to some extent it should be expected that culpable drivers may select themselves out of such surveys, nonetheless these factors do not seem to adequately explain the magnitude of the effect observed in 1987, and broadly replicated on a considerably larger scale in the current study.

Nor is such a possible explanation consistent with the minimally lower response rate of drivers deemed culpable within police accident files, or the nature of their response pattern, which although suggesting considerable modification of bias, is far from being inversely related to the general response pattern.

Drivers' causal accident attributions from the combined British survey (excluding police accident samples) and the police accident survey are detailed separately below to facilitate comparison of self/other attributions in particular. The police accident survey data, involving drivers deemed most culpable for their respective accidents, is bracketed, and follows the combined British data.

TABLE 9(a): ATTRIBUTIONS FOR OWN ACCIDENTS - BRITISH SAMPLE

The frequency percentages for the degree to which drivers considered the six factors below to be influential in the occurrence of their two most recent accidents as drivers are listed. The attributional rating key is as follows:

1	2	3	4	5
Not at all	Minimally	Moderately	Considerably	Totally

	ACCIDENT 1			ACCIDENT 2		
		(N=553)	(N=230)		(N=245)	(N=93)
		%	%		%	%
SELF	1	40.3	(19.6)	1	47.3	(26.9)
	2	15.0	(19.1)	2	14.7	(10.8)
	3	15.0	(21.3)	3	14.7	(21.5)
	4	15.7	(21.7)	4	13.9	(21.5)
	5	13.9	(18.3)	5	9.4	(19.4)
		(N=470)	(N=172)		(N=220)	(N=72)
OTHER DRIVER	1	13.0	(19.2)	1	10.0	(26.4)
	1	8.5	(15.7)	2	6.4	(11.1)
	3	12.6	(14.5)	3	11.4	(9.7)
	4	21.9	(26.2)	4	23.2	(25.0)
	5	44.0	(24.4)	5	49.1	(27.8)
		(N=176)	(N=79)		(N=88)	(N=32)
OTHER ROAD USER	1	74.4	(63.3)	1	85.2	(81.3)
	2	5.1	(7.6)	2	2.3	(6.3)
	3	4.0	(8.9)	3	2.3	(3.1)
	4	10.8	(15.2)	4	8.0	(6.3)
	5	5.7	(5.1)	5	2.3	(3.1)
		(N=542)	(N=223)		(N=243)	(N=89)
ROAD CONDITIONS	1	53.5	(44.4)	1	65.4	(40.4)
	2	10.3	(13.5)	2	9.1	(14.6)
	3	14.0	(15.2)	3	9.9	(12.4)
	4	16.6	(21.5)	4	11.5	(28.1)
	5	5.5	(5.4)	5	4.1	(4.5)
		(N=542)	(N=224)		(N=243)	(N=89)
WEATHER	1	63.5	(50.0)	1	71.2	(53.9)
	2	7.0	(10.7)	2	4.9	(13.5)
	3	10.7	(18.8)	3	6.6	(12.4)
	4	13.7	(15.2)	4	13.6	(18.0)
	5	5.2	(5.4)	5	3.7	(2.2)

	(N=539)	(N=225)	(N=239)	(N=90)
MECHANICAL FAILURE	1 92.6	(89.3)	1 95.4	(84.4)
	2 2.0	(3.6)	2 2.1	(3.3)
	3 2.0	(1.3)	3 1.3	(2.2)
	4 1.1	(1.8)	4 0.8	(4.4)
	5 2.2	(4.0)	5 0.4	(5.6)

The results detailed above and on the previous page (Table 9) seem to clearly demonstrate a marked tendency for drivers in this study to attribute far more influence for the occurrence of accidents in which they were involved as drivers, to other drivers than to themselves. Their first reported accident was considered by 65.9% of respondents to be "totally" or "considerably" attributable to the 'other driver(s)', and an even higher proportion, 72.3%, made this judgement for their second accident. Conversely, 29.6% and 23.3% of drivers attributed their first and second accidents respectively, "totally" or "considerably" to their own driving.

Although this effect is considerably reduced within the driver group deemed culpable by police accident records, the percentage of drivers attributing influence "totally" or "considerably" to other drivers for their 1st and 2nd accidents (50.6%; 52.8%) remains considerably greater than that attributed to themselves (40%; 40.9%).

However, illustrating an almost inverse relationship, 55.3% of accident-involved drivers considered the first accident they reported to be "minimally" or "not at all" attributable to themselves and their own driving, and a slightly higher proportion, 62.0%, made the same attribution for the second accident. Whereas in marked contrast, 21.5% and 16.4% of accident-involved drivers considered the "other driver" to be "minimally" or "not at all" influential in their first and second accidents respectively. Similarly, a modified contrast was revealed for the accident group deemed culpable (38.7% and 37.7% attributed minimal or absent influence to themselves; while 34.9% and 37.5% made such attributions to other drivers).

Other road users, road and weather conditions, and mechanical failure were all held to be minimally influential in self-reported accidents, although this effect was less pronounced in the accident group deemed culpable. The response patterns for the current study and those of Clay's (1987) study seem to involve a high degree of consistency, suggesting a tendency which may be generalizable at least to some extent.

TABLE 9(b) : SIGNIFICANCE AND PREDICTIVE VALUE OF DIFFERENTIAL SELF/OTHER CAUSAL ATTRIBUTIONS FOR ROAD ACCIDENTS

Combined British Sample (excluding Police Accident Data)

Influence attributed to self and other driver for first reported accident (general sample)

Crosstabulation: A1SELF
By A1ODR

A1ODR-> / A1SELF	Count / Row Pct / Adj Res	1	2	3	4	5	Row Total
	1	9 4.3% -5.0	1 .5% -5.6	0 .0% -7.4	11 5.3% -7.9	188 90.0% 18.1	209 44.7%
	2	4 5.6% -2.0	2 2.8% -1.9	4 5.6% -1.9	47 66.2% 9.8	14 19.7% -4.4	71 15.2%
	3	6 9.1% -1.0	7 10.6% .6	29 43.9% 8.3	23 34.8% 2.7	1 1.5% -7.5	66 14.1%
	4	8 10.7% -.7	25 33.3% 8.4	24 32.0% 5.5	18 24.0% .5	0 .0% -8.3	75 16.0%
	5	34 72.3% 12.7	5 10.6% .5	2 4.3% -1.8	4 8.5% -2.4	2 4.3% -5.8	47 10.0%
	Column Total	61 13.0%	40 8.5%	59 12.6%	103 22.0%	205 43.8%	468 100.0%

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F.< 5
607.90583	16	.0000	4.017	1 OF 25 (4.0%)

Statistic	Symmetric	With A1SELF Dependent	With A1ODR Dependent
Lambda	.44444	.44015	.44867

Influence attributed to self and other driver for second reported accident (general sample)

Crosstabulation: A2SELF
By A2ODR

A2ODR-> / A2SELF	Count / Row Pct / Adj Res	1	2	3	4	5	Row Total
	1	6 5.5% -2.2	0 .0% -3.8	0 .0% -5.3	5 4.6% -6.5	98 89.9% 12.0	109 49.5%
	2	1 3.1% -1.4	2 6.3% -.0	1 3.1% -1.6	23 71.9% 7.1	5 15.6% -4.1	32 14.5%
	3	3 8.6% -.3	3 8.6% .6	13 37.1% 5.2	13 37.1% 2.1	3 8.6% -5.2	35 15.9%
	4	4 13.3% .7	7 23.3% 4.1	11 36.7% 4.7	8 26.7% .5	0 .0% -5.8	30 13.6%
	5	8 57.1% 6.1	2 14.3% 1.3	0 .0% -1.4	2 14.3% -.8	2 14.3% -2.7	14 6.4%
	Column Total	22 10.0%	14 6.4%	25 11.4%	51 23.2%	108 49.1%	220 100.0%

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F.< 5
237.40130	16	.0000	.891	13 OF 25 (52.0%)

Statistic	Symmetric	With A2SELF Dependent	With A2ODR Dependent
Lambda	.38117	.36036	.40179

Highly significant (p<.001) differential self/other attributional tendencies are evident within a large sample of British drivers representative of drivers licensed by the DVLA, the attributional bias suggesting that "other" drivers are considered to have influenced accident occurrence to a greater degree than they did themselves within the two most recent accidents reported. Not only was this tendency significant, but the Lambdas suggest a reasonable level of confidence in predictions of responsibility for accidents simply on the basis of whether drivers were making such attributions to themselves or "other" drivers (ref. Hays, 1981). Interactions between self and other (non-driving) road users, or situational factors were considerably less significant and allowed negligible confidence in predictions (refer Appendix D{1}).

Combined Police Accident Sample: Drivers deemed primarily or solely culpable for accident involvement

Influence attributed to self and other driver for first accident reported (police sample)

Crosstabulation: A1SELF
By A1ODR

A1ODR-> / A1SELF	Count / Row Pct / Adj Res	1	2	3	4	5	Row Total
	1	1 2.6% -3.0	0 .0% -3.1	0 .0% -2.9	6 15.4% -1.8	32 82.1% 9.5	39 22.8%
	2	4 11.1% -1.4	6 16.7% .2	4 11.1% -.6	14 38.9% 1.9	8 22.2% -.4	36 21.1%
	3	5 13.5% -1.0	7 18.9% .6	10 27.0% 2.6	14 37.8% 1.8	1 2.7% -3.5	37 21.6%
	4	6 16.7% -.5	11 30.6% 2.7	8 22.2% 1.6	11 30.6% .7	0 .0% -3.9	36 21.1%
	5	17 73.9% 7.1	3 13.0% -.4	2 8.7% -.8	0 .0% -3.1	1 4.3% -2.4	23 13.5%
	Column Total	33 19.3%	27 15.8%	24 14.0%	45 26.3%	42 24.6%	171 100.0%

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F.< 5
151.56964	16	.0000	3.228	3 OF 25 (12.0%)

Statistic	Symmetric	With A1SELF Dependent	With A1ODR Dependent
Lambda	.34109	.34091	.34127

Influence attributed to self and other driver for second accident reported (police sample)

Crosstabulation: A2SELF
By A2ODR

A2ODR-> / A2SELF (Count / Row Pct / Adj Res)	1	2	3	4	5	Row Total
1	3 13.0% -1.8	0 .0% -2.1	0 .0% -1.9	2 8.7% -2.2	18 78.3% 6.6	23 31.9%
2	0 .0% -1.5	0 .0% -.9	0 .0% -.8	4 66.7% 2.5	2 33.3% .3	6 8.3%
3	0 .0% -2.4	2 15.4% .5	3 23.1% 1.8	8 61.5% 3.4	0 .0% -2.5	13 18.1%
4	3 18.8% -.8	5 31.3% 2.9	4 25.0% 2.3	4 25.0% .0	0 .0% -2.8	16 22.2%
5	13 92.9% 6.3	1 7.1% -.5	0 .0% -1.4	0 .0% -2.4	0 .0% -2.6	14 19.4%
Column Total	19 26.4%	8 11.1%	7 9.7%	18 25.0%	20 27.8%	72 100.0%

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F.< 5
100.40763	16	.0000	.583	22 OF 25 (88.0%)

Statistic	Symmetric	With A2SELF Dependent	With A2ODR Dependent
Lambda	.52475	.51020	.53846

The differential self/other attributions of responsibility within the driver group deemed primarily or solely liable for their accident involvement reflect a considerably modified positive self bias, consistent with Farrow's 1987 findings, but nontheless indicating greater responsibility attributed to "other" drivers, consistent with Preston & Harris' (1965) findings. Confidence in predicting attributions of responsibility according to whether they relate to self or other does not seem to be disallowed by objective culpability of the attributor sample.

ACCIDENT AVOIDANCE

TABLE 10: POSSIBILITY OF ACCIDENT AVOIDANCE BY OWN ACTIONS

	ACCIDENT 1 (N=549) %	(N=224) %		ACCIDENT 2 (N=247) %	(N=92) %
YES	42.4%	(55.8)	YES	42.1	(57.6)
NO	57.6%	(44.2)	NO	57.9	(42.4)

TABLE 11: POSSIBILITY OF ACCIDENT AVOIDANCE BY ACTIONS OF OTHER ROAD USERS (INCLUDING OTHER DRIVERS)

	ACCIDENT 1 (N=545) %	(N=226) %		ACCIDENT 2 (N=244) %	(N=92) %
YES	68.3%	(58.8)	YES	74.2	(57.6)
NO	31.7%	(41.2)	NO	25.8	(42.4)

The responses detailed in Tables 10 and 11 above, relating to questions on whether or not drivers considered that there was anything which either they and/or any other road user, including other driver(s), could have done to prevent the accidents in which they were involved, seem to reflect very similar attributions to those concerned with accident influence. Overall, a higher proportion of respondents considered that there was nothing which they could have done to avoid the accident(s) from occurring, as compared to those who felt that there was some avoidance measure which they could have taken.

However, a notably higher proportion of drivers considered that the other road user (driver) could have helped to avoid their accident(s), by comparison with those who considered that there was no effective avoidance measure which the other road user (driver) could have used. Again, these findings are substantially consistent with those of Clay (1987).

Thus, it seems that a tendency for attributional response bias to occur in relation to road traffic accidents, which was suggested by the findings of a moderate-sized study in Bedford (Clay, 1987), may be a stable effect which generalizes across regions. No attempt is made here to generalize the findings regarding attributional tendencies to the Australian sample as a cross-cultural comparison would be inappropriate and invalid in view of the considerable oversampling of young drivers and milder oversampling of female drivers. Any differential effects could be confounded with inferences regarding relative inexperience and a need to develop skills, and/or a higher incidence of single vehicle accidents, rather than cultural differences generalizing to the population as a whole.

The possibility of differential patterns of attributional response in accordance with effects due to age, sex, and driving experience duration and intensity as well as accident frequency and recency, seems worth exploring, in particular in relation to the over representation of young males in accident statistics. However, it is beyond the scope and focus of the current study to explore these issues in depth. Suffice to note here that drivers' attributional tendencies do not appear to be simply a function of recency or defensive response to the consequences of their accidents, in terms of injury to themselves and/or others (refer Appendix D{2}).

One factor, besides perceptual salience (refer Jones & Nisbett, 1972; Hewstone, 1989), which may well be implicated in positive self bias in relation to attributions for accident causation, is the global perception of self as a driver in comparison with other drivers. This issue will therefore be addressed next.

More than 1400 drivers responded to the statement "I consider my driving to be"....as follows:

Excellent 3.6%; Above average 46.9%; Average 48.7%;
Below average 0.7%; Poor 0.1%.

Thus it seems that, consistent with the findings of Clay (1987) a considerable majority of drivers in this study considered their driving to be at least as good as, if not better than, that of the average driver.

In order to examine which factors may be particularly influential in such estimations, global ratings were dichotomized to allow focus on ratings of self as "Above average" by comparison with "Average or below". These ratings were then examined in relation to the self-perception scale utilized within this study (refer Appendix A) in a discriminant function analysis, which is detailed below.

GLOBAL DRIVER RATING IN RELATION TO SELF PERCEPTION

A Discriminant Function Analysis (DFA) was performed to ascertain which self-perception variables allowed maximal discrimination between drivers according to their global ratings of themselves as drivers (refer Table 12).

TABLE 12: FACTORS ASSOCIATED WITH GLOBAL DRIVER RATINGS

TABLE 12(A): GROUP MEANS AND STANDARD DEVIATIONS

VARIABLE	OWN DRIVING (GLOBAL) AVERAGE OR BELOW (n=681)		ABOVE AVERAGE (n=691)	
	Mean	SD	Mean	SD
Aggressive/Defensive	2.43	0.92	2.67	1.00
Anticipating/Non-antic.	3.93	0.89	4.33	0.81
Attentive/Inattentive	3.96	0.87	4.24	0.75
Careful/Careless	4.05	0.83	4.17	0.79
Courteous/Impolite	4.02	0.87	3.97	0.88
Decisive/Indecisive	3.69	0.93	4.25	0.77
Experienced/Inexper.	3.75	1.00	4.36	0.80
Insistent/Yielding	2.62	0.89	2.87	0.96
Irritable/Placid	2.45	1.00	2.40	0.95
Lax/Precise	2.24	0.84	1.87	0.78
Nervous/Confident	2.15	0.99	1.52	0.72
Patient/Impatient	3.55	1.09	3.60	1.13
Reckless/Cautious	1.93	0.80	1.91	0.82
Responsible/Irrespons.	4.19	0.78	4.40	0.75
Safe/Risky	4.10	0.78	4.36	0.76
Selfish/Considerate	1.98	0.83	1.96	0.90
Slow/Fast	2.81	0.87	2.44	0.87
Tolerant/Intolerant	3.67	0.96	3.68	1.01

TABLE 12(B): UNIVARIATE F-TESTS WITH 1 AND 1370 DEGREES OF FREEDOM

VARIABLE	WILKS' LAMBDA	F	SIGNIFICANCE
Aggressive/Defensive	0.98542	20.27	0.0000
Anticipating/Non-antic	0.94810	75.00	0.0000
Attentive/Inattentive	0.97153	40.15	0.0000
Careful/Careless	0.99474	7.24	0.0072
Courteous/Impolite	0.99904	1.31	0.2524
Decisive/Indecisive	0.90364	146.10	0.0000
Experienced/Inxper	0.89781	155.90	0.0000
Insistent/Yielding	0.98111	26.38	0.0000
Irritable/Placid	0.99949	0.70	0.4022
Lax/Precise	0.95014	71.89	0.0000
Nervous/Confident	0.88168	183.80	0.0000
Patient/Impatient	0.99943	0.78	0.3788
Reckless/Cuatious	0.99984	0.22	0.6366
Responsible/Irrespons	0.98073	26.92	0.0000
Safe/Risky	0.97200	39.46	0.0000
Selfish/Considerate	0.99982	0.24	0.6240
Slow/Fast	0.95657	62.20	0.0000
Tolerant/Intolerant	0.99995	0.6375E-01	0.8007

The univariate F-tests (Table 12(B), previous page) suggest that driver self-ratings as an "above average" to "excellent" driver are strongly associated with driver self perceptions of being in particular confident (or not nervous), experienced and decisive; and to a lesser degree anticipating, precise (or not lax) and speedy (or not slow). Estimations of being attentive, safe, responsible, insistent, and aggressive, although significant at beyond .0001 level (as were all the previously mentioned variables), may nonetheless be considered of relatively minor importance within such a large sample. It seems worth noting that variables relating to social interaction skills, such as tolerance, recklessness, selfishness, irritability, patience and courtesy are all below significance, suggesting that they may have no bearing, or at least no direct bearing, on drivers' estimations of relative on-road capability.

TABLE 12(C): CANONICAL DISCRIMINANT FUNCTION

EIGENVALUE	0.27
CANONICAL CORRELATION	0.46
PERCENT OF VARIANCE	21.50
WILKS' LAMBDA	0.78
CHI-SQUARED	329.50
DEGREES OF FREEDOM	18
SIGNIFICANCE	0.0000

The canonical discriminant function shows that this analysis had an overall significance beyond .0001 level.

TABLE 12(D): GROUP CENTROIDS

AVERAGE OR BELOW	-0.52682
ABOVE AVERAGE	0.51919

The group centroids reflect the inter-group differences demonstrated by the analysis as a whole, taking into consideration the relative weightings on each variable.

TABLE 12(E): STANDARDIZED CANONICAL DISCRIMINANT FUNCTION COEFFICIENTS

Aggressive	0.14715
Anticipating	0.21372
Attentive	0.00123
Careful	-0.06293
Courteous	-0.21798
Decisive	0.20448
Experienced	0.39503
Insistent	0.13599
Irritable	0.00486
Lax	-0.15668
Nervous	-0.31941
Paient	0.10274
Reckless	0.00220
Responsible	-0.06152
Safe	-0.01504
Selfish	-0.01504
Slow	-0.22707
Tolerant	-0.11989

TABLE 12(F): STRUCTURE MATRIX: POOLED WITHIN-GROUPS CORRELATIONS BETWEEN DISCRIMINATING VARIABLES AND CANONICAL DISCRIMINANT FUNCTIONS (VARIABLES LISTED IN DESCENDING ORDER OF CORRELATION SIZE WITHIN FUNCTION)

Nervous	-0.69993
Experienced	0.64460
Decisive	0.62393
Anticipating	0.44704
Lax	-0.43768
Slow	-0.40711
Attentive	0.32710
Safe	0.32427
Responsible	0.26782
Insistent	0.26513
Aggressive	0.23243
Careful	0.13893
Courteous	-0.05910
Patient	0.04545
Irritable	-0.04326
Selfish	-0.02531
Reckless	-0.02440
Tolerant	0.01303

TABLE 12(G): PREDICTIVE VALUE

ACTUAL GROUP	n	PREDICTED GROUP MEMBERSHIP Average or below	Above average
AVERAGE OR BELOW	681	458 67.3%	223 32.7%
ABOVE AVERAGE	691	190 27.5%	501 72.5%

Percent of "grouped" cases correctly classified: 69.90%

This analysis suggested that a significant distinction could be made between drivers in this sample according to their driver self-perceptions on a number of variables, in relation to global driver self-ratings of being "average or below", or "above average".

Overall, perceptions of self as confident, experienced and decisive seemed of prime importance, anticipation, precision (lack of laxness) and speed (lack of slowness) seemed of moderate importance, while considerations of attentiveness and safety contributed very little to the discriminating function, and social interaction skills appeared to be virtually irrelevant to comparative driver judgements.

IN SUMMARY: Drivers' relative awareness of personal influence over accident involvement, comparative judgments of self as a driver, and the factors which seem to be most closely associated with such judgements have all been examined. This seems to provide useful contextual information prior to the identification of underlying dimensions within a large dataset, which can then be used for the purpose of reduction and metavariable formation and subsequent identification of the factors which seem to be most closely associated with, and able to distinguish between drivers, in accordance with self-reported accident involvement and culpability.

IDENTIFICATION OF DRIVER DIMENSIONS

PRINCIPAL COMPONENTS ANALYSES (PCA)

PCA can be a valuable research tool, facilitating identification, or confirmation of the underlying dimensions within a large, multivariate dataset. The factors or metavariables thus constructed may then be evaluated for their orthogonality or distinctiveness, internal consistency, stability across samples, and ability to account for a significant percentage of total sample variance, consistent with previous study findings and current research objectives.

Tabachnick & Fidell (1983) suggest that where PCA is used purely as an exploratory tool, then few limitations on its use need to be imposed. Nonetheless a sample size of at least 200 and preferably considerably more is recommended to: avoid violation of assumptions for multivariate analyses; allow a sufficient subjects-to-variables ratio (ideally 20:1); allow strong, stable correlations to be formed; and facilitate valid and useful interpretation. The employment of multivariate techniques allows the correlations between factor matrices to be automatically taken into consideration.

Principal components analyses were performed on sets of variables relating to: driver affect/state; driver self-perception; perception of dangerous drivers; driver attitudinal/behavioural tendencies; and attributions for road traffic accidents in Britain. The factors which emerged are reported below. Full factor matrices for all PCA's employed in the current research are detailed in Appendix E.

TABLE 13: DRIVER AFFECT/STATE

Seventeen variables were entered into a PCA. Four factors emerged, accounting for almost 65 percent of the total variance (refer Table 18 on the next page).

TABLE 13(A): FACTOR VARIANCE

Factor	Eigenvalue	% of variance accounted for	Cumulative % of variance accounted for
1	4.60	27.07	27.07
2	2.56	15.08	42.15
3	1.92	11.31	53.46
4	1.84	10.81	64.27

The first factor alone accounted for more than 25 percent, while the four factors together accounted for a little over 64 percent of the total variance attributable to the seventeen factors (refer Section B of the questionnaire - Appendix A).

To facilitate the emergence of distinct factors, Varimax rotation was performed (using SPSSX V3.1), to maximize the degree to which closely related variables formed cohesive subgroups, while increasing their distance from less related ones. The purpose of this function is to facilitate meaningful and useful interpretation, and therefore the value of any practical application. The factors which subsequently emerged are detailed on the following page.

TABLE 13(B): ROTATED FACTOR MATRIX

FACTOR 1	Weight	FACTOR 2	Weight
IRRITATION		INTIMIDATION	
Irritated	.81	Intimidated	.78
Frustrated	.80	Fearful	.77
Tense	.76	Upset	.64
Angry	.74	Free	-.42
Stressed	.73		
Impatient	.71		
Relaxed	-.58		
Tired	.54		

FACTOR 3	Weight	FACTOR 4	Weight
UNAWARENESS		EXCITEMENT	
Alert	.85	Excited	.88
In control	.72	Exhilarated	.85
Confident	.55		

The four factors which emerged all contained variables which loaded highly upon them. The factors seemed readily interpretable, each forming a cohesive whole which appeared to be relevant to accident prevention. The factor structure bore a considerable resemblance to that obtained by Clay (1987), while accounting for fractionally greater variance for the analysis as a whole. Two variables were reflexed prior to evaluation of the internal consistency of these factors, and their employment in further analyses, Relaxed from Factor 1 and Free from Factor 2. All three variables in Factor 3 (Alert, In control and Confident) were reflexed prior to examination of the internal consistency of the scale as a whole.

TABLE 14: DRIVER SELF PERCEPTION

Eighteen variables, which were rated in relation to their polar opposites, e.g. aggressive/defensive (refer Section E of the questionnaire - Appendix A) were entered into a PCA. The following four factors emerged, accounting together for close to 60 percent of the total variance.

TABLE 14(A): FACTOR VARIANCE

Factor	Eigenvalue	% of variance accounted for	Cumulative % of variance accounted for
1	3.09	17.15	17.15
2	3.04	16.91	34.06
3	2.46	13.64	47.70
4	2.00	11.13	58.83

The first two factors accounted together for more than a third of the total variance, while the four factors combined accounted for close to 60 percent of the total variance attributable to the eighteen variables.

Varimax rotation resulted in the following factor structures:

TABLE 14(B): ROTATED FACTOR MATRIX

FACTOR 1	Weight	FACTOR 2	Weight
IRRITABLE		SAFE	
Irritable/Placid	.79	Safe/Risky	.69
Patient/Impatient	-.74	Careful/Careless	.67
Tolerant/Intolerant	-.70	Responsible/ Irresponsible	.66
Selfish/Considerate	.56	Reckless/Cautious	-.66
Insistent/Yielding	.56	Slow/Fast	.50
Courteous/Impolite	-.51	Aggressive/Defensive	-.47

FACTOR 3	Weight	FACTOR 4	Weight
CONFIDENT		AWARE	
Nervous/Confident	-.82	Attentive/Inattentive	.79
Decisive/Indecisive	.68	Anticipating/ Non-anticipating	.78
Experienced/ Inexperienced	.60	Lax/Precise	-.45

Most factors contained two or three variables which loaded highly upon them. Thus the variance they accounted for tended to be concentrated within these variables rather than diffused throughout the factor, facilitating interpretation. This factor structure was readily amenable to naming, forming logically related subgroups. As with the previous PCA, this analysis accounted for a minimally greater percentage of total variance than did Clay's (1987) study, while revealing considerable similarity in the factor structure. Seven variables were reflexed prior to evaluation of the internal consistency of these factors and their employment in further analyses, In Factor 1 Patient became Impatient, Tolerant Intolerant, and Courteous Impolite. In Factor 2 Reckless became Cautious and Aggressive Defensive. In Factor 3 Nervous became Confident and in Factor 4 Lax became Precise.

TABLE 15: DRIVERS' PERCEPTION OF THE "DANGEROUS" DRIVER

This PCA involved the same eighteen variables as the previous one (Driver Self-perception) from which a diametrically opposite factor structure emerged, accounting for over 55 percent of the total variance within four factors.

TABLE 15(A): FACTOR VARIANCE

Factor	Eigenvalue	% of variance accounted for	Cumulative % of variance accounted for
1	3.46	19.25	19.25
2	2.44	13.57	32.82
3	2.22	12.33	45.15
4	2.11	11.70	56.85

The first two factors together accounted for almost a third of the total variance attributable to the eighteen variables in this scale, while the four factors accounted for almost 57%.

The factors which were extracted by Varimax rotation differed from the self-perception factors, however a pattern of relationship between perception of "self" and "dangerous" driver became apparent, with polar opposites tending to emerge within the two scales.

Varimax rotation resulted in the following factor structures:

TABLE 15(B): ROTATED FACTOR MATRIX

FACTOR 1	Weight	FACTOR 2	Weight
UNSAFE		NERVOUS	
Safe/Risky	.78	Nervous/Confident	-.80
Responsible/Irresponsible	.78	Decisive/Indecisive	.72
Reckless/Cautious	-.66	Experienced/ Inexperienced	.71
Tolerant/Intolerant	.65	Lax/Precise	-.58
Patient/Impatient	.65	Slow/Fast	-.43
Selfish/Considerate	-.56		

FACTOR 3	Weight	FACTOR 4	Weight
INSISTENT		UNAWARE	
Insistent/Yielding	.76	Attentive/ Inattentive	.77
Irritable/Placid	.67	Anticipating/ Non-anticipating	.77
Aggressive/Defensive	.52	Careful/Careless	.63
Courteous/Impolite	-.51		

Each factor included at least one or two variables which loaded highly upon it, while the majority of the remaining variables of which it was comprised had moderate loadings. This scale demonstrated considerably less variation than the self-perception scale and was not central to the objectives of the current study. It was not therefore included in the analyses.

TABLE 16: DRIVER ATTITUDINAL/BEHAVIOURAL TENDENCIES

This PCA reduced a 27-variable scale to nine factors, accounting for 55 percent of the total variance.

TABLE 16(A): FACTOR VARIANCE

Factor	Eigenvalue	% of variance accounted for	Cumulative % of variance accounted for
1	2.21	8.19	8.19
2	2.05	7.58	15.77
3	1.71	6.33	22.10
4	1.60	5.91	28.01
5	1.53	5.66	33.67
6	1.52	5.64	39.31
7	1.46	5.42	44.73
8	1.46	5.40	50.13
9	1.33	4.92	55.05

The first five factors accounted for over a third of the total variance, while the nine factors extracted, together accounted for a little over fifty percent of the variance.

Varimax rotation resulted in the following factor structure.

TABLE 16(B): ROTATED FACTOR MATRIX

FACTOR 1	Weight
SPEED	
I tend to drive faster than most of my friends.	.65
I find that I am overtaken by other cars with similar engine capacity to my own.	-.60
I drive slower than the traffic flow to keep within the legal speed limits.	-.56
I think that I am too cautious in busy traffic.	-.50
I find long, fast trips on the motorway enjoyable.	.48

The 2nd, 3rd and 4th variables were reflexed prior to evaluation of the internal consistency of Factor 1 and its employment in further analyses.

FACTOR 2	Weight
FRUSTRATION	
I find rush hour traffic very frustrating.	.64
I get very angry with other drivers who interfere with my driving because of their own poor anticipation.	.63
I find other drivers who blast their horns at me very irritating.	.61
I try to prevent other drivers from taking advantage when I have right of way.	.55
"Sunday drivers" seem to get in the way, particularly when I have an urgent trip to make.	.45

FACTOR 3	Weight
DRINK DRIVING	
I find that I can drive better after one or two drinks.	.74
On social occasions I drink less than I would normally, or not at all, if I intend to drive.	-.73
How often in the last 12 months would you say that you have driven when you thought that you might be over the legal alcohol limit.	.71

The 2nd variable was reflexed prior to evaluation of the internal consistency of Factor 3 and its employment in further analyses. The 3rd variable was reduced from a 7- to a 5-point scale by combining the three maximum offender groups into one, and reflexed, prior to the creation of factors, rendering it consistent with the other scales in this study and Guppy's (1984) conception and employment of this variable.

FACTOR 4	Weight
DRIVER SKILLS	
My driving skills and judgement are at least equal to that of most people in my own age group.	.79
I consider my driving to be...	.55
Where skill and fast reactions are required, I find that I can overtake safely.	.50
I find myself taking corners too fast to be fully in control.	.39

FACTOR 5	Weight
SOLO SPEEDING	
I tend to drive more carefully when I have passengers than when I am alone.	.82
When I am angry or upset, I find a short, fast drive makes me feel more relaxed.	.62

FACTOR 6	Weight
ANTICIPATION	
I find that I can anticipate what other road users will do.	.83
I can anticipate hazards on the road.	.72

FACTOR 7	Weight
NEGATIVE ATTITUDE TO OTHER DRIVERS	
I expect that most other drivers will drive well.	-.75
I find myself having to cope with slow and incompetent drivers.	.58

The first variable was reflexed prior to evaluation of the internal consistency of Factor 7 and its employment in further analyses.

FACTOR 8	Weight
AWARENESS OF OTHER ROAD USERS	
I find that pedestrians behave unpredictably on the roads.	.72
I find that cyclists and motorcyclists seem to appear from nowhere on the road.	.68

FACTOR 9	Weight
PERCEIVED LACK OF CONTROL	
I feel that the problems I encounter while driving are beyond my control.	.82
I feel that I am at the mercy of other people's driving style when I am out driving.	.62

All factors resulting from this analysis were loaded upon by two or more variables, the majority of which involved either moderate to high loadings. This analysis included one additional (drink-driving) variable, added to the original 26 (Clay, 1987), resulting in 55.05% of the variance being accounted for by 9 factors, (as compared to 51.9% by 7 factors in Clay's {1987} PCA). However despite some minor variations, the two factor structures nonetheless show greater consistency than disparity, while accounting for a modest increase in total variance.

TABLE 17: ATTRIBUTIONS FOR ROAD TRAFFIC ACCIDENTS IN BRITAIN

In the attribution PCA, concerned with attributions for road accidents in general within Britain, five factors drawn from a pool of sixteen variables accounted for nearly 60 percent of the total variance (refer Tables 17(A) and (B) overleaf).

TABLE 17(A): FACTOR VARIANCE

Factor	Eigenvalue	% of variance accounted for	Cumulative % of variance accounted for
1	2.41	15.08	15.08
2	1.90	11.85	26.93
3	1.81	11.29	38.22
4	1.71	10.67	48.89
5	1.58	9.88	58.77

TABLE 17(B): ROTATED FACTOR MATRIX

FACTOR 1	Weight	FACTOR 2	Weight
ATTITUDE TO DRIVER VARIABLES		ROAD & WEATHER CONDITIONS	
Lack of Anticipation	.74	Weather Conditions	.84
Lack of Consideration	.70	Road Conditions	.81
Lack of Attention	.58		
Close Following	.53		
Improper Overtaking	.51		

FACTOR 3	Weight	FACTOR 4	Weight
ATTITUDE TO OTHER ROAD USERS		IMPAIRMENT	
Pedestrian at Fault	.80	Fatigue	.74
Cyclist/Motorcyclist Error	.80	Intoxication (Alcohol)	.65
Mechanical Failure	.53	Failure to Give Way	.61
		Driving While Under Stress	.34

FACTOR 5	Weight
SPEED & AGGRESSION	
Excess Speed	.81
Aggressive Driving	.63

All factors in this analysis were found to be loaded on highly by one or two variables, with most having moderately loaded variables as well. The factor structure bears considerable resemblance, with minor variations, to that of Clay's (1987) structure which accounted for 54.3% of the total variance in five factors, by comparison with 58.77% in five factors in the current study, involving a modest increase.

In summary, the principal components analyses suggest that all factor structures employed in the current study demonstrate a considerable degree of stability, while accounting for a reasonable percentage of the total variance, although the attitudinal/behavioural tendencies analysis is by far the weakest. Thus a revision and further development of this scale would be advisable prior to its employment in any further surveys.

An examination of the internal consistency of the factors obtained and the scales, where appropriate, yielded the following results:

TABLE 18: CRONBACH'S ALPHA VALIDATION OF FACTORS/SCALES

TABLE 18(A): DRIVING AFFECT/STATE (17 item scale)

Alpha .89 (N=1342) (min Alpha .88 max Alpha .90)

IRRITABILITY
Alpha .89 (N=1368)

INTIMIDATION
Alpha .76 (N=1377)

UNAWARENESS
Alpha .71 (N=1384)

A high degree of internal consistency was found within this scale as a whole, and in general, within the factors created from it.

TABLE 18(B): SELF-PERCEPTION (18 item scale)

IRRITABLE Alpha .81 (N=1397)	SAFE Alpha .76 (N=1396)
CONFIDENT Alpha .71 (N=1404)	AWARE Alpha .70 (N=1399)

A high degree of internal consistency was found within the factors obtained from the self perception scale.

TABLE 18(C): DANGEROUS DRIVER PERCEPTION (18 item scale)

UNSAFE Alpha .83 (N=1385)	NERVOUS Alpha .71 (N=1339)
INSISTENT Alpha .64 (N=1374)	UNAWARE Alpha .73 (N=1381)

A moderate to high internal consistency was found within the factors obtained from this scale.

TABLE 18(D): DRIVER ATTITUDINAL/BEHAVIOURAL TENDENCIES
(27 item scale)

SPEED Alpha .55 (N=1410)	FRUSTRATION Alpha .63 (N=1403)
DRINK DRIVING Alpha .57 (N=1423)	DRIVER SKILLS Alpha .43 (N=1405)

A moderate degree of internal consistency was found within three of the four major factors in this scale, the fourth being relatively low. The other factors each consisted of two items only. Although employment of the individual variables within this scale would appear to offer advantages over the use of factors, within the current research factors were employed to allow methodological consistency. However in future analyses the discriminatory power of the individual variables will be evaluated.

TABLE 18(E): ATTRIBUTION FOR ACCIDENTS IN BRITAIN
(16 item scale)

Alpha .83 (N=1397) (min Alpha .81 max Alpha .82)

ATTITUDE TO DRIVER VARIABLES Alpha .70 (N=1421)	ATTITUDE TO OTHER ROAD USERS Alpha .67 (N=1421)

IMPAIRMENT
Alpha .60 (N=1412)

A high degree of internal consistency was found within this scale as a whole, and a moderate internal consistency within the three larger factors.

FORMATION OF METAVARIABLES FOR USE IN FURTHER ANALYSES

The factors extracted from the principal components analyses were used to form metavariables for use in further analyses. Each metavariable was formed by a summation of all of the variables of which it was comprised.

DISTINGUISHING BETWEEN DRIVERS ON THE BASIS OF SELF-REPORTED ACCIDENT INVOLVEMENT, CULPABILITY, AND TRAFFIC OFFENCES

OVERVIEW

A series of Multivariate Analyses of Variance and Covariance (MANCOVAS) was carried out, the results of which suggest that it is possible to distinguish between drivers according to their anonymous self-reports of accident involvement and traffic offences in relation to: emotional/arousal responses to driving; beliefs about accident causation in general; driver self-perception; and reported behavioural/attitudinal tendencies within the driving situation. The first set of MANCOVAS focuses on accident involvement and subjective culpability within a large sample. The second set, concerned with (detected) traffic offence history per se and recency, yielded somewhat similar but weaker and rather less useful findings, therefore a brief summary only is reported in the results. Full details are reported in Appendix G(1). The third set of MANCOVAS involves a moderate-sized cross-cultural sample with a focus on young drivers up to 25 years, again examining accident involvement and subjective culpability.

ACCIDENT INVOLVEMENT AND SUBJECTIVE CULPABILITY

In the first set of four MANCOVAS, drivers were grouped according to the degree of influence they considered themselves to have exerted over their two most recent accidents, thus three groups were obtained:

(1) no accidents
(2) no culpable accidents
(3) culpable accidents

In order to facilitate examination of the effects of maturation and aging, drivers were divided into three approximately equal-sized groups:

(1) under 30 yrs
(2) 30-44 yrs
(3) over 44yrs

Driving duration is known to be highly correlated with age, and their effects therefore frequently confounded. To allow the effects of driving experience/exposure and age to be distinguished, driving experience variables relating to driving duration and intensity were entered into the MANCOVAS as covariates:

Number of years driving regularly: (Yrsdriv)
Usual weekly mileage: (Mlswkly)

For the first set of MANCOVAS, means and standard deviations for all 18 cells derived from the main effect groups [accident involvement x 3, age x 3, sex x 2] are reported in Appendices F(1) to F(4) together with the multivariate and univariate significance of the covariates concerned with both intensity and duration of driving experience, and the adjusted means (controlling for driving experience covariates). Similar details pertaining to the second and third sets of MANCOVAS are reported in Appendices G(2) to G(5), and H(1) to H(4) respectively.

The focus of the first set of MANCOVAS is the driver's assessment of the degree to which he/she influenced personal accident involvement while driving. The combined British sample was employed for this purpose. Firstly, the emotional /arousal responses to driving were examined, allowing the influence of stress, fatigue, attentional loss, and to some extent motivation, to be ascertained. Such effects are expected to be influenced to a considerable degree by factors external to the driving situation (refer Ch.3)

DRIVER AFFECT/STATE IN RELATION TO ACCIDENT INVOLVEMENT

No significant multivariate interactions were detected, however multivariate significance was found for two of the three main effects: accident involvement ($p=.002$) and age ($p<.001$) (refer Table 19B).

ACCIDENT INVOLVEMENT

Examination of the univariate accident effects (refer Table 19B) revealed that accident-involved drivers differed significantly from the non-accident group, reporting: higher levels of irritability ($p=.008$); higher levels of intimidation ($p=.010$), which an examination of the adjusted means suggested was largely due to the higher level of intimidation of culpable middle-aged drivers; and in particular, unawareness (lower levels of alertness, confidence and control) ($p<.001$) than non-accident-involved drivers.

Following control for the two covariates, driving experience intensity and duration, the helmert contrasts and adjusted means revealed that irritability remained a significant discriminator ($t=2.50$, $p=.013$) between accident and non-accident-involved drivers, unawareness in relation to accident-involved drivers feeling less alert, confident and in control when driving, was far more significant ($t=-3.12$, $p=.002$). The modest intimidation effect for accident-involvement per se, found to be related to higher weekly mileage for accident- than non-accident-drivers, was rendered just below significance level by covariate control, however an age by accident interaction revealed that culpable drivers aged 30 years and over were significantly more intimidated ($t=2.15$, $p=.032$) within the driving situation than all other drivers.

Thus accident-involved drivers, according to their own ratings of emotional/state response to driving, are more irritable and more unaware (less: alert, confident and in control) than drivers who did not report accident involvement. Culpable drivers aged 30 years or more reported the highest levels of intimidation.

AGE
Two univariate age effects (refer Table 19{A}) were detected, the first relating to significantly greater intimidation ($p<.001$) while driving reported by drivers aged 30 and over. This appears to be largely due to the high level of intimidation reported by culpable middle-aged and older drivers, in contrast with both their younger counterparts and non-culpable and non-accident-involved peers. The second age effect related to young drivers, especially young males, reporting significantly higher levels of excitement and exhilaration ($p=.003$) whilst driving than did drivers aged 30 and over.

Following control for the covariates, intimidation remained a significant ($t=-4.77$, $p<.001$) feature of the two older driver groups, while also significantly distinguishing ($t=2.15$, $p=.03$) culpable middle-aged and older drivers from their younger counterparts within an age by accident interaction. The greater exhilaration and excitement of young drivers also retained significance ($t=.340$, $p=.001$).

SEX
No significant sex differences emerged prior to control for driving experience. However following covariate control, a

significant univariate age by sex interaction ($t=2.18$, $p=.03$) revealed that young males reported feeling more excited and exhilarated when driving than did females or drivers aged 30 years and over.

TABLE 19: DRIVER AFFECT/STATE

TABLE 19(A): MULTIVARIATE RESULTS

AGE BY SEX BY ACCIDENT INVOLVEMENT
Multivariate tests of significance (S=4 M=-1/2 N=635)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.98619	1.11	16.00	3886.66	.340

SEX BY ACCIDENT INVOLVEMENT
Multivariate tests of significance (S=2 M=1/2 N=635)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.99303	1.11	8.00	2558.00	.350

AGE BY ACCIDENT INVOLVEMENT
Multivariate tests of significance (S=4 M=-1/2 N=635)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.99247	.60	16.00	3908.05	.885

AGE BY SEX
Multivariate tests of significance (S=2 M=1/2, N=635)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.99019	1.57	8.00	2544.00	.128

ACCIDENT INVOLVEMENT
Multivariate tests of significance (S=2 M=1/2 N=635)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.98103	3.06	8.00	2544.00	.002

SEX
Multivariate tests of significance (S=1 M=1 N=635)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.99424	1.84	4.00	1272.00	.118

AGE
Multivariate tests of significance (S=2 M=1/2 N=635)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.96457	5.79	8.00	2544.00	.000

TABLE 19(B): SIGNIFICANT UNIVARIATE RESULTS

ACCIDENT INVOLVEMENT
Univariate F-tests with (2,1275) DF

Variable	HypthSS	ErrorSS	HypthMS	ErrorMS	F	Sig/F
IRRITABILITY	404.06	52875.72	202.03	41.47	4.87	.008
INTIMIDATION	86.81	12055.10	43.40	9.45	4.59	.010
UNAWARENESS	86.85	5785.05	43.43	4.54	9.57	.000

AGE
Univariate F-tests with (2,1275) DF

Variable	HypthSS	ErrorSS	HypthMS	ErrorMS	F	Sig/F
INTIMIDATION	250.79	12055.10	125.40	9.45	13.26	.000
EXHILARATION	34.05	3753.17	17.02	2.94	5.78	.003

SIGNIFICANT AFFECT/STATE EFFECTS

IRRITABILITY
Accident-involved drivers reported that driving increased their feelings of irritability and frustration to a significantly higher degree than did the non-accident group.

INTIMIDATION
Significantly higher levels of intimidation and fearfulness while driving appears to distinguish drivers aged 30 years and over from those who are under 30 years. This effect was found to be more marked amongst middle-aged and older culpable drivers than their non-accident-involved and non-culpable counterparts. The lower levels of intimidation in the under 30's, may be partly due to younger drivers greater enjoyment of driving and also their employment of driving as a means of reducing negative affect (Schuman, Pelz, Ehrlich & Selzer, 1967).

UNAWARENESS
Accident-involved drivers reported significantly higher levels of unawareness (feeling less alert, in control and confident) while driving than the non-accident group.

EXCITEMENT
Young drivers under 30 years reported significantly higher levels of excitement and exhilaration whilst driving than middle-aged and older drivers, irrespective of accident involvement. This effect was particularly in evidence amongst younger males.

DRIVERS' SELF-PERCEPTION IN RELATION TO ACCIDENT INVOLVEMENT

The second MANCOVA examined drivers' self-rated profiles in accordance with four driving-related dimensions. A significant multivariate Age by Sex interaction ($p<.001$) (refer Table 20(A)), was found to relate at univariate level to perceptions of safety ($p=.007$) and awareness ($p=.023$) (refer Table 20(B)). An examination of the means revealed that young males in particular rated themselves as less safe drivers. However, in relation to awareness, young and middle-aged males considered themselves to be more aware than did their female counterparts, whereas the reverse was true for drivers over 44 years.

Although no other interactions were significant at multivariate level, multivariate significance was found for all three main effects, i.e. accident involvement ($p<.001$, age ($p=.004$), and sex ($p=.001$).

ACCIDENT INVOLVEMENT

Examination of the univariate accident effects (refer Table 20 {B}), revealed that drivers could be distinguished according to accident-involvement on all four self-perception dimensions, i.e. irritable (p=<001), safe ($p<.001$), confident ($p=.001$), and aware ($p<.001$). Culpable drivers rated themselves highest of all three accident groups on irritability, non-accident-involved drivers had intermediary ratings, and non-culpable drivers the lowest.

Following covariate control, helmert contrasts and adjusted means revealed that culpable drivers rated themselves as significantly more irritable ($t=-2.93$, $p=.003$) than did non-culpable or non-accident drivers in their self-ratings.

Significant safety differences were also revealed between non-accident drivers and the two accident groups ($t=4.45$, $p<.001$), and to a slightly lesser degree between culpable and non-culpable drivers ($t=3.29$, $p=.001$), with non-accident-involved drivers rating their safety at the highest level, non-culpable drivers at the intermediary level and culpable drivers at the lowest level of safety. Young culpable males were found to differ significantly from all other drivers ($t=-2.08$, $p=.037$), rating their driving as less safe than did females, older drivers, and non-accident and non-culpable drivers, according to an age by sex by accident interaction.

Culpable drivers rated themselves as significantly less confident drivers than did both their non-culpable, or non-accident-involved counterparts ($t=3.46$, $p=.001$). Non-culpable drivers rated their driving awareness at a significantly higher level than did non-accident-involved drivers (t=2.07, p=.039). However, a significantly sharper distinction revealed that culpable drivers rated themselves as less aware of the driving environment than did non-culpable drivers (t=4.20, p<.001).

Thus, in summary, culpable drivers appear according to their own ratings to be the most irritable, and the least safe, the least confident and the least aware of all drivers in accordance with accident-involvement.

AGE

The univariate age effects (refer Table 20(B)), related to significantly divergent perceptions of self as irritable (p=.001), and safe (p=.008) on the basis of age. The former is due to drivers' perceptions of themselves as irritable decreasing significantly in a linear fashion with increasing age, with the sharpest distinction occurring after the age of 44 years, while the latter relates to drivers' perceptions of their driving safety, which appears to increase in a linear fashion with age.

An examination of the helmert contrasts and adjusted means revealed that significant distinctions remained between young drivers and the two older groups (t=2.91, p=.004), and between middle-aged and older drivers (t=3.31, p=.001), in relation their perceptions of themselves as irritable drivers, following covariate control.

Drivers aged less than 30 years were found to differ significantly (t=-3.09, p=.002) from the two older groups, the younger drivers having the lowest self-ratings of safety. A significant age by sex interaction (t=-3.10, p=.002) was found to relate to males under 30 years having the lowest self-ratings of safety of all drivers. A significant age by sex by accident interaction (t=-2.08, p=.037) revealed that culpable young males could be distinguished even from their young male peers in their tendency to give low self-ratings of their driving safety.

Significant age by sex interactions revealed that whereas younger and middle-aged males rated their awareness within the driving environment at higher levels than did their female counterparts (t=2.02, p=.043), the reverse was the case amongst older drivers, with females aged 45 years and over rating themselves as significantly more aware while driving than did their male peers (t=2.10, p=.036).

SEX

Significant differences were detected between males and females at the univariate level, according to their perceptions of themselves as irritable (p=.007), safe (p=.027), and confident (p=.006) drivers. Following control for driving experience duration and intensity, the helmert contrasts and adjusted means revealed that these distinctions remained, relating to males' perceiving themselves to be significantly more irritable (t=2.69, p=.007), and more confident (t=2.74, p=.006), but less safe (t=-2.22, p=.027) than did females in their self perceptions. Young males were found to rate themselves as significantly less safe (t=-3.10, p=.002) than did females and drivers aged 30 and over. This was especially the case for culpable young males (t=-2.08, p=.037).

TABLE 20: DRIVER SELF PERCEPTION

TABLE 20(A): MULTIVARIATE RESULTS

AGE BY SEX BY ACCIDENT INVOLVEMENT
Multivariate tests of significance (S=4 M= -1/2 N=648 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.98667	1.09	16.00	3969.15	.356

SEX BY ACCIDENT INVOLVEMENT
Multivariate tests of significance (S=2 M=1/2 N=648 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.99454	.89	8.00	2598.00	.524

AGE BY ACCIDENT INVOLVEMENT
Multivariate tests of significance (S=4 M=-1/2 N=648 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.99120	.72	16.00	3969.15	.777

AGE BY SEX
Multivariate tests of significance (S=2 M=1/2 N=648 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.97350	4.39	8.00	2598.00	.000

ACCIDENT INVOLVEMENT
Multivariate tests of significance (S=2 M=1/2 N=648 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.95369	7.79	8.00	2598.00	.000

SEX
Multivariate tests of significance (S=1 M=1 N=648 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.98536	4.82	4.00	1299.00	.001

AGE
Multivariate tests of significance (S=2 M=1/2 N=648 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.98256	2.87	8.00	2598.00	.004

TABLE 20(B): SIGNIFICANT UNIVARIATE RESULTS

AGE BY SEX
Univariate F-tests with (2,1302) DF

Variable	HypthSS	ErrorSS	HypthMS	ErrorMS	F	Sig/F
SAFE	104.30	13548.95	52.15	10.41	5.01	.007
AWARE	28.73	4931.33	14.36	3.79	3.79	.023

ACCIDENT INVOLVEMENT
Univariate F-tests with (2,1302) DF

Variable	HypthSS	ErrorSS	HypthMS	ErrorMS	F	Sig/F
IRRITABLE	266.41	20500.17	133.21	15.75	8.46	.000
SAFE	475.07	13548.95	237.54	10.41	22.83	.000
CONFIDENT	54.80	5373.38	27.40	4.13	6.64	.001
AWARE	118.99	4931.33	59.49	3.79	15.71	.000

SEX
Univariate F-tests with (1,1302) DF

Variable	HypthSS	ErrorSS	HypthMS	ErrorMS	F	Sig/F
IRRITABLE	114.01	20500.17	114.01	15.75	7.24	.007
SAFE	51.30	13548.95	51.30	10.41	4.93	.027
CONFIDENT	31.00	5373.38	31.00	4.13	7.51	.006

AGE
Univariate F-tests with (2,1302) DF

Variable	HypthSS	ErrorSS	HypthMS	ErrorMS	F	Sig/F
IRRITABLE	218.55	20500.17	109.27	15.75	6.94	.001
SAFE	99.73	13548.95	49.87	10.41	4.79	.008

SIGNIFICANT DRIVER SELF PERCEPTION EFFECTS

IRRITABLE

Drivers' perception of themselves as irritable decreased significantly in a linear fashion with increasing age. However, the reduction in irritability was more pronounced between middle-aged and older drivers than it was between younger and middle-aged drivers. Males' perception of their own irritability was significantly higher than was females equivalent self-perception. Irritability allowed a significant distinction to be made between drivers according to accident involvement, with non-culpable drivers tending to report the lowest levels of irritability, non-accident-involved drivers the intermediary levels and culpable drivers reporting the highest levels of irritability.

SAFE
Drivers' perception of themselves as safe drivers appears to increase in a linear fashion with age. A significant distinction was found between young drivers' perception of their driving safety and that of the two older driver groups. Males rated their driving safety at a significantly lower level than did females in their self perceptions. Drivers differed significantly in their safety perceptions according to accident involvement, with non-accident-involved drivers tending to rate their safety at the highest level, non-culpable drivers at the intermediary level and culpable drivers at the lowest level of safety.

Young males were found to rate their driving safety at a significantly lower level than the self-ratings of young females. However, while females' perception of their driving safety appears to remain fairly stable over time, the discrepancy between the sexes during youth appears to become minimal as males mature.

A significant age by sex by accident effect was found suggesting that non-culpable males' perception of themselves as safe drivers changes from being virtually identical to their culpable male counterparts when young, to being slightly closer to their non-accident male counterparts in middle-age and virtually identical to their non-accident male counterparts with increasing age. Culpable males consistently rate themselves as less safe than do other males, although the distinction between culpable and non-culpable young males is minimal. Non-culpable females rate themselves very similarly to their non-accident-involved female counterparts in youth and middle-age, but less safe than all other females with increasing age. Culpable females on the other hand rate themselves as less safe than their female counterparts in youth and middle-age, but surprisingly, rate themselves as safer than their non-culpable female counterparts with increasing age.

CONFIDENT
Males rated themselves as significantly more confident drivers than did females, which on the surface appears somewhat paradoxical considering that the reverse is the case for perceptions of driving safety. Culpable drivers rated themeselves as significantly less confident drivers than did non-culpable or non-accident-involved drivers.

AWARE
Non-culpable drivers reported significantly higher levels of driver' awareness than non-accident-involved drivers. However a significantly sharper distinction revealed that culpable drivers were less aware of the driving environment than non-culpable drivers. Another significant effect suggested that, whereas both young and middle-aged females rate themselves as being less aware of the driving environment than their male counterparts, the reverse occurs with increasing age.

DRIVER ATTITUDES/REPORTED BEHAVIOURS IN RELATION TO ACCIDENT INVOLVEMENT

The third MANCOVA was concerned with driver attitudes and reported behavioural tendencies. The significant multivariate effects found in this analysis are detailed in Table 21(A). Only one multivariate interaction was significant, sex by accident involvement (p=.009), which had univariate significance (refer Table 21(B)) in relation to frustration (p=.002), and perceived control (p=.046). An examination of the adjusted means revealed that whereas males reported similar levels of driving-related frustration regardless of their accident-involvement, in contrast accident-involved females were distinguishable from their non-accident counterparts by their higher self-ratings of driving-related frustration, the highest levels being reported by culpable young females. The second effect was found to relate to non-culpable males' reporting themselves to have significantly less control over the driving situation than did their culpable and non-accident counterparts.

No other multivariate interactions were detected, however multivariate significance was found for all three main effects, i.e. accident involvement (p=.027), age (p<.001), and sex (p<.001).

ACCIDENT INVOLVEMENT
The accident effects related at univariate level (refer Table 21(B)) to the significantly higher frequency of reported speeding behaviours of the accident group by comparison with non-accident drivers (p=.015). However speed was significantly related to weekly mileage and no significant differences remained on the basis of speeding in relation to accident involvement per se following covariate control. However an age by sex by accident interaction revealed a significantly higher frequency of reported speeding behaviours (t=2.16, p=.031) by accident-involved males under the age of 45 years by comparison with all other drivers. A further univariately significant accident effect emerged

after covariate control ($t=-2.21$, $p=.027$) which the adjusted means revealed related to non-culpable-accident-involved drivers reporting less negative attitudes to other drivers than both culpable and non-accident drivers.

AGE

A significant univariate effect for speed ($p<.001$) was detected. This was found to relate in a linear fashion to a significant decline in reported speeding behaviours with increasing age, the sharpest distinction occurring between young drivers and all drivers over the age of 30 years. Following control for the covariates, an examination of the helmert contrasts and adjusted means revealed that young drivers reported significantly greater frequency of speeding behaviours than did the two older groups ($t=4.45$, $p<.001$), and middle-aged drivers were also significantly more inclined to speed than older drivers ($t=3.12$, $p=.002$) although this effect was less pronounced.

A univariately significant effect for frustration ($p=.001$) related to the significantly higher levels of driving-related frustration reported by young drivers by comparison with drivers aged 30 and over. Examination of the adjusted means revealed that after covariate control, young drivers continued to differ significantly from the two older groups ($t=3.73$, $p<.001$), the effect rendered more pronounced.

A significant effect for driver skills at the univariate level ($p<.001$) suggested that young drivers placed considerably greater confidence in their driver skills than all other drivers. This effect appears to decline in a linear fashion with age, the distinction between middle-aged and older drivers' reported skilled behaviours being less marked. Following covariate control, the helmert contrasts and adjusted means revealed that the distinctions between young drivers and the older groups ($t=4.91$, $p<.001$) and to a considerably lesser degree, between the two older groups ($t=2.47$, $p=.014$) remained significant.

A highly significant univariate effect ($p<.001$) was found to distinguish young drivers' greater tendencies to speed when upset and to drive less carefully when alone than when carrying passengers, by comparison with the two older groups. A less pronounced difference was found between drivers aged 30-44 years and those aged 45 years and over. These effects remained significant following covariate control, young drivers solo speeding tendencies being considerably more significant ($t=7.22$, $p<.001$) than those of middle-aged drivers ($t=2.21$, $p=.027$).

A univariately significant effect in relation to anticipation emerged after covariate control ($t=1.99$, $p=.046$) which was found to distinguish older drivers from the two younger groups on the basis of lower reported anticipatory skills on the part of drivers aged 45 years and over.

Following covariate control a significant univariate effect emerged ($t=-1.99$, $p=.047$) which the adjusted means revealed involved older drivers being distinguishable from the two younger groups by their tendency to have more negative attitudes to other drivers.

A significant univariate effect was detected after covariate control ($t=-2.42$, $p=.016$) which involved a distinction between drivers aged under 45 years and the older group, the latter reporting significantly greater difficulty in detecting pedestrians, cyclists and motorcyclists in the driving situation than did the two younger groups.

SEX

Five univariately significant effects were found relating to speed ($p=.024$), driver skills ($p=.005$), drink driving ($p<.001$), anticipation ($p=.015$), and awareness of other road users ($p=.003$). Examination of the adjusted means revealed that males tended to report significantly higher levels of speeding behaviours than did females, however this was found to be the case for the two younger age groups, but not for drivers aged 45 and over. Following control for the covariates, the significantly higher frequency of reported speeding behaviours of males by comparison with females remained ($t=2.25$, $p=.024$).

Males also reported significantly higher levels of drink-driving behaviours than did females ($t=4.67$, $p<.001$); rated their driver skills at significantly higher levels ($t=2.78$, $p=.005$); reported significantly higher levels of anticipation ($t=2.43$, $p=.015$); and reported significantly greater awareness of pedestrians, cyclists and motorcyclists than did females ($t=-2.97$, $p=.003$), this effect emerging following covariate control.

AGE BY SEX

Following covariate control, a significant age by sex interaction emerged at univariate level relating to speed ($t=2.22$, $p=.027$). Examination of the adjusted means revealed that this related to the higher frequency of reported speeding behaviours by males under the age of 30 years by comparison with all other drivers. A significant age by sex interaction was also evident for frustration ($t=2.13$, $p=.033$), relating to the high levels of reported frustration while driving by females aged 45 years and over by comparison with their male counterparts.

AGE BY ACCIDENT INVOLVEMENT

Two univariately significant age by accident interactions emerged following covariate control, relating to drink-driving. The adjusted means revealed that accident-involved drivers aged under 30 years differed significantly from their non-accident-involved counterparts ($t=-3.90$, $p<.001$), reporting considerably greater tendencies to drive after drinking. Culpable young and middle-aged drivers were significantly more inclined to drink-drive than their older counterparts ($t=-2.94$, $p=.003$).

Following covariate control a significant univariate age by accident interaction ($t=2.20$, $p=.208$) was found to relate to the higher rates of reported solo speeding (speeding when upset and driving less carefully when alone) of young accident-involved drivers by comparison with all other drivers. A univariately significant age by accident interaction emerged after covariate control ($t=2.00$, $p=.045$) which the adjusted means revealed involved significantly lower anticipatory levels reported by culpable young drivers than their non-accident and non-culpable counterparts.

SEX BY ACCIDENT INVOLVEMENT

A significant univariate sex by accident interaction ($t=3.56$, $p<.001$) emerged following covariate control relating to frustration, which the adjusted means revealed involved culpable females across all age groups being distinguishable from their male counterparts by higher levels of driving frustration.

Following covariate control a significant univariate sex by accident interaction was revealed ($t=2.08$, $p=.038$) relating to the greater inclination of accident-involved males to report solo speeding behaviours. A further univariately significant interaction emerged after controlling for driving experience ($t=2.34$, $p=.020$) which the adjusted means revealed related to non-culpable females reporting less awareness of pedestrians, cyclists and motorcyclists within the driving environment than did all other drivers. Perceived lack of control within the driving situation was also found to significantly distinguish non-culpable males from their culpable and non-accident counterparts following covariate control ($t=2.22$, $p=.027$), the former reporting themselves to have less control over the driving situation.

AGE BY SEX BY ACCIDENT INVOLVEMENT

A univariately significant age by sex by accident interaction was detected following covariate control ($t=2.16$, $p=.031$). The helmert contrasts and adjusted means revealed that young, and to a slightly lesser degree middle-aged, accident-involved males reported the highest frequency of speeding behaviours of all drivers, differing significantly from non-accident-involved drivers, females, and older drivers.

TABLE 21(A): MULTIVARIATE RESULTS

AGE BY SEX BY ACCIDENT INVOLVEMENT
Multivariate tests of significance (S=4 M=2 N=639)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.97655	.85	36.00	4798.49	.727

SEX BY ACCIDENT INVOLVEMENT
Multivariate tests of significance (S=2 M=3 N=639)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.97294	1.96	18.00	2560.00	.009

AGE BY ACCIDENT INVOLVEMENT
Multivariate tests of significance (S=4 M=2 N=639)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.96243	1.37	36.00	4798.49	.070

AGE BY SEX
Multivariate tests of significance (S=2 M=3 N=639)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.98542	1.05	18.00	2560.00	.400

ACCIDENT INVOLVEMENT
Multivariate tests of significance (S=2 M=3 N=639)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.97594	1.74	18.00	2560.00	.027

SEX
Multivariate tests of significance (S=1 M=3 1/2 N=639)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.96133	5.72	9.00	1281.00	.000

AGE
Multivariate tests of significance (S=2 M=3 N=639)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.92479	5.67	18.00	2560.00	.000

TABLE 21(B): SIGNIFICANT UNIVARIATE RESULTS

SEX BY ACCIDENT INVOLVEMENT
Univariate F-tests with (2,1288) DF

Variable	HypthSS	ErrorSS	HypthMS	ErrorMS	F	Sig/F
FRUSTRATION	143.72	14383.88	71.86	11.17	6.43	.002
PERCEIVED CONTROL	17.39	3630.57	8.70	2.82	3.09	.046

AGE BY ACCIDENT INVOLVEMENT
Univariate F-tests with (4,1288) DF

Variable	HypthSS	ErrorSS	HypthMS	ErrorMS	F	Sig/F
DRINK DRIVING	77.52	4306.27	19.38	3.34	5.80	.000

ACCIDENT INVOLVEMENT
Univariate F-tests with (2,1288) DF

Variable	HypthSS	ErrorSS	HypthMS	ErrorMS	F	Sig/F
SPEED	61.89	9512.39	30.94	7.39	4.19	.015

SEX
Univariate F-tests with (1,1288) DF

Variable	HypthSS	ErrorSS	HypthMS	ErrorMS	F	Sig/F
SPEED	37.48	9512.39	37.48	7.39	5.08	.024
DRIVER SKILLS	18.04	2999.42	18.04	2.33	7.75	.005
DRINK DRIVING	72.87	4306.27	72.87	3.34	21.80	.000
ANTICIPATION	4.82	1052.57	4.82	.82	5.89	.015
AWARENESS OF OTHER ROAD USERS	12.69	1857.88	12.69	1.44	8.80	.003

AGE
Univariate F-tests with (2,1288) DF

Variable	HypthSS	ErrorSS	HypthMS	ErrorMS	F	Sig/F
SPEED	158.95	9512.39	79.47	7.39	10.76	.000
FRUSTRATION	155.61	14383.88	77.80	11.17	6.97	.001
DRIVER SKILLS	56.42	2999.42	28.21	2.33	12.11	.000
SOLO SPEEDING	167.64	4055.27	83.82	3.15	26.62	.000

SIGNIFICANT ATTITUDINAL/BEHAVIOURAL TENDENCIES EFFECTS

SPEED
A significant decline in speeding behaviours was reported with increasing age, the sharpest distinction occurring between young drivers and the two older groups. Males reported significantly higher levels of speeding behaviours than did females. However, while a significantly higher rate

of speeding behaviours was reported by males aged less than 45 years by comparison with their female counterparts, this was not the case with older drivers.

Young males reported a significantly higher frequency of speeding behaviours than all other drivers. Young accident-involved males reported a significantly higher frequency of speeding behaviours than non-accident-involved drivers, females, and drivers aged 30 years and over.

FRUSTRATION
Young drivers reported significantly higher levels of driving-related frustration than the two older driver groups. However while driving-related male frustration was found to decline with age, females aged 45 years and over reported significantly higher levels of driving frustration than their male counterparts. Culpable females reported significantly higher levels of driving-related frustration than their male counterparts of all ages, the highest levels being reported by culpable young females.

DRIVER SKILLS
Young drivers rated their driver skills at significantly higher levels than did the two older groups, the distinction between the latter two groups, although less marked, was also significant. Males rated their driver skills at significantly higher levels than did females.

DRINK DRIVING
Males reported significantly higher levels of drink-driving behaviours than did females. The adjusted means revealed that young accident-involved drivers differed significantly from their non-accident-involved counterparts ($t=-3.90$, $p<.001$), reporting considerably greater tendencies to drive after drinking. Culpable young and middle-aged drivers were significantly more inclined to drink-drive than their older counterparts ($t=-2.94$, $p=.003$).

SOLO SPEEDING
A highly significant difference was found distinguishing young drivers' greater tendencies to speed when upset and to drive less carefully when alone than when carrying passengers, by comparison with middle-aged and older drivers. A smaller distinction between drivers aged 30-44 years and those over 44 years was also significant. Solo speeding behaviours were reported at significantly higher levels by young accident-involved drivers than all other drivers.

ANTICIPATION
Drivers in the two younger groups reported significantly higher levels of anticipatory skills than did those in the older group. Males consistently reported significantly

better anticipation than did females. Culpable young drivers reported significantly lower levels of anticipatory skills than their non-culpable and non-accident-involved peers.

NEGATIVE ATTITUDE TO OTHER DRIVERS
Non-culpable drivers reported significantly less negative attitudes to other drivers than their culpable or non accident-involved counterparts.

AWARENESS OF OTHER ROAD USERS
Older drivers reported significantly less awareness of pedestrians, cyclists and motorcyclists within the driving situation than did those in the two younger groups. Females reported significantly less awareness of pedestrians, cyclists and motorcyclists than did males. Non-culpable females reported significantly less awareness of pedestrians, cyclists and motor-cyclists than did all other drivers.

PERCEIVED CONTROL
Non-culpable males tended to consider the behaviour of other drivers to influence their own safety on the roads to a significantly greater degree than did their respective counterparts.

ATTRIBUTIONS FOR ROAD TRAFFIC ACCIDENTS IN BRITAIN IN RELATION TO ACCIDENT INVOLVEMENT

The final MANCOVA in this first set of analyses examined the degree of importance drivers attributed to a variety of accident risk factors in Britain, in relation to the attributions they made for their own accident involvement. Thus it was hoped that some indication may be obtained of the importance of beliefs about accident risk factors and their relationship with the degree of influence drivers consider themselves to have over their own accident involvement.

A significant multivariate interaction was found for age, sex and accident involvement at .008 level. This was found to relate at the univariate level to speed and aggression ($p=.001$) and impairment ($p=.022$). The three main effects, accident involvement, sex, and age, were all found to have multivariate significance ($p<.001$). Four of the five attribution factors had univariate significance in relation to all three main effects, as detailed below.

AGE BY SEX BY ACCIDENT INVOLVEMENT
The significant multivariate interaction ($p=.008$) involved at univariate level, speed and aggression ($p=.001$) and impairment ($p=.022$). An examination of the helmert contrasts

and means adjusted for the covariates revealed two driver groups with significantly lower attributions of importance to speed and aggression as accident risk factors than other drivers: young accident-involved males, whose attributions contrasted with their female counterparts (t=3.49, p=.001); and a relatively small effect involving middle-aged accident-involved females whose attributions differed significantly from their non-accident counterparts (t=-2.24, p=.026).

Two significant interactions relating to impairment identified two driver groups with significantly lower attributions of importance to impairment in relation to accident risk: accident-involved males under the age of 45 years who contrasted with non-accident drivers and their female counterparts (t=-2.35, p=.019); and older culpable males who differed from their non-culpable and non-accident peers (t=-2.26, p=.024).

Notably, culpable males consistently maintained low estimates of risk attributable to speed/aggression and impairment, making barely perceptible increases in their risk attributions, whereas in contrast non-culpable males made the lowest estimates of risk in relation to these factors when young, but considerably higher risk attributions from the age of 30 in relation to speed/aggression, and to a lesser degree in relation to impairment, making increasingly higher risk attributions than their culpable male peers with age in relation to both of these factors.

AGE BY ACCIDENT INVOLVEMENT

A univariately significant interaction between age and accident involvement (p=.022) was detected for attitude to other road users, relating to significantly lower estimates of risk attributable to pedestrian, cyclist and motorcyclist error by non-accident-involved and non-culpable drivers aged less than 30 years by comparison with their counterparts in the two older groups. Following covariate control, this distinction was found to be particularly pronounced between young non-culpable drivers and their older counterparts (t=-3.14, p=.002). Examination of the adjusted means revealed that non-culpable drivers had the lowest estimates of risk amongst young drivers, but the highest levels of risk from the age of 30 onwards, in relation to the importance of pedestrian, cyclist, and motorcyclist error in accident causation.

AGE BY SEX

A univariately significant interaction between age and sex related to speed and aggression (p=.018). This was illustrated by the lower estimates of risk made by young males by comparison with both young females and drivers aged 30 and over. Following covariate control, males aged less than 30 years were found to have significantly lower estimates of risk due to speed and aggression than their female counterparts (t=-2.27, p=.023).

ACCIDENT INVOLVEMENT
Univariate significance with regard to accident involvement related to: attitude to driver variables (p=.002), attitude to other road users (p=.050), speed and aggression (p<.001) and impairment (p<.001). Following covariate control a highly significant effect relating to attitude to driver variables emerged (t=3.35, p=.001), which the helmert contrasts and adjusted means revealed was attributable to the consistently lower estimates of risk due to driver variables made by culpable drivers, distinguishing them from both non-culpable and non-accident-involved drivers. An examination of the adjusted means revealed that non-culpable drivers made higher estimates of risk than all other driver groups, while non-accident-involved drivers fell midway between the two accident-involved groups in their judgements of risk. Attitude to other road users was rendered non-significant in relation to accident involvement following covariate control.

Following control for driving experience duration and intensity, a significant difference in risk estimation relating to speed and aggression was found between accident and non-accident-involved drivers (t=3.31, p=.001), the former attributing considerably less risk to speed and aggression. An examination of the adjusted means suggested that this was due to no small degree to culpable drivers' risk estimates, however no significant difference between culpable and non-culpable-accident-involved drivers emerged.

Following covariate control a significant difference between accident- and non-accident-involved drivers emerged (t=2.14, p=.03) which examination of the adjusted means suggested relates to lower estimates of risk due to road and weather conditions on the part of accident-involved drivers.

In relation to impairment, accident-involved drivers were found to make significantly lower estimates of risk than their non-accident-involved counterparts (t=3.77, p<.001) following control for driving experience.

AGE
Univariate significance in relation to age involved: attitude to driver variables (p=.026), attitude to other road users (p<.001), speed and aggression (p=.018), and impairment (p=.001). Following covariate control, the helmert contrasts and adjusted means revealed that a small but significant increase in awareness of the importance of driver variables appears to occur in a linear fashion with increasing age,

distinguishing young drivers from the two older groups ($t=2.26$, $p=.024$) as well as well as distinguishing between the two older driver groups ($t=-2.28$, $p=.023$).

Similarly, estimates of risk attributable to pedestrians, cyclists and motorcyclists increased significantly in a linear fashion with increasing age, distinguishing young drivers from the two older groups ($t=-4.20$, $p<.001$), and to a lesser degree distinguishing middle-aged from older drivers ($t=-2.79$, $p=.005$). A significant increase in estimates of risks relating to speed and aggression was also found to occur after the age of 44 years ($t=-2.85$, $p=.004$).

Estimates of risk due to impairment were found to increase in a linear fashion with increasing age, with significant differences emerging between young drivers and the two older groups ($t=-2.69$, $p=.007$), with a clearer distinction between middle-aged and older drivers ($t=-3.46$, $p=.001$).

SEX

Sex differences of univariate significance related to: attitude to driver variables ($p=.031$), attitude to other road users ($p<.001$), speed and aggression ($p<.001$), and impairment ($p<.001$). On the whole males were found to make significantly lower estimates of the risks due to attitude to driver variables than females. This effect remained following covariate control for driving experience duration and intensity ($t=-2.16$, $p=.031$). Similarly, males made significantly lower estimates of risk than females in relation to the risks attributable to errors by pedestrians, cyclists and motorcyclists ($t=-5.51$, $p<.001$). Females made significantly higher estimates of the risks attributable to speed and aggression than males did ($t=-3.73$, $p<.001$). Males attributed significantly less risk to impairment than their female counterparts did ($t=-3.72$, $p<.001$).

<u>TABLE 22: ATTRIBUTIONS FOR ROAD TRAFFIC ACCIDENTS IN BRITAIN</u>

<u>TABLE 22(A): MULTIVARIATE RESULTS</u>

AGE BY SEX BY ACCIDENT INVOLVEMENT

Multivariate tests of significance (S=4 M=0 N=661 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.97166	1.91	20.00	4395.48	.008

SEX BY ACCIDENT INVOLVEMENT

Multivariate tests of significance (S=2 M=1 N=661 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.99367	.84	10.00	2650.00	.587

AGE BY ACCIDENT INVOLVEMENT
Multivariate tests of significance (S=4 M=0 N=661 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.97695	1.55	20.00	4395.48	.056

AGE BY SEX
Multivariate tests of significance (S=2 M=1 N=661 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.99051	1.27	10.00	2650.00	.244

ACCIDENT INVOLVEMENT
Multivariate tests of significance (S=2 M=1 N=661 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.96791	4.36	10.00	2650.00	.000

SEX
Multivariate tests of significance (S=1 M=1 1/2 N=661 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.97253	7.48	5.00	1325.00	.000

AGE
Multivariate tests of significance (S=2 M=1 N=661 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.97552	3.30	10.00	2650.00	.000

TABLE 22(B): SIGNIFICANT UNIVARIATE RESULTS

AGE BY SEX BY ACCIDENT INVOLVEMENT
Univariate F-tests with (4,1329) DF

Variable	HypthSS	ErrorSS	HypthMS	ErrorMS	F	Sig/F
SPEED AND AGGRESSION	32.79	2335.81	8.20	1.76	4.66	.001
IMPAIRMENT	62.02	7174.29	15.50	5.40	2.87	.022

AGE BY ACCIDENT INVOLVEMENT
Univariate F-tests with (4,1329) DF

Variable	HypthSS	ErrorSS	HypthMS	ErrorMS	F	Sig/F
ATTITUDE TO OTHER ROAD USERS	49.33	5726.54	12.33	4.31	2.86	.022

AGE BY SEX
Univariate F-tests with (2,1329) DF

Variable	HypthSS	ErrorSS	HypthMS	ErrorMS	F	Sig/F
SPEED AND AGGRESSION	14.11	2335.81	7.05	1.76	4.01	.018

ACCIDENT INVOLVEMENT
Univariate F-tests with (2,1329) DF

Variable	HypthSS	ErrorSS	HypthMS	ErrorMS	F	Sig/F
ATTITUDE TO DRIVER VARIABLES	84.77	8928.59	42.38	6.72	6.31	.002
ATTITUDE TO OTHER ROAD USERS	25.80	5726.54	12.90	4.31	2.99	.050
SPEED AND AGGRESSION	30.37	2335.81	15.18	1.76	8.64	.000
IMPAIRMENT	109.17	7174.29	54.59	5.40	10.11	.000

SEX
Univariate F-tests with (1,1329) DF

Variable	HypthSS	ErrorSS	HypthMS	ErrorMS	F	Sig/F
ATTITUDE TO DRIVER VARIABLES	31.37	8928.59	31.37	6.72	4.67	.031
ATTITUDE TO OTHER ROAD USERS	130.83	5726.54	130.82	4.31	30.36	.000
SPEED AND AGGRESSION	24.40	2335.81	24.40	1.76	13.88	.000
IMPAIRMENT	74.87	7174.29	74.87	5.40	13.87	.000

AGE
Univariate F-tests with (2,1329) DF

Variable	HypthSS	ErrorSS	HypthMS	ErrorMS	F	Sig/F
ATTITUDE TO DRIVER VARIABLES	49.10	8928.59	24.55	6.72	3.65	.026
ATTITUDE TO OTHER ROAD USERS	81.91	5726.54	40.95	4.31	9.50	.000
SPEED AND AGGRESSION	14.26	2335.81	7.13	1.76	4.06	.018
IMPAIRMENT	75.10	7174.29	37.55	5.40	6.96	.001

SIGNIFICANT ACCIDENT ATTRIBUTION EFFECTS

ATTITUDE TO DRIVER VARIABLES

A small but significant increase in awareness of the importance of driver variables appears to occur with increasing age distinguishing the 30-44 year age group from both the under 30s and those aged 45 and over. On the whole males were found to make significantly lower estimates of the risks due to driver variables than females. Culpable drivers were found to consistently make the lowest estimates of the risks due to attitude to driver variables, significantly differing from their non-culpable counterparts across age and sex in this respect. An examination of the means revealed that non-culpable drivers made higher estimates of risk than all other drivers, while non-accident-involved drivers fell midway between the two accident-involved groups in their judgements of risk.

ATTITUDE TO OTHER ROAD USERS

Estimates of risk attributable to pedestrians, cyclists and motorcyclists increased significantly in a linear fashion, with increasing age. Females made significantly higher estimates of risk than males. An interaction effect between age and accident involvement related to significantly lower estimates of risk attributable to pedestrian, cyclist and motorcyclist error by non-accident-involved and non-culpable drivers aged less than 30 years by comparison with their counterparts in the two older groups. This distinction was found to be particularly pronounced between young non-culpable drivers and their older counterparts.

SPEED AND AGGRESSION

A significant increase in estimates of risks relating to speed and aggression occurred after the age of 44 years. Females consistently made significantly higher estimates of the risks attributable to speed and aggression than did males. A significant difference in risk estimation was found between accident and non-accident-involved drivers. This effect appears to be due in no small measure to culpable drivers low risk estimates.

Young males (under 30 years) made significantly lower estimates of risk than both their female counterparts and older drivers. Two driver groups made significantly lower attributions of importance to speed and aggression as accident risk factors than all other drivers: young accident-involved males, whose attributions contrasted with their female counterparts; and middle-aged, accident-involved females whose attributions differed significantly from their non-accident counterparts.

ROAD & WEATHER CONDITIONS

A slight but significant tendency was found for accident-involved drivers to make lower estimates of risk due to road and weather conditions than their non-accident-involved counterparts.

IMPAIRMENT

Estimates of risk due to impairment were found to increase significantly in a linear fashion with increasing age. Males consistently attributed less risk to impairment than their female counterparts. Accident-involved drivers made significantly lower estimates of risk than their non-accident-involved counterparts.

Two significant interactions relating to impairment identified two driver groups with significantly lower attributions of importance to impairment in relation to accident risk: accident-involved males under the age of 45 years who contrasted with non-accident drivers and their female counterparts; and older culpable males who differed from their non-culpable and non-accident peers.

Non-culpable young males made the lowest estimates of risk attributable to impairment of all drivers, significantly lower than each subsequent estimate for this accident group, which increased considerably with age, particularly after the age of 44 years. In sharp contrast, culpable males had low estimates of risk in youth, which increased only slightly with age. Thus only culpable males consistently maintained low estimates of risk attributable to impairment.

In summary: the first set of mancovas identified significant differences between driver groups according to age, sex, and accident involvement, including culpability. Young drivers and males, but especially young males, are statistically over-represented in accidents and identified by a considerable body of previous research as being associated with risky practices. These groups were distinguished in the foregoing analyses, not only on the basis of the greater pleasure they experience within the driving situation, but also aspects of their affect/arousal state, self-perception, behavioural tendencies, and beliefs about accident causation, which are likely to increase their chances of accident involvement.

Furthermore, many of these features, and also some additional factors, were identified as being associated with accident involvement per se, and some, by their nature or degree, distinguished subjectively culpable-, non-culpable-, and non-accident-involved drivers as three fairly distinct groups.

While this study obviously has imperfections, being relatively exploratory in relation to culpability, these findings clearly have considerable implications with regard to increasing the effectiveness of accident prevention strategies. At the least, such identified driver' groups could be targetted to increase their awareness of the nature of the consequences which have been found to be associated with their beliefs, perceptions, behavioural tendencies, in conjunction with fatigue-, stress-, and alcohol-induced impairment within the driving situation. What may seem apparent from the vantage point of comparative studies, may be far more obscure to the individual behind the wheel without the benefit of such comparisons.

TRAFFIC OFFENCE HISTORY/RECENCY

The second set of MANCOVAS is concerned with the relationship between traffic offence history and driver attitude/ attribution. As these results are somewhat similar to, but weaker than, those relating to accident involvement, and repetitious to a considerable degree with regard to age, sex, and experiential effects, a summary of the results pertinent to detected traffic offences and their interactions only will be reported here. However a full report of these analyses is available in Appendix G(1).

DRIVER AFFECT/STATE IN RELATION TO TRAFFIC OFFENCES

The main effect for traffic offences was not significant at multivariate level.

AGE BY SEX BY TRAFFIC OFFENCES
A univariately significant interaction between age, sex, and traffic offences was found to relate to irritability (p=.020) and unawareness (p=.009). The findings for the former were that, although irritability increased in a linear fashion in males with a history of traffic offences, female traffic offenders were found to report the highest levels of irritability of all drivers, during middle-age, while in sharp contrast reporting the lowest levels of irritability of all drivers, from the age of 45 years, this effect being particularly pronounced within older female traffic offenders with current endorsements. Following covariate control middle-aged female traffic offenders were found to report significantly higher levels of irritability within the driving situation than all other drivers (t=3.09, p=.002).

A further interaction effect revealed that middle-aged female traffic offenders reported significantly lower levels of driver awareness than their older counterparts (t=3.14, p=.002), the former with current endorsements reporting the lowest levels of awareness of all drivers, and the latter, also with current endorsements, reporting the highest levels. In contrast, young male traffic offenders reported significantly higher levels of driver awareness than their older counterparts (t=2.03, p=.04). These differing patterns suggest that offences may be mediated by different factors in accordance with life stage and sex.

AGE BY TRAFFIC OFFENCES
A univariately significant age by traffic offences interaction relating to unawareness (p=.033), revealed that, following covariate control, middle-aged traffic offenders were distinguished by their significantly lower level of awareness within the driving environment by comparison with

other drivers (t=-2.19,p=.03), which appears to be attributable largely to the low awareness of female offenders within this age group.

DRIVERS' SELF-PERCEPTION IN RELATION TO TRAFFIC OFFENCES

The main effect for traffic offences was multivariately significant (p<.001).

AGE BY SEX BY TRAFFIC OFFENCES
Following covariate control a significant interaction emerged relating to the significantly higher ratings of self as irritable by middle-aged female traffic offenders by comparison with their older counterparts (t=2.62, p=.009).

TRAFFIC OFFENCES
With regard to traffic offences, univariately significant effects related to drivers' perceptions of themselves as safe (p=.001), confident (p=.001), and aware (p=.018). Following covariate control, drivers with no history of traffic offences were found to perceive themselves to be significantly safer drivers than did traffic offenders (t=3.35, p=.0008). However, traffic offenders rated themselves as significantly more confident than did those without such a history (t=-3.38, p=.0008). Drivers with current endorsements rated themselves as having less driver awareness than did traffic offenders without current endorsements (t=2.84, p=.005).

DRIVER ATTITUDES/REPORTED BEHAVIOURS IN RELATION TO TRAFFIC OFFENCES

The main effect for traffic offences was not significant at multivariate level.

AGE BY SEX BY TRAFFIC OFFENCES
Following covariate control a significantly higher frequency of solo speeding distinguishing young male traffic offenders was revealed (t=-2.23, p=.03). Older male offenders were distinguished by reporting significantly less awareness of non-driving road users than all other drivers (t=-2.07, p=.04)

AGE BY TRAFFIC OFFENCES
Following covariate control, older traffic offenders were found to report significantly more negative attitudes to

other drivers than their counterparts in the two younger groups or than non-offenders (t=-2.32, p=.02).

TRAFFIC OFFENCES

Solo speeding alone was univariately significant (p=.038) in relation to traffic offences. Following covariate control traffic offenders were found to report significantly higher frequencies of speeding behaviours (t=-2.28, p=.02), and solo speeding behaviours (speeding when upset, and taking less care when driving alone) (t=-2.37, p=.02) than did non-offenders.

ATTRIBUTIONS FOR ROAD TRAFFIC ACCIDENTS IN BRITAIN IN RELATION TO TRAFFIC OFFENCES

The main effect for traffic offences was multivariately significant (p=.002).

AGE BY SEX BY TRAFFIC OFFENCES

A univariately significant interaction between age, sex, and traffic offences related to impairment (p=.028). Following covariate control older female traffic offenders were distinguished by the significantly greater importance they attributed to impairment in relation to accident causation, by comparison with, not only their male counterparts, but all other drivers (regardless of age, sex, or traffic offence history) (t=-2.17, p=.03).

AGE BY TRAFFIC OFFENCES

Traffic offenders in the 30-44 years age band attributed significantly less importance to impairment in relation to accident causation than did either their younger or older counterparts (t=-2.69, p=.007)

TRAFFIC OFFENCES

A univariately significant effect was found to relate to speed and aggression in relation to traffic offences (p=.001). Covariate control revealed that traffic offenders consistently attributed significantly less importance to speed and aggression in relation to accident causation than did drivers without such a history (t=3.66, p=.0003).

YOUNG DRIVER CROSS-CULTURAL ACCIDENT INVOLVEMENT/LIABILITY

The third set of MANCOVAS is concerned with driver self-assessment of influence over accident occurrence, with a focus on young drivers (up to 25 years) drawn from the combined British sample and a sample of Victorian (Australian) drivers, thus allowing cross-cultural comparison.

DRIVER AFFECT/STATE IN RELATION TO ACCIDENT INVOLVEMENT

No multivariate interactions were found, however a significant multivariate effect for country was detected ($p=.010$). This was found at univariate level to relate to intimidation ($p=.007$) and was due to the significantly lower levels of intimidation and fear while driving, reported by British drivers by comparison with the Australians.

AGE BY SEX BY COUNTRY
A significant interaction at univariate level ($t=-2.22$, $p=.027$) was found to relate, following covariate control, to the lower levels of intimidation reported by non-culpable accident-involved British males by comparison with all other drivers.

ACCIDENT INVOLVEMENT
Following covariate control culpable drivers were found to be distinguishable from non-accident and non-culpable drivers by their significantly higher levels of reported irritation and frustration within the driving situation ($t=-2.39$, $p=.018$). Similarly, a univariately significant effect for intimidation and fear emerged after controlling for covariates ($t=-2.06$, $p=.040$) which an examination of the adjusted means revealed related to significantly higher levels of reported intimidation and fear while driving by culpable drivers by comparison with non-accident and non-culpable drivers.

COUNTRY
A significant univariate effect for country in relation to intimidation remained following control for the driving experience covariates ($t=-2.72$, $p=.007$) which the adjusted means revealed related to lower reported levels of intimidation and fear within the driving situation by British than Australian drivers.

TABLE 23: DRIVER AFFECT/STATE

TABLE 23(A): MULTIVARIATE RESULTS

ACCIDENT INVOLVEMENT BY SEX BY COUNTRY
Multivariate tests of significance (S=2 M=-1/2 N=191 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.97185	1.38	8.00	770.00	.200

SEX COUNTRY
Multivariate tests of significance (S=1 M=1 N=191 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.99051	.92	4.00	385.00	.451

ACCIDENT INVOLVEMENT BY COUNTRY
Multivariate tests of significance (S=2 M=1/2 N=191 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.98907	.53	8.00	770.00	.834

ACCIDENT INVOLVEMENT BY SEX
Multivariate tests of significance (S=2 M=1/2, N=191 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.98341	.81	8.00	770.00	.595

COUNTRY
Multivariate tests of significance (S=1 M=1 N=191 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.96611	3.38	4.00	385.00	.010

SEX
Multivariate tests of significance (S=1 M=1 N=191 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.99206	.77	4.00	385.00	.545

ACCIDENT INVOLVEMENT
Multivariate tests of significance (S=2 M=1/2 N=191 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.96807	1.57	8.00	770.00	.129

TABLE 23(B): SIGNIFICANT UNIVARIATE RESULTS

COUNTRY
Univariate F-tests with (1,388) DF

Variable	HypthSS	ErrorSS	HypthMS	ErrorMS	F	Sig/F
INTIMIDATION	60.46	3180.43	60.46	8.20	7.38	.007

SIGNIFICANT AFFECT/STATE EFFECTS

IRRITABILITY
Following control for driving experience duration and intensity, the helmert contrasts and adjusted means revealed that culpable drivers reported significantly higher levels of irritability when driving than did non-culpable or non-accident-involved drivers (t=-2.39, p=.018).

INTIMIDATION
Similarly, culpable drivers were found to report significantly higher levels of intimidation when driving than did the other driver groups(t=-2.06, p=.040), following covariate control. Accident-involved Australians reported significantly higher levels of intimidation when driving than their British counterparts (t=-2.72, p=.007). A significant univariate age by sex by country interaction (t=-2.22, p=.027) revealed that non-culpable British males reported lower levels of intimidation than all other drivers.

UNAWARENESS
No significant effects were detected.

EXHILARATION
No significant effects were detected.

DRIVER SELF-PERCEPTION IN RELATION TO ACCIDENT INVOLVEMENT

No significant multivariate interactions were found, however two of the three main effects were significant at multivariate level: sex (p=.001) and accident involvement (p<.001). Three factors had univariate significance in relation to sex: irritable (p=.009), safe (p=.004), and confident (p=.031); while all four factors had univariate significance in relation to accident involvement: irritable (p=.006), safe (p<.001), confident (p=.014), and aware (p<.001).

ACCIDENT BY COUNTRY
A significant univariate interaction (t=-2.15, p=.032) was found to relate to non-culpable British males and females lower reported levels of irritiability within the driving situation than their culpable and non-accident-involved counterparts.

SEX
Following covariate control, males' perceptions of themselves as drivers, by comparison with females' equivalent perceptions revealed that males rated themselves to be significantly more irritable (t=2.61, p=.009), less safe (t=-2.86, p=.004), and more confident (t=2.27, p=.024).

ACCIDENT INVOLVEMENT
Following covariate control, an examination of the helmert contrasts and adjusted means revealed that culpable drivers rated themselves as significantly more irritable (t=-3.22, p=.001), less safe (t=4.25, p<.001), less confident (t=2.27, p=.024), and less aware (t=3.62, p<.001) than did non-culpable and non-accident-involved drivers.

TABLE 24: DRIVER SELF PERCEPTION

TABLE 24(A): MULTIVARIATE RESULTS

ACCIDENT INVOLVEMENT BY SEX BY COUNTRY
Multivariate tests of significance (S=2 M=1/2 N=193)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.98140	.91	8.00	776.00	.503

SEX BY COUNTRY
Multivariate tests of significance (S=1 M=1 N=193)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.98936	1.04	4.00	388.00	.385

ACCIDENT INVOLVEMENT BY COUNTRY
Multivariate tests of significance (S=2 M=1/2 N=193)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.96108	1.94	8.00	776.00	.051

ACCIDENT INVOLVEMENT BY SEX
Multivariate tests of significance (S=2 M=1/2, N=193)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.97495	1.24	8.00	776.00	.273

COUNTRY
Multivariate tests of significance (S=1 M=1 N=193)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.98340	1.64	4.00	388.00	.164

SEX
Multivariate tests of significance (S=1 M=1 N=193)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.95364	4.72	4.00	388.00	.001

ACCIDENT INVOLVEMENT
Multivariate tests of significance (S=2 M=1/2 N=193)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.92307	3.96	8.00	776.00	.000

TABLE 24(B): SIGNIFICANT UNIVARIATE RESULTS

SEX
Univariate F-tests with (1,391) DF

Variable	HypthSS	ErrorSS	HypthMS	ErrorMS	F	Sig/F
IRRITABLE	91.14	5228.68	91.14	13.37	6.82	.009
SAFE	85.23	4072.70	85.23	10.42	8.18	.004
CONFIDENT	19.90	1666.10	19.90	4.26	4.67	.031

ACCIDENT INVOLVEMENT
Univariate F-tests with (2,391) DF

Variable	HypthSS	ErrorSS	HypthMS	ErrorMS	F	Sig/F
IRRITABLE	141.01	5228.68	70.50	13.37	5.27	.006
SAFE	240.22	4072.70	120.11	10.42	11.53	.000
CONFIDENT	36.59	1666.10	18.30	4.26	4.29	.014
AWARE	58.23	1399.08	29.12	3.58	8.14	.000

SIGNIFICANT DRIVER SELF PERCEPTION EFFECTS

IRRITABLE
Culpable drivers rated themselves as significantly more irritable than did non-culpable and non-accident groups. Males reported themselves to be significantly more irritable than did females. An interaction between accident involvement and country revealed that non-culpable British drivers rated themselves as significantly less irritable than did both their non-accident-involved and their culpable counterparts.

SAFE
Culpable drivers rated themselves to be significantly less safe than did non-culpable and non-accident-involved drivers. Males rated themselves as significantly less safe drivers than did females.

CONFIDENT
Culpable drivers can be distinguished from non-culpable and non-accident-involved drivers by their significantly lower confidence ratings. Males' ratings of confidence were significantly higher than were those of females.

AWARE
Culpable drivers considered themselves to be significantly less aware within the driving environment than did non-culpable or non-accident-involved drivers.

DRIVER ATTITUDES/REPORTED BEHAVIOURS IN RELATION TO ACCIDENT INVOLVEMENT

There were no significant multivariate interactions within this analysis, however two of the three main effects had multivariate significance, country and sex, both of which were significant beyond the .001 level.

ACCIDENT INVOLVEMENT BY SEX BY COUNTRY
Perceived control was univariately significant (p=.027) in relation to an interaction between accident involvement, sex and country. Following covariate control this was found to relate to culpable British females perception of significantly less control within the driving situation than their male counterparts (t=2.69, p=.007).

SEX AND COUNTRY
Driver skills were univariately significant (p=.013) in relation to an interaction between sex and country. An examination of the adjusted means revealed that this was due to Australian males making higher ratings of their driver skills than all other drivers, while in contrast Australian females made the lowest ratings of driver skills than all other drivers. The distinction between these two driver groups remained significant following covariate control (t=-2.51, p=.-013).

ACCIDENT INVOLVEMENT AND COUNTRY
Drink driving interacted significantly at univariate level (p=.035) with accident involvement and country. This effect remained significant after covariate control, an examination of the adjusted means revealing that non-accident-involved

British drivers reported significantly lower levels of drink driving behaviours than their Australian counterparts (t=-2.34, p=.020).

ACCIDENT INVOLVEMENT AND SEX

With regard to accident involvement and sex, speed was found to be univariately significant (p=.019). Following covariate control, the helmert contrasts revealed that this effect remained significant (t=2.64, p=.009). The adjusted means revealed the significantly lower frequency of speeding behaviours reported by non-accident-involved and non-culpable females by comparison with culpable females as well as all males.

COUNTRY

Four factors were univariately significant in relation to country: frustration (p=.012), drink driving (p=.036), solo speeding (p<.001), and anticipation (p=.025). Following covariate control British drivers were found to report significantly higher levels of frustration within the driving situation than their Australian counterparts (t=2.52, p=.012). Australian drivers reported significantly higher levels of drink driving behaviours than did British drivers (t=-2.10, p=.36). British drivers reported significantly higher levels of solo speeding behaviours than did Australian drivers (t=4.01, p<.001). British drivers reported significantly higher levels of anticipation within the driving situation than their Australian counterparts (t=2.24, p=.025).

SEX

In relation to sex, five of the nine factors were univariately significant: speed (p=.043), driver skills (p<.001), drink driving (p=.008), anticipation (p=.002), and perceived control (p=.021). Following covariate control, males were found to report significantly higher levels of both speeding (t=2.03, p=.043) and drink driving behaviours (t=2.65, p=.008) than did females. Males rated their driver skills (t=4.29, p<.001) and their anticipatory skills (t=3.12, p=.002) significantly more highly than did females. Females perceived themselves to have significantly less control within the driving situation than did males (t=-2.32, p=.021).

ACCIDENT INVOLVEMENT

No significant effects were detected in relation to accident involvement alone, either at multivariate or univariate level, following exclusion of experience/exposure effects.

TABLE 25: DRIVER ATTITUDINAL/REPORTED BEHAVIOURAL TENDENCIES

TABLE 25(A): MULTIVARIATE RESULTS

ACCIDENT INVOLVEMENT BY SEX BY COUNTRY
Multivariate tests of significance (S=2 M=3 N=190 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.95728	.94	18.00	766.00	.530

SEX BY COUNTRY
Multivariate tests of significance (S=1 M=3 1/2 N=190 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.96779	1.42	9.00	383.00	.179

ACCIDENT INVOLVEMENT BY COUNTRY
Multivariate tests of significance (S=2 M=3 N=190 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.94373	1.25	18.00	766.00	.214

ACCIDENT INVOLVEMENT BY SEX
Multivariate tests of significance (S=2 M=3 N=190 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.95156	1.07	18.00	766.00	.379

COUNTRY
Multivariate tests of significance (S=1 M=3 1/2 N=190 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.91129	4.14	9.00	383.00	.000

SEX
Multivariate tests of significance (S=1 M=3 1/2 N=190 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.90201	4.62	9.00	383.00	.000

ACCIDENT INVOLVEMENT
Multivariate tests of significance (S=2 M=3 N=190 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.96889	.68	18.00	766.00	.835

TABLE 25(B): SIGNIFICANT UNIVARIATE RESULTS

ACCIDENT INVOLVEMENT BY SEX BY COUNTRY
Univariate F-tests with (2,391) DF

Variable	HypthSS	ErrorSS	HypthMS	ErrorMS	F	Sig/F
PERCEIVED CONTROL	19.19	1032.33	9.59	2.64	3.63	.027

SEX BY COUNTRY
Univariate F-tests with (1,391) DF

Variable	HypthSS	ErrorSS	HypthMS	ErrorMS	F	Sig/F
DRIVER SKILLS	17.11	1065.12	17.11	2.72	6.28	.013

ACCIDENT INVOLVEMENT BY COUNTRY
Univariate F-tests with (2,391) DF

Variable	HypthSS	ErrorSS	HypthMS	ErrorMS	F	Sig/F
DRINK DRIVING	13.28	766.11	6.64	1.96	3.39	.035

ACCIDENT INVOLVEMENT BY SEX
Univariate F-tests with (2,391) DF

Variable	HypthSS	ErrorSS	HypthMS	ErrorMS	F	Sig/F
SPEED	59.36	2890.63	29.68	7.39	4.01	.019

COUNTRY
Univariate F-tests with (1,391) DF

Variable	HypthSS	ErrorSS	HypthMS	ErrorMS	F	Sig/F
FRUSTRATION	68.58	4210.32	68.58	10.77	6.37	.012
DRINK DRIVING	8.64	766.11	8.64	1.96	4.41	.036
SOLO SPEEDING	52.26	1268.35	52.26	3.24	16.11	.000
ANTICIPATION	5.92	459.30	5.92	1.17	5.04	.025

SEX
Univariate F-tests with (1,391) DF

Variable	HypthSS	ErrorSS	HypthMS	ErrorMS	F	Sig/F
SPEED	30.46	2890.63	30.46	7.39	4.12	.043
DRIVER SKILLS	50.04	1065.12	50.04	2.72	18.37	.000
DRINK DRIVING	13.78	766.11	13.78	1.96	7.03	.008
ANTICIPATION	11.40	459.30	11.40	1.17	9.71	.002
PERCEIVED CONTROL	14.26	1032.33	14.26	2.64	5.40	.021

SIGNIFICANT ATTITUDINAL/BEHAVIOURAL EFFECTS

SPEED
Non-accident-involved and non-culpable females reported significantly lower levels of speeding behaviours than did culpable females or all male groups. Males reported significantly higher levels of speeding behaviours than did females.

FRUSTRATION
British drivers were found to report significantly higher levels of frustration than did Australian drivers.

DRIVER SKILLS
Following covariate control the helmert contrasts and adjusted means revealed that Australian males differed significantly from their female counterparts in their ratings of their driver skills ($t=-2.51$, $p=.013$), the former having the highest and the latter the lowest self-ratings of driver skills of all drivers within this sample. Males ratings of their driver skills were significantly higher than were those of females ($t=.4.29$, $p<.001$).

DRINK DRIVING
Following covariate control, non-accident-involved British drivers were found to report significantly lower levels of drink driving behaviour than their Australian counterparts ($t=-2.34$, $p=.020$). Australian drivers reported significantly higher levels of drink driving behaviours than did British drivers ($t=-.2.10$, $p=.036$). Males reported significantly higher levels of drink driving behaviours than did females ($t=2.65$, $p=.008$).

SOLO SPEEDING
British drivers reported significantly higher levels of solo speeding behaviours than did Australian drivers ($t=4.01$, $p<.001$) after covariate control.

ANTICIPATION
Following covariate control, British drivers were found to report significantly higher levels of anticipation within the driving situation than their Australian counterparts ($t=2.24$, $p=.025$). Males rated their anticipatory skills significantly higher than did females ($t=3.12$, $p=.002$).

NEGATIVE ATTITUDE TO OTHER DRIVERS
No significant effects were detected.

AWARENESS OF OTHER ROAD USERS
No significant effects were detected.

PERCEIVED CONTROL
Following covariate control the adjusted means revealed that culpable British females perceived themselves to have significantly lower levels of control within the driving situation than did their male counterparts (t=.2.69, p=.007) Females perceived themselves to have significantly less control within the driving situation than did males (t=-2.32, p=.021).

ATTRIBUTIONS FOR ROAD TRAFFIC ACCIDENTS IN BRITAIN/AUSTRALIA IN RELATION TO ACCIDENT INVOLVEMENT

A significant multivariate interaction was found between accident involvement and country (p=.009). This was found at univariate level to relate to impairment, at a significance level of .004. The means revealed that British culpable drivers rated impairment to be significantly less important in relation to accident causation than did all other drivers.

Multivariate significance was also found for two of the three main effects, country (p<.001), and sex (p<.001).

COUNTRY
One factor only, impairment (p<.001), had univariate significance in relation to country, reflecting the greater importance Australian drivers attributed to impairment with regard to accident causation, by comparison with British drivers. This effect was found to be significant following covariate control (t=-4.15, p<.001).

SEX
Four of the five factors in this analysis were univariately significant in relation to sex: attitude to driver variables (p=.044), attitude to other road users (p<.001), speed and aggression (p<.001), and impairment (p<.001). Following covariate control, females were found to attribute significantly more importance to driver variables with regard to accident causation than did males (t=-2.02, p=.044); to other road users' errors (t=-3.63, p<.001); to speed and aggression (t=-4.38, p<.001) and to impairment (t=-3.53, p<.001) in relation to accident causation than did males.

ACCIDENT INVOLVEMENT BY SEX BY COUNTRY
Following covariate control, the helmert contrasts revealed a significant univariate interaction in relation to speed and aggression (t=2.22, p=.027). This was found to involve significantly less importance attributed to speed and aggression by culpable British males by comparison with their Australian counterparts.

SEX BY COUNTRY

Following covariate control a significant univariate interaction emerged in relation to road and weather conditions ($t=-2.44$, $p=.015$). Examination of the adjusted means revealed that this involved British males attributing less importance to road and weather conditions in relation to accident causation than did their female counterparts or Australian drivers.

ACCIDENT INVOLVEMENT BY COUNTRY

After controlling for driving experience duration and intensity, culpable British drivers were found to attribute significantly less importance to impairment in relation to accident causation than did all other drivers ($t=2.66$, $p=.008$).

TABLE 26: DRIVER ATTITUDINAL/BEHAVIOURAL TENDENCIES

TABLE 26(A): MULTIVARIATE RESULTS

ACCIDENT INVOLVEMENT BY SEX BY COUNTRY

Multivariate tests of significance (S=2 M=1 N=195 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.97099	1.17	10.00	786.00	.311

SEX BY COUNTRY

Multivariate tests of significance (S=1 M=1 1/2 N=195 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.97401	2.10	5.00	393.00	.065

ACCIDENT INVOLVEMENT BY COUNTRY

Multivariate tests of significance (S=2 M=1 N=195 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.94244	2.36	10.00	786.00	.009

ACCIDENT INVOLVEMENT BY SEX

Multivariate tests of significance (S=2 M=1 N=195 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.98306	.67	10.00	786.00	.749

COUNTRY

Multivariate tests of significance (S=1 M=1 1/2 N=195 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.93477	5.48	5.00	393.00	.000

SEX
Multivariate tests of significance (S=1 M=1 1/2 N=195 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.92914	5.99	5.00	393.00	.000

ACCIDENT INVOLVEMENT
Multivariate tests of significance (S=2 M=1 N=195 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.97613	.96	10.00	786.00	.481

TABLE 26(B): SIGNIFICANT UNIVARIATE RESULTS

SEX BY COUNTRY
Univariate F-tests with (1,397) DF

Variable	HypthSS	ErrorSS	HypthMS	ErrorMS	F	Sig/F
ROAD/WEATHER CONDITIONS	14.45	965.61	14.45	2.43	5.94	.015

ACCIDENT INVOLVEMENT BY COUNTRY
Univariate F-tests with (2,397) DF

Variable	HypthSS	ErrorSS	HypthMS	ErrorMS	F	Sig/F
IMPAIRMENT	49.56	1755.16	24.78	4.42	5.60	.004

COUNTRY
Univariate F-tests with (1,397) DF

Variable	HypthSS	ErrorSS	HypthMS	ErrorMS	F	Sig/F
IMPAIRMENT	76.25	1755.16	76.25	4.42	17.25	.000

SEX
Univariate F-tests with (1,397) DF

Variable	HypthSS	ErrorSS	HypthMS	ErrorMS	F	Sig/F
ATTITUDE TO DRIVER VARIABLES	31.55	3065.96	31.55	7.72	4.08	.044
ATTITUDE TO OTHER ROAD USERS	61.42	1849.58	61.42	4.66	13.18	.000
SPEED AND AGGRESSION	35.77	740.12	35.77	1.86	19.19	.000
IMPAIRMENT	55.09	1755.16	55.09	4.42	12.46	.000

SIGNIFICANT ATTITUDINAL/BEHAVIOURAL EFFECTS

ATTITUDE TO DRIVER VARIABLES
Females attributed significantly more importance to driver

variables with regard to accident causation than did males. This effect was found to be significant after controlling for the covariates ($t=-2.02$, $p=.044$).

ATTITUDE TO OTHER ROAD USERS

Following covariate control females were found to attribute significantly more importance to other road users' errors in relation to accident causation than did males ($t=-3.63$, $p<.001$).

SPEED AND AGGRESSION

Females attributed significantly more importance to speed and aggression in relation to accident causation than did males ($t=-4.38$, $p<.001$) following covariate control. Helmert contrasts also revealed a significantly lower rating of the importance of speed and aggression in accident causation by culpable British males than their Australian counterparts ($t=2.22$, $p=.027$).

ROAD AND WEATHER CONDITIONS

The helmert contrasts identified a significant univariate effect for road and weather conditions in relation to sex and country following covariate control ($t=-2.44$, $p=.015$). An examination of the adjusted means revealed that British males attributed less importance to road and weather conditions as causal factors in accidents than did British females, or Australian drivers.

IMPAIRMENT

Following covariate control, culpable British drivers were found to rate impairment to be significantly less important in relation to accident causation than did all other drivers ($t=2.66$, $p=.008$). Australian drivers attributed significantly more importance to impairment with regard to accident causation than did British drivers ($t=-4.15$, $p<.001$). Females attributed significantly more importance to impairment in relation to accident causation than did males ($t=-3.53$, $p<.001$).

DISCUSSION

The main concern of the current study was to evaluate drivers' awareness of their potential for active accident avoidance, and factors which may impede such avoidance (Clay, 1987). The relative individual and collective potential for positive accident avoidance/prevention (Hewstone, 1989; Fiske & Taylor, 1991) could then be examined within the context of factors which may influence and/or be influenced by the behaviour of individual drivers, such as the prevailing socio-cultural norms (Barjonet, 1988; Reason et al, 1990; Parker et al, 1992), laws and policies which affect and/or govern road user behaviour (Waller & Waller, 1987; Johnston, 1987).

Exploring the possibility of increasing drivers' awareness of their potential to actively avoid accidents (Knapper & Cropley, 1980; Preston & Harris, 1965), identifying and attempting to attenuate influences which may reduce their ability to do so (Jones & Nisbett, 1972; Hewstone, 1989), and enabling them to cope with problems which may compromise both their own safety and that of others (Murphy, DuBois & Hurrell, 1986; Weil, 1989), not least within the driving environment, thus increasing the potential safety of all road users, all seem to be objectives which are worth pursuing.

1) Causal attribution bias

The first objective **"to examine drivers' assessments of factors which they consider influenced personal accident involvement while driving"**, addressed the possibility of bias in drivers' causal attributions. The results strongly suggest that drivers tend to attribute significantly more responsibility to "other drivers" than to themselves for the occurrence of their accidents, and furthermore an increase in confidence in such differential attributions seems possible simply on the basis of to whom the attribution of responsibility is being made. These findings are consistent with attribution bias identified by previous research in a variety of settings (Jones & Nisbett, 1972; Watson, 1982; Hewstone, 1989) as well as the tentative conclusions of Clay (1987) within a moderate-sized driver sample. However, the significance and predictive value of the current findings within a large driver sample add considerable weight to these findings.

Nonetheless, the question arises in relation to both Clay's (1987) findings and those of the current study, whether such attributional bias may be artifactual, resulting simply from a tendency for culpable drivers to select themselves out of such studies. In order to address this issue, a sample of drivers was obtained from police accident files. These drivers were deemed primarily or solely culpable for accidents in which they were involved by traffic police investigative teams. Their response rate was only very slightly less than that of the general driver sample obtained via postal survey, thus arguing against the non-compliance of culpable drivers with road safety surveys. Furthermore their responses differed from those of the general sample, reflecting considerably higher ratings of subjective culpability for accidents occurring within the sampling timeframe, and involving injury to themselves or others, all of which conformed to the selection procedure for this sample. Their greater level of acknowledgement of subjective culpability by comparison with the general driver sample was consistent with Farrow's (1987A/B) conclusion that citation by the police would increase acceptance of liability.

It is of particular interest, and concern, that even within an objectively culpable sample, differential self/other attribution of responsibility revealed a highly significant tendency to attribute greater responsibility to the "other driver" for accident occurrence, and as with the general sample, confidence in the prediction of such a discrepancy could be increased simply on the basis of who was being rated. This finding is consistent with those of Preston & Harris (1965), whose sample of drivers deemed culpable by traffic police for accidents, many of which resulted in serious injury, differed considerably from the police in their estimations of their contribution to, and culpability for, their accidents. The fact that citation by the police is associated with higher subjective culpability assessments is highly encouraging with regard to the potential for educational and remedial measures. The fact that attributional bias exists, and appears to persist despite objectively culpable assessment, has considerable implications for road safety regarding the driver's ability to learn from experience, to appreciate and act on the relevance of road safety communications, and for the quality of social interaction on the roads.

Despite evidence that some degree of causal attribution bias by drivers seems to exist, it was nonetheless found possible to identify significant distinctions between drivers on the basis of self-reported influence on accidents while allowing the effects of age, sex, and driving duration and intensity to be examined separately. The findings were consistent with a large body of previous research, while allowing elaboration and clarification in relation to culpability in particular. This seems potentially to allow examination of such behaviours in relation to the prevailing norms, offering insight into accident involvement, and thus having practical implications for accident prevention.

2) Accident involvement and subjective culpability in relation to predisposing factors

The second objective "**to identify factors which distinguish drivers according to self-reported accident-involvement and culpability in relation to:**" various predisposing factors, addressed the possibility of distinguishing drivers according to non-accident-involvement and subjective non-culpable and culpable accident-involvement. The findings revealed significant multivariate and univariate effects within all four areas of focus in relation to accident-involvement within a large sample of British drivers. This allowed a composite driver profile to be developed on the basis of accident culpability within the context of age/sex tendencies, while controlling for driving experience intensity and duration, in relation to emotional/arousal responses to driving, self-perception, beliefs about accident causation, and reported behavioural/attitudinal tendencies within the driving situation. French, West, Elander & Wilding (1993) examined factors relating to "accident liability". However in contrast with the current study they make no distinction between drivers on the basis of liability or culpability but simply according to accident-involvement per se, as many other studies have done. It should be noted that, while the current research has the limits of a retrospective study, distinguishing between culpable and non-culpable drivers, albeit subjectively, allows some measure of control with regard to accident-involvement per se, in particular where the tendencies between these groups diverge significantly. The concern here is how factors which may predispose drivers to accidents relate to self-reported accident-involvement and culpability, i.e. drivers' awareness of accident influence, and how such patterns relate to age/sex norms for the same factors.

2(a) "Affect/state within the driving situation".

Examination of the relationship between accident-involvement and drivers' emotional/ arousal response tendencies revealed that two of the three main effects, age ($p < .001$) and accident-involvement ($p = .006$), were highly significant at the multivariate level. Three of the four factors in this analysis were univariately significant in relation to accident-involvement.

The main findings were that:
. young drivers (under 30 years) reported significantly lower levels of intimidation (feelings of intimidation, fearfulness and upset), and higher levels of exhilaration and excitement while driving than did the two older groups, young males in particular were significantly distinguished by the latter effect;
. accident-involved drivers rated themselves as significantly more irritable, and less aware (less alert, less decisive, less in control) within the driving environment, than did non-accident-involved drivers, the latter effect being highly significant;
. culpable drivers aged 30 years or more reported significantly higher levels of intimidation than all other drivers.

The greater enjoyment of driving by young drivers illustrated by higher levels of excitement and exhilaration and lower levels of intimidation (including intimidation, fearfulness and upset) is consistent with Gulian et al's (1989) finding that driving enjoyment receded with age. Lower levels of intimidation, fearfulness and upset are also consistent with Schuman et al's (1967) finding that young drivers use their vehicle "as an emotional outlet" to diffuse unpleasant emotional arousal. The particular enjoyment of driving by young males seems to support Reason et al's (1990) inference that males exhibit greater engagement with the activity of driving than do females.

Both the greater irritability and lower level of awareness of the accident groups could be envisaged as predisposing to, and resulting from, accident involvement. However a lower level of awareness (feeling less alert, less decisive and less in control) would appear particularly to increase the risk of accident involvement. With limited potential for comparison, drivers may be unlikely to realise the manner in which they differ from other drivers, or the degree to which such differential affect/state may contribute to a compromise of safety.

Greater irritability and lack of awareness appear consistent with a considerable body of research on driver stress (Gulian, 1987; Gulian et al, 1989), including Farrow's (1987) finding that DWI offenders were distinguished from non-DWI offenders by their "increased working hours and other identified stressors" and often found themselves "driving alone and driving after conflict or driving in a fatigued state". Similarly, feeling more irritable and less alert, less decisive and less in control also seem to be consistent with the characteristics identified by Reason et al (1990) as being associated with the committal of serious errors, being affected by mood being the most significant predictor of dangerous errors, which were also associated with driver self-ratings of being relatively unsafe and accident-prone. Notably, being affected by mood was also a significant predictor of drivers who committed violations, and both violations and dangerous errors were found to be more frequently committed by young drivers and males, who are notably over-represented in accident statistics. The limited distinction between drivers in this analysis on the basis of culpability could represent defensive attribution, or simply differential salience of the behaviour of self and others, or a combination of the two (Jones & Nisbett, 1972; Hewstone, 1989).

The higher levels of intimidation (intimidation, fearfulness and upset) which distinguished culpable drivers in the two older groups may be a partial reflection of the loss of enjoyment in the activity of driving by older drivers found by Gulian et al (1989) and the current study, with such drivers nonetheless finding themselves having to drive.

In summary, driver affect/state allows some distinctions between drivers on the basis of age, and to a lesser degree sex, while allowing rather clearer distinctions according to accident involvement, including culpability, in relation to factors which have been found to compromise safety. The former relate to the greater enjoyment of driving by younger drivers, especially young males, which appears to wane with age. Accident involvement seems to be associated with negative affect and a reduced level of awareness within the driving situation. Culpable drivers aged 30 years and over appear to derive the least enjoyment from driving, being distinguished by higher levels of intimidation, fearfulness and upset.

2(b) "Driver self-perception"

Examination of the relationship between accident-involvement and driver self-perception revealed a significant multivariate interaction between age and sex ($p<.001$), and all three main effects (accident involvement, age, and sex) were found to have high multivariate significance, accident involvement being the most significant ($p<.001$). All four factors involved in this analysis were highly significant univariately in relation to accident involvement.

The main findings were that:
. males rated themselves as significantly more irritable and more confident but less safe than did females;
. young males in particular could be distinguished from other drivers by their ratings of themselves as unsafe.
. irritability decreased significantly in a linear fashion with age, particularly within the older age band (from 45 years onwards), while conversely perceptions of safety increased significantly in a linear fashion across the three age bands;
. culpable drivers rated themselves as significantly more irritable, less safe, less confident, and less aware, than did non-culpable or non-accident-involved drivers.
. non-culpable drivers also rated themselves as significantly less safe than did the non-accident group, the distinction being slightly sharper than that relating to culpability.

The greater confidence of males identified in this study seems to be consistent with Reason et al's (1990) conclusion that males appear to have greater engagement with the activity of driving than females, greater effort and confidence could be expected to ensue.

The ratings of unsafe, or risky behaviour by males and young drivers, young males in particular, are consistent with the social conditioning identified by Barjonet (1988) who noted the association of risk with "man's positive image in our society", while observing that risky driving behaviours persist partly because "risk has a value that the traffic system allows to be realized", with the advantages sometimes afforded by such behaviours tending to reinforce them. Young drivers' ratings of themselves as relatively unsafe are consistent with Baxter et al's (1990) finding that drivers of both sexes under 30 years were more inclined than older drivers to exceed speed limits and close follow. The perception of young males in particular as unsafe, or risky, and in common with other males, confident, is consistent with Finn & Bragg's (1986) finding that young males "perceived their own chances of an accident to be significantly less than those of both their peers and older males". Similarly the perception of themselves as risky and confident by young males is consistent with Matthews & Moran's (1986) finding that young males made low risk estimates where reliance on very fast, skilful driver responses seemed to render this appropriate. Sivak et al (1990) found age and sex effects which were stable across cultures, which also supported the finding that young drivers and males appear to have a greater propensity for risk-taking. The identification of young males with risk is also consistent with Evans & Wasielewski's (1983) observation of "close following behaviour in freeway traffic" being associated with a history of accident-involvement and violations, being young and being male.

The reduction in irritability with age/maturation is consistent with Hilakivi et al's (1989) finding that emotional lability and limited self control have been found to be associated with young drivers. Furthermore they not only found that such young drivers were involved in accidents, but were considered responsible for their accidents, which is consistent with the association of irritability with culpable drivers in the current study. Evidence of the process of social and emotional maturation has been noted by other studies also. McFarland (1966) for example, considered the vehicle to have a symbolic, rather than simply a functional value for young males, not dissimilar to Reason et al's (1990) view of males' greater engagement with driving than that of females, while Schuman et al (1967) noted the employment of the vehicle "as an emotional outlet" by young drivers. Various problems and risky lifestyles exhibited by young drivers (Jessor, 1987), and with which they must contend, such as long working hours and unresolved conflict (Farrow, 1987A/B) have been identified by many studies, and would seem to be contributors to stress which may well be beyond the means and resources of many young people to cope, and which may therefore be expected to contribute to irritability and culpable accident involvement at various times during the maturation process. The greater irritability and risk propensity, together with a lower level of awareness and confidence associated with culpability suggests, in the absence of age/sex interactions, that culpable accident involvement may be mediated on the whole by similar factors in subjectively culpable drivers. This seems to be consistent with Jonah's (1990) identification of the persistence with age of similar features to those identified by Jessor, such as drink-driving, in a proportion of the population.

The discriminatory power of subjective culpability in relation to factors which would seem clearly to compromise drivers' safety is of particular interest. The lower level of awareness of culpable drivers seems to be consistent with Clay's (1987) finding that accident-involved drivers attributed less importance to impairment due to alcohol, fatigue, and stress in relation to accident risk, and in light of their tendency to attribute more responsibility for their accidents to the "other drivers" involved than to themselves, their concern with lack of anticipation as a risk factor with particular relevance to such other drivers, is also consistent with these findings, albeit a less sensitive indicator as Clay (1987) did not distinguish drivers according to culpability.

The ability to distinguish males, young drivers and culpable drivers according to self-ratings of irritability is of considerable interest, in particular because of the over-representation of young males in accidents and the association between stress, alone or in combination with fatigue and/or alcohol, and accident involvement. These findings seem to be consistent with many previous studies. Reason et al (1990) found that "the extent to which mood was perceived as having an adverse effect on driving performance was a predictor of... violations, dangerous errors and relatively harmless lapses", the former two being associated more frequently with men and young drivers. Parker et al's (1992) examination of factors underlying violations and errors revealed that young drivers, and to a slightly lesser degree males, were "less aware of or concerned with the negative outcomes (for themselves or others) of violations...more attuned to the potentially positive outcomes" and perceived little pressure from "their friends and intimates...not to commit violations".

However, being accident-free during the previous three years was not found to be more strongly associated with attitudes and intentions not to commit violations, simply to beliefs that "significant others would be less likely to expect them to commit the violations". One of the factors which may have contributed to such lack of sensitivity is the confounding of culpable and non-culpable accident involvement. Irritability could also be associated with West et al's (1993) "mild social deviance" which involved self-interest taking precedence over shared interest within the driving situation which was found to be an important indicator of accident involvement rate. This is consistent with Milberg & Clark's (1988) finding that non-compliance was increased by "an angry mood".

The relatively negative self perception of culpable drivers identified in the current study is consistent with Wilson's (1987) finding that drivers who rated themselves as "self-centred and ill-mannered" were rated very similarly by observers. Similarly Guppy et al (1990), employing the same scale, distinguished accident-involved drivers according to their self-perceptions of being selfish, irresponsible and nervous, the former two descriptors emerging more strongly after controlling for driving experience. Clay (1987) found that although accident-involved drivers were poorly distinguished on the basis of accident-involvement per se, their mean ratings revealed that they were more impatient, intolerant, irritable, and selfish, than the non-accident group. However the unconfounding of culpable and non-culpable accident involvement seems to allow significant and considerably clearer distinctions.

The ability to distinguish young males according to self-ratings of being the least safe (or most risky), and males as confident are consistent with the findings of Parker et al (1992) and Reason et al (1990). The low confidence of culpable drivers identified in the current study appears consistent with Reason et al's self-descriptors of drivers who commit dangerous errors and minor slips, but in opposition to the high confidence identified in frequent traffic violators. However the significantly higher confidence of males in this study is consistent with Reason et al's finding that frequent violation was associated with confidence and notably "men of all ages reported more violations than women". The divergence in confidence is also consistent with Reason et al's explanation that "errors and lapses on the road involve failures of cognitive competence...violations...involve motivational factors.

Thus it seems that, with regard to irritability and safety perceptions, culpable drivers reported tendencies are very much in accord with those found for young drivers and males. Culpable drivers' perceptions of themselves as unsafe were highly significant ($F=22.60$, $p<.001$). However, as Guppy pointed out (Guppy & Clay, in preparation), self perception ratings may denote what is valued as much as any self concept, thus it seems likely that males, young drivers, especially young males, and culpable drivers may be giving a positive affirmation of risky behaviour rather than suggesting a particular awareness of a driving style which is unsafe. These findings are consistent with those of Reason et al (1990), Parker et al (1992), Jessor (1987), Waller & Waller (1987), and Farrow (1987A/B) with regard to social conditioning and peer influence.

With regard to confidence, the effect due to culpability was not only pronounced, but in contrast to irritability and safety, culpable drivers rated their confidence against the norm for males, i.e. whereas males rated themselves as significantly more confident than females ($p=.009$), culpable drivers rated themselves as significantly less confident than non-culpable or non-accident-involved drivers ($p=.001$). The lack of awareness of culpable drivers was not only highly significant ($F=16.45$, $p<.001$), but awareness was also a significant factor in relation to accident involvement alone.

The current findings that culpably accident-involved drivers consider themselves to be more irritable, unsafe, and lacking in confidence and awareness as drivers than do their non-culpable and non-accident-involved counterparts, are largely supportive of Guppy el al's (1990) findings that accident involved drivers perceived themselves to be selfish, irresponsible and nervous, although lack of awareness failed to emerge in their study, in the absence of differentiation according to culpability. It is of interest that distinctions can be made between drivers according to culpability as well as accident involvement per se, suggesting the possible utility of targeting subgroups which may be in need, not simply of persuasion or enlightenment, but in light of their relative lack of confidence, enablement to effectively avoid accidents.

It is encouraging in terms of potential utility regarding analysis of accident causation and promotion of accident-free driving that it seems possible to distinguish between drivers in a manner in which they seem largely in agreement. In Wilson's (1987) study, for example, drivers' and observers' self descriptors were largely compatible and not emphasizing socially desirable qualities, i.e. drivers observed to be "self-centred and short-tempered" described themselves as "self-centred and ill-mannered". Similarly the current findings suggest that drivers who considered themselves to have some responsibility for their accidents also considered themselves, in absolute rather than comparative terms, to be relatively unsafe, and to some degree lacking in qualities which may render them safer, even though they may be unaware that they differ in such respects from other drivers (Preston & Harris, 1965).

Thus, although a relatively positive self image as a driver seems to be the norm (Svenson, 1981; McCormick et al, 1986; Clay, 1987; Sivak et al, 1989; Goszczynska & Roslan, 1989), significant differences between drivers can be detected on the basis of age, sex and accident involvement. However the potential to distinguish between drivers according to their self-assessed accident culpability seems to be of particular importance with regard to practical implications for accident prevention.

According to a global rating of self as driver, the findings of the current study, consistent with the findings of Clay (1987), were that a little over 50 percent of drivers considered their driving to be 'above average', of which a very small percentage rated their driving as 'excellent', a little under 50 percent rated their driving as 'average', while the remaining less than one percent rated their driving as below average or poor. It seems therefore, as Preston & Harris (1965) noted, that culpability for accidents resulting in injury, and citation for negligence for such accidents, may have little influence on global assessments of personal driver ability. Thus, although considerable research has focused on such assessments, they may have limited utility unless the basis on which drivers make them is clarified. The current study addresses this issue.

A discriminant function analysis performed to examine the global assessment of self as a driver in relation to the self-perception scale employed in this study allowed 69.90% of drivers to be correctly classified as 'above average' or 'average or below'. The findings suggest (according to analysis of individual variables as opposed to metavariables) that such assessments are strongly related to perceptions of self as being confident ($F=183.80$, $df=1,1370$, $p<.0001$), experienced ($F=155.90$, $df=1,1370$, $p<.0001$) and decisive ($F=146.10$, $df=1,1370$ $p<.0001$) as a driver.

Several possible explanations for any failure of accident culpability to markedly impinge upon this decision process, seem worth exploring. Firstly, drivers may be relatively unaware of their own abilities as compared to those of others, particularly in the absence of any comparative measure which they find meaningful. Secondly, drivers may consider, perhaps with justification, that transient factors may have intervened to render what is generally considered average to good driving ability, to be atypically, relatively unsafe. Thirdly drivers may, as the current study findings suggest, consider that irrespective of their own culpability, the "other driver" was more culpable, and thus their opinion of their own driving ability in comparative terms, may remain relatively undiminished. Finally, social responsibility criteria are notably absent from such judgements.

Thus it is of particular interest that within this study, culpable drivers rating their own abilities in absolute terms, perceived themselves as drivers to be less safe, less confident, and less aware, but more irritable, than did other drivers, with lack of safety, or a tendency to take risks, being their most significant feature. It seems that addressing the issue of underlying reasons for these differential perceptions may help to inform effective accident prevention strategies.

2(c) "Driver attitudinal/ behavioural tendencies"

An examination of the relationship between drivers' reported attitudinal/behavioural tendencies and accident involvement revealed significant covariate effects involving in particular, speed ($t=3.42$, $p=.001$) and anticipation ($t=4.90$, $p<.001$) in relation to weekly mileage, and driver skills ($t=2.76$, $p=.006$) in relation to number of years driving, resulting in a considerable reduction in their significance following covariate control.

A significant multivariate interaction was found between sex and accident involvement, which related at univariate level to frustration ($p=.002$), with a minor effect for perceived control ($p=.044$). All three main effects were found to be significant at multivariate level, however that relating to accident involvement was by far the most modest ($p=.027$). All of the nine factors involved in this analysis were found to be significant in relation to one or more main effects and/or interactions following control of the experiential effects, eight of which were related to accident involvement per se, or its interaction effects.

The main findings were that:

. speeding behaviours had a highly significant ($p<.001$) inverse relationship with age, drivers under 30 reporting the highest frequencies, especially young males; young drivers also reported significantly higher levels of frustration within the driving situation, appeared to place significantly greater confidence in their driver skills, reported greater solo speeding tendencies (speeding when upset, and taking less care when driving alone) than the two older groups. The latter two effects declined in a linear fashion with age. Several minor effects revealed that older drivers were distinguished by reporting: significantly lower anticipatory skills, less awareness of pedestrians, cyclists and motorcyclists within the driving environment, and more negative attitudes to other drivers.

. males reported significantly higher levels of speeding behaviours ($p=.024$) than did females, up to the age of 45 years; they also reported significantly higher levels of drink-driving behaviours ($p<.001$), rated their driver skills ($p=.005$), their anticipatory skills ($p=.015$) and their awareness of non-driving road users (pedestrians, cyclists and motorcyclists) ($p=.003$) more highly than did females;

. accident-involved males within the two younger age bands reported a significantly higher frequency of speeding behaviours than did drivers aged 45 and over, or non-accident-involved drivers. Non-culpable accident-involved drivers reported significantly less negative attitudes to other drivers than both culpable and non-accident drivers. Young accident-involved drivers reported significantly higher frequencies of drink-driving behaviours than did their non-accident counterparts. Culpable young and middle-aged drivers were significantly more inclined to drink-drive than their older counterparts. Young accident-involved drivers, and accident-involved males, were both distinguished by their significantly higher frequencies of reported solo speeding (speeding when upset, and taking less care when driving alone) than all other drivers. Young culpable drivers reported significantly lower anticipatory levels than their non-accident and non-culpable counterparts. Culpable females reported significantly higher frequency of frustration within the driving situation than their male counterparts. A minor effect revealed that non-culpable males perceived themselves to have significantly less control within the driving situation than their culpable and non-accident counterparts.

The association between speeding behaviours and young drivers, especially those under 30 years, and with males, especially young males, is consistent with many studies. McFarland (1966) for example, found speeding errors in young drivers under 25 years, while Schuman et al (1967) found that drivers aged 22-24 committed driving errors associated with such factors as excessive or inappropriate speed, young drivers were also more inclined to employ a short, fast spin on the road to diffuse unpleasant emotional arousal. Baxter et al (1990) found a tendency amongst drivers under 30 of both sexes to exceed speed limits; Parker et al, 1992 found that younger drivers, and to a slightly lesser degree males in general, were inclined to have "less awareness of or concern with the negative outcomes of violations, especially speed, and greater difficulty in resisting commission of the violations". Wasielewski (1984) also identified greater frequency of higher speeds in younger drivers. McNair (1988) found that inexperienced drivers, males and people up to 40 years expressed less concern about problems relating to speed than more experienced drivers, females and drivers over 40 years, with a further increment in concern with increasing age (in drivers over 60 years), while compliance with speed limits increased with age and was more prevalent amongst women.

Considering Gulian et al's (1989) finding that driving enjoyment recedes with age, supported by the greater excitement and exhilaration, and lower level of intimidation of young drivers found in the current study, it seems that the greater frustration of young drivers, also identified in this analysis, may relate to the greater volatility of the young (Hilakivi et al, 1989), and the need, amongst young males in particular, to employ their vehicle to diffuse negative affect (Schuman et al, 1967) and as a means of dealing with life stress and conflict in general (Jessor, 1987; Farrow, 1987A/B). This combination of effects seems explicable in terms of Gulian et al's identification of stress within the driving situation as being derived to a significantly greater degree from the latter, external (life) sources than those intrinsic to driving. The greater confidence in their driver skills by younger drivers is consistent with the findings of Finn & Bragg (1986) who identified over-confidence in young males in relation to their driving abilities, and especially Matthews & Moran (1986) who identified reliance on fast reactions as contributing considerably to young males' driver confidence.

The tendencies for younger drivers to speed when upset and to take less care when driving alone are consistent with Schuman et al's (1967) finding that young drivers, especially young males, tend to speed when upset to diffuse negative affect, and Wasielewski's (1984) finding that higher speeds were more frequently associated with younger drivers, solo drivers, and those with a history of accidents and/or traffic violations. Similarly, Evans & Wasielewski (1983) found that "close following behaviour in freeway traffic" was associated with a history of road accidents and violations, being young, being male, travelling alone, and driving without seatbelts.

The significantly higher levels of (competitive) speeding behaviours in males up to the age of 45 years is consistent with the findings of many previous studies, as discussed in relation to age effects. The greater frequency of drink-driving amongst males is also consistent with many previous research findings. Mannering et al (1987) for example found that drink-driving was more prevalent amongst males, older drivers and non-seatbelt users. McLean et al (1988) found that an in-depth investigation of 80 rural road accidents revealed that "the prevalence of elevated BAC was highest in males aged 20-24 years and 30-49 years". Parker et al (1992) found that positive attitudes towards commiting drink-driving violations, amongst others, together with intention to commit such offences, and very weak disincentives not to commit them, were strongly associated with being young and being male. Similarly, Reason et al (1990) found that violations were reported more frequently by men, while those "who report the most violations also tend to rate themselves as particularly skilful drivers". Higher confidence in driver skills in males is therefore consistent with this finding, as it is with their greater engagement in the activity of driving, suggested by Reason et al. The greater awareness of non-driving road users (pedestrians, cyclists and motorcyclists) by males may be considerably a product of greater technical, and possibly also social, awareness of motorcyclists' behaviours and their manoeuvre requirements, factors identified by Brooks (1988, 1991, Brooks & Guppy, 1990) as influential in relation to motorcyclist/driver accidents.

The association between speeding behaviours, accident-involvement and males aged less than 45 years seems hardly surprising in view of their statistical over-representation in accidents, as well as the considerable evidence of their speeding behaviours. Clay's (1987) finding that accident-involved drivers reported significantly greater frequency of speeding behaviours than the non-accident group is consistent with the current findings, although age/sex differences were not examined simultaneously. Parker et al's (1992) finding that favourable attitudes towards, and intentions to commit driving violations, including speeding, were strongly associated with being young and being male, is consistent with accident statistics and supported by the current study findings. These groups also reported experiencing little disincentive to commit traffic violations. Parker et al noted that "males tended to see negative outcomes (being stopped and fined; having an accident) as less likely to ensue from speeding than did females, to evaluate putting the lives of pedestrians at risk through speeding less negatively than did females, and to see male friends as having weaker negative expectations regarding speeding" than did females in relation to their female friends' expectations. They also reported that drivers who were accident-involved during the previous three years reported less disapproval from significant others to commit traffic violations than did the non-accident group.

Reason et al (1990) found that driving violations were associated with deviation from the law, youth, high annual mileage, and individuals whose driving was more affected by mood, and were prevalent amongst males and drivers who rated themselves as "better drivers". Being affected by mood was the most significant predictor of dangerous errors, which was also associated with low motorway useage and driver self-ratings of being relatively unsafe and accident-prone. Young and male drivers reported committing dangerous errors, but especially violations, far more frequently than did women or older drivers.

West et al (1993) found that drivers who scored within the top 25 per cent on their social motivation questionnaire "reported more than four times the number of accidents than did the 25 per cent of lowest scorers", while notably their model identified that accident frequency "was independently associated with faster driving speed, higher annual mileage and higher levels of mild social deviance. Faster driving speed was in turn a function of lower thoroughness, higher social deviance and higher annual mileage", with males scoring notably higher than females on social deviance. West et al described low thoroughness as "a tendency not to plan ahead, not to approach decision making in a logical and systematic manner and to make decisions without considering the costs and benefits of the alternative courses of action".

Haworth (1988) noted that speed was identified as a contributory factor in 22% of 186 accident fatalities involving trucks, according to Victorian Coroners' reports for 1984-1986. Wasielewski (1984) identified greater frequency of higher speeds in younger drivers, solo drivers...and drivers with a history of accidents and/or traffic violations. McNair (1988) reported that "crashes were more common among males, young people (under 25 years) and newly licensed drivers" while notably "these sub groups were also the most likely to drive at a speed faster than the legal limit".

Non-culpable drivers' less negative attitudes to other drivers seems to qualify and elaborate Clay's (1987) finding that accident-involved drivers reported more negative attitudes to other drivers than did the non-accident group. As the current study allows both driving experience and culpability effects to be examined separately, the current finding seems to be consistent with the generally higher levels of experience of non-culpable drivers by comparison with non-accident drivers allowing a more sophisticated and realistic analysis of any accident involvement (Fiske & Taylor, (1991), while suggesting that the greater tendency to have negative attitudes to other drivers reported by accident-involved drivers (Clay, 1987), may be associated to a greater degree with culpable than non-culpable accident-involvement.

The higher frequency of drink-driving behaviours reported by young accident-involved drivers than their non-accident counterparts is consistent with Jessor's (1987) identification of drink driving as one of a cluster of behaviours described as "an adolescent risky behaviour syndrome", while the persistence beyond adolescence and early adulthood is consistent with Jonah's (1990) finding that such behaviours persist with age in a proportion of the population who appear to continue to deal with unresolved conflict. More specifically, Jonah (1986) found that young drivers are over-represented in accidents involving alcohol, a pattern notably similar to the over-representation of the young in accidents in general. McLean et al's (1988) finding that "about 15% of drivers and riders" involved in their in-depth accident analysis "had a BAC over...0.08g/100ml" and that "the prevalence of elevated BAC was highest in males aged 20-24 and 30-49" is also consistent with the current findings.

Clay's (1987) finding that accident involved drivers attributed less importance to impairment (due to alcohol, stress and fatigue) as an accident causal factor is consistent with the current finding, although controlling for driving experience, age and sex allow a more precise pattern to emerge. Banchevska's (1980) finding that young drivers considered drink driving to be "the most important cause of accidents", is not inconsistent with the finding that young accident-involved drivers differ from young drivers in general in their tendency to drive after drinking. The underestimation of impairment risk involved in the quantity of alcoholic intake reported by Phelps (1987) offers a partial explanation, while Jessor's (1987) identification of indulgence in alcohol as being one of a cluster of contributory "psychosocial risk factors" which were able to account for "approximately 25% of the variance in risky driving behaviour for both sexes" offers a broader explanation relating to the social context within which such behaviours occur.

More specifically, Farrow (1987A/B) identified differences in life circumstances which distinguish groups of young people in relation to their being non-offenders, non-DWI offenders, or DWI offenders, with the latter being distinguished by the life problems with which they must cope, and the relative lack of resources at their disposal to cope with such problems, and their notable resistance to changing their alcohol intake on occasions where they would have to drive. However, far from offering help and support to those young people who may need it, Waller & Waller (1987) concluded that factors within society actively encourage young people to indulge in behaviours which compromise their safety, thus the onus of responsibility should not lie solely with those individuals who are seen to transgress, but collectively with all elements of society which create a highly influential climate which encourages them to do so.

The finding that culpable young and middle-aged drivers were significantly more inclined to drink-drive than their older counterparts is consistent with many of the findings mentioned above. In particular, it illustrates the consequences of problems associated with drink driving persisting with age, identified by Jonah (1986), and McLean et al's (1988) identification of prevalent raised BACs in accident-involved "males aged 20-24 and 30-49 years". It is also consistent with their findings that drivers with the highest and most frequent alcohol consumption prior to driving tended to have the lowest expectations of negative consequences, which are in agreement with surveys carried out by Clayton et al (1980, 1984), Guppy (1984, 1987, 1988), and Albery (1991). It is also consistent with Reason et al's (1990) identification of violations and serious errors being associated with both young drivers and males, and Parker et al's (1992) finding that both these groups held stronger views about the positive features, and weaker views about the negative features, associated with committal of traffic violations such as drink driving, as well as weaker intentions and weaker disincentives not to commit them.

The ability to identify, even a proportion of culpable drivers according to both self-reported behaviours and causal attributions is encouraging in relation to the prospects for countermeasure development. The association between both speeding and drink driving with accident involvement per se would seem to reflect two differing factors. Firstly, the fact that speeding and drink driving are neither necessary nor sufficient indicators of accident liability. Secondly, the identification of attribution bias within the current and previous studies (Jones & Nisbett, 1972) particularly in relation to road accidents (Preston & Harris, 1965; Clay, 1987), together with Reason et al's (1990) finding that drivers who most frequently commit violations tend to consider their driver skills to be superior, may reflect a relative lack of awareness of the degree to which they contribute to their own accident involvement, on the part of particular groups of drivers. The degree to which this may be due to differential salience of the behaviour of self and others, defensive attribution, or probably a combination of both (Hewstone, 1989) cannot be definitively answered here, but may be a useful focus for future research.

Both young and male accident-involved drivers' significantly higher reported frequency of speeding when upset and taking less care when driving alone is consistent with Schuman et al's (1967) identification of young drivers, young males in particular tending to speed when feeling upset, and Wasielewski's (1984) finding that higher speeds tended to be associated with younger drivers, solo drivers, as well as accident and traffic violation histories. It is possible that this is considerably a product of the greater volatility of young drivers and males, and/or driving behaviours being the most visible and accessible coping resource of which these groups are aware, and possibly indicative of restricted access to alternative coping measures. Farrow's (1987A/B) findings suggest that this may be the case for some groups of young people in particular, due to their inherited circumstances and resources.

A small effect relating to non-culpable males' perception of themselves as having significantly less control within the driving situation than their culpable and non-accident counterparts would appear to be explicable in terms of their restricted accident avoidance potential in the event of gross error on the part of any "other driver" with whom they are involved in traffic conflicts. However it seems quite possible that this effect may also be confounded partly by misattribution of responsibility to other drivers by some non-culpable males, who contribute to their own accident involvement without full realization of this effect, especially in light of the findings of Reason et al (1990) and Parker et al (1992) that violations and dangerous errors are committed most frequently by males and young drivers, and that the most frequent committal of traffic violations is associated with a high degree of confidence by such drivers in their own driving abilities.

Young culpable drivers' significantly lower reported anticipatory levels by comparison with their non-accident and non-culpable counterparts seems to be consistent with the greater volatility of young drivers identified by Hilakivi et al (1989), the evidence of stress and conflict in young drivers (Schuman et al, 1967; Jessor, 1987; Farrow, 1987A/B), and the reduced information processing abilities detected by Mayer & Treat (1977) in young accident-involved drivers whose personal histories suggested a considerable degree of stress and conflict. Folkman et al's (1981) identification of a reduced ability to cope with ambiguity in the face of stress beyond the individual's coping resources, and more specifically French et al's (1993) identification of "lower thoroughness" being associated with accident involved drivers up to the age of 60 years, with "a steady increase in thoroughness" being evident "between late teens and 30s" and "calmness" being positively correlated with age also seem to be consistent with the current findings. Notably the association between accident involvement and low thoroughness identified by French et al "appeared to be mediated by...preferred driving speed".

Culpable females' significantly higher reported frequency of frustration within the driving situation than their male counterparts appears explicable to some degree in terms of the lower level of engagement with the activity of driving by females in general, suggested by Reason et al (1990), with problems perhaps being induced by having to drive, rather than wishing to do so.

The interaction effects revealed that whereas males tended to report relatively consistent levels of driving-related frustration irrespective of accident-involvement, accident-involved females in general, and culpable females in particular, reported significantly higher levels of frustration within the driving environment than did their non-accident-involved counterparts, which seems to support Reason et al's (1990) suggestion that the accident involvement of males and females may be mediated by different factors.

It seems therefore that accident-involved drivers' behaviour may reflect to some degree the norms for young drivers and males with regard to speeding, regardless of their ability to do so safely. Similarly drink-driving tendencies amongst the accident-involved and culpable drivers in particular, appear to be a reflection, or perhaps more accurately an extension, of the norm for males. Young accident-involved drivers were distinguished by their significantly higher frequencies of drink-driving than their non-accident-involved counterparts. However both young and middle-aged culpable drivers reported drink-driving significantly more frequently than did their older counterparts. The persistence into middle-age of alcohol-related problems suggests, not simply adherence to social norms, but is perhaps indicative of unresolved conflicts and probably physical and/or psychological dependence on alcohol, suggesting the need, noted by Albery (1991), for intervention on several levels.

Thus an examination of reported attitudinal/behavioural tendencies seems to allow the emergence of two well documented accident-related factors, speeding and drink-driving. Their rather modest significance levels seem to support the contention that they are neither necessary nor sufficient for accident occurrence. However, the fact that they remain significant in the face of separate and highly significant age and/or sex effects, and in the case of speeding behaviours, despite the control of highly significant experiential effects due to weekly mileage, suggest that speed and alcohol persist as important factors which may be frequently, but not inevitably, part of the accident equation.

The prevalence of these behaviours without an accident eventuating seems to lend qualified, albeit unjustified, support to a rational basis for their persistence by habitual speeders and drink-drivers. However, their potential to act as catalysts into accident-involvement within the driving situation, strongly suggests that drivers need to be made aware of other factors which may alone, or in combination with speeding and/or drink-driving (Jessor, 1987; Jonah, 1990), precipitate accidents. Such other factors may include the appropriateness of speed (HMSO, Police Drivers' Manual, 1990) for level of experience/expertise, and level of awareness as influenced by attitudes to risk, and any combination of impairment factors, in relation to the prevailing road/weather/traffic conditions.

The significant involvement of both culpable and non-culpable drivers in speeding and drink-driving behaviours suggests the possibility of defensive attribution, lack of awareness of the degree of personal influence over accident occurrence and/or a reduced capacity for effective avoidance measures.

In summary, young drivers and males were distinguished by higher frequencies of risky behaviours and greater confidence in their driver skills, whereas a small effect relating to older drivers involved factors which appear consistent with perceptual and other problems associated with aging (Fell, 1976; Viano et al, 1990; Scialfa et al, 1988), explicable in terms of the considerable degenerative effects identified by Rabbit (1990) in a relatively small proportion of older drivers. Accident involvement and culpability both allowed clear distinctions between drivers, mainly in interaction with age and sex, relating in particular to risky behaviours and lower anticipatory levels. These findings are broadly supportive of Reason et al's (1990) identification of both motivational factors and cognitive failures being associated with safety compromise, especially with regard to young drivers and males. These findings suggest the potential for targetting driver groups which are particularly at risk of accident involvement, as well as evaluating the degree to which excessive demands within drivers' daily lives may influence on-road behaviour and safety (Farrow, 1987A/B). Both culpable and non-culpable accident involvement has allowed useful distinctions between drivers to emerge, however their utility would seem to be considerably enhanced by exploring the factors with which they tend to combine to result in accidents, in order to effectively address the issue of accident prevention.

2(d) "Beliefs about accident causation"

Examination of the degree of importance which drivers attribute to various accident risk factors , i.e. accident causation in general, in relation to their own accident involvement, revealed a significant multivariate interaction for age, sex and accident involvement ($p=.008$), relating to speed and aggression ($p=.001$) and to a considerably lesser degree, impairment ($p=.022$). The three main effects, age, sex, and accident involvement, were all found to be highly significant at multivariate level ($p<.001$). Four of the five attribution factors had univariate significance in relation to all three main effects. Drivers were found to be distinguishable on the basis of both accident-involvement and culpability in this analysis.

The main findings were that:
. males attributed significantly less importance to risk than females in relation to all factors within this analysis apart from road and weather conditions which was non-significant. Speed and aggression, impairment, and attitude to other road users were all highly significant ($p<.001$); young males in particular were distinguished by attributing

significantly less risk to speed and aggression.
. similarly with regard to age, road and weather conditions alone was non-significant, impairment ($p=.001$) and attitude to other road users ($p<.001$) in particular were highly sigificant. A significant ($p=.004$) increase in the risk attributed to speed and aggression was found to occur within the older age band (45 years and over), whereas for the other three factors, attitude to driver variables, attitude to other road users, and impairment, the importance attributed to their risk potential increased in a linear fashion with increasing age. Young non-culpable drivers were distinguished by their low risk attributions to pedestrian, cyclist, and motorcyclist error in accident causation, in contrast with their older counterparts.
. four factors were univariately significant in relation to accident involvement, three of which were highly significant after covariate control: both impairment ($p<.001$), and speed and aggression ($p=.001$) related to lower risk estimates by accident-involved drivers by comparison with the non-accident group, and attitude to driver variables ($p=.001$) which related to culpable drivers being distinguished by the lowest risk estimates, non-accident drivers intermediary risk estimates and non-culpable drivers the highest. Young accident-involved males were distinguished by their low risk estimates for speed and aggression ($p=.001$) and to a considerably lesser degree, middle-aged accident-involved females ($p=.026$). Small but significant effects were also found for low impairment risk estimates involving accident-involved males under the age of 45 years ($p=.019$) and older culpable males ($p=.024$) who differed significantly from their non-culpable and non-accident peers.

Accident-involved drivers attributed significantly less importance to risks relating to speed and aggression than did those who were not accident-involved. An examination of the means suggested that this was largely due to the low risk ratings of culpable drivers, culpable males in particular. Accident-involved drivers also attributed significantly less risk to impairment than did non-accident-involved drivers. Similarly, regarding attitude to driver variables (lack of attention, anticipation and consideration, close following, improper overtaking), culpable drivers attributed significantly less importance to risk than both non-accident-involved and non-culpable drivers, with the latter making the highest risk estimates. Thus it seems that the risk attributions of accident-involved drivers in general, and culpable drivers in particular, are broadly similar to the norms for young drivers and males. However the ability to clearly distinguish drivers according to self-reported accident-involvement and subjective culpability in relation to low risk estimates suggests that their behaviour is not simply a product of peer group pressure, although this may be highly influential. There appears to be a need to examine and question whatever implicit message is being conveyed to each successive generation of young males which seems to encourage many to very publicly affirm their willingness and ability to take risks, radically compromising their own and others safety, rather than encouraging a realistic and mature appreciation that courage is simply a requirement of the human condition, varying with lifestage and circumstance rather than being predominantly a requirement of the young male.

These findings are consistent with previous research with regard to the relatively low risk perceptions of young males in particular (Finn & Bragg, 1986) at least where fast, skilful driver response is required (Matthews & Moran, 1986), while suggesting that such perceptions are not restricted to males (Sivak et al, 1990). However, as Barjonet (1988) noted, by comparison with women, men tend to find risk more appealing, place greater positive value on it, are more inclined to take risks, and perceive less threat from accidents. He further asserts that "man's positive image in our society is as much related to risk as woman's image is related to safety". The findings of Reason et al (1990) and Parker et al (1992) are supported by the current findings relating to the risk tendencies of young drivers and males, but especially young males.

With regard to alcohol, young drivers seem to consider drink driving to be "the most important cause of accidents" (Banchevska, 1980), suggesting some degree of awareness and concern about the consequences of drink driving. However, given their general tendency to make risk estimations which are relatively low by comparison with those of other drivers, and their considerable underestimation of the risks which are actually associated with driving after drinking "six or more drinks" Phelps (1987), it is perhaps not surprising that their generally relatively low attribution of risk extends specifically to the risks related to drink driving also.

In attribution terms, Fiske & Taylor (1991) point out that causal reasoning develops together with other capabilities during maturation, but is also influenced by experience, so that "in domains in which they are not well-informed" the causal reasoning of adults as well as children may be similarly and necessarily limited. In relation to driver culpability, it could be argued that increasing experience and maturity, and perhaps a reduction in various impairing factors including the effects of conflict, may allow situational appraisals which involve greater awareness, and less compliance with societal norms which may have implications for driver performance, thus leading to greater competence and safety within the driving situation.

Although a significant effect occurred only in relation to accident-involvement per se, it is of interest that culpable males attributed less importance to risks relating to speed and aggression than both their male and female counterparts within each age group with two notable exceptions. Non-culpable males under 30 years attributed less importance to speed and aggression than did all other drivers, however in marked contrast, non-culpable males within the two older age groups attributed more importance to speed and aggression than did either their culpable or non-accident-involved counterparts. The other exception was non-culpable middle-aged females, who had the lowest risk estimates for all females, differing only slightly however, from their culpable female counterparts. Non-accident-involved females in the two older groups made the highest estimates of risk.

A similar pattern emerged in relation to impairment, with non-culpable young males attributing less importance to impairment risk than all other drivers, less than each subsequent rating for this accident group, whose risk estimates increased considerably with age, particularly within the older age band.

In sharp contrast, culpable males had low estimates of risk in youth, which decreased slightly with increasing age, with culpable males in the older age band having the lowest estimates of risk of all drivers, with the sole exception of non-culpable males under the age of 30. Culpable young and middle-aged females had lower estimates of risk than their female counterparts, however culpable females in the 45 years and over age band had the highest estimates of risk of all drivers, marginally higher than their non-accident-involved counterparts, which would seem to suggest that factors other than drink driving may be of prime causal importance regarding the accident involvement of older females.

McLean et al's (1988) in-depth investigative findings, relating to 80 rural road accidents, that "those with higher BACs...grossly under-estimated the effect of alcohol on their driving ability" seem to be broadly consistent with the above findings relating to accident-involved drivers' lack of awareness of impairment effects.

In summary, young drivers, males, the accident-involved, including subjectively culpable drivers, were all distinguished by attributing less importance to the risks of accident causation in relation to factors which have been well established as consistituting risk. It is of no small interest that both accident involvement and membership of groups associated with accident risk were clearly identified in this manner. The current findings seem to suggest the potential utility of survey-based risk estimation and exploration of differences between drivers' according to self-designated accident status and culpability, while bearing in mind the possibility of misattribution regarding the latter. It seems that beliefs about accident causation may allow clear distinctions to be made between drivers according to self-reported culpability and accident status, with important differences emerging between culpable and non culpable drivers with regard to implications for accident prevention.

Composite culpable driver profile

The following features were found to be significantly associated with culpable accident involvement:

- arousal within the driving situation of greater intimidation in culpable drivers in the two older groups;
  arousal within the driving situation of greater irritability and less awareness (feeling less alert, in control and confident) in both culpable and non-culpable accident-involved drivers.

- perception of self as a driver, as considerably more irritable, less confident, less aware and to an appreciably greater degree less safe (or placing less value on safety) in culpable drivers.
- greater reported frequency of drink-driving behaviours in culpable drivers in the two younger groups;
- lower reported anticipatory levels in young culpable drivers;
- higher reported frequencies of frustration within the driving situation by culpable females;
- NON-CULPABLE males distinguished by less negative attitudes to other drivers, and perception of themselves as having less control within the driving environment than culpable or non-accident males;
- higher reported frequency, in culpable and non-culpable accident-involved drivers, of speeding behaviours by males in the two younger groups, and solo speeding behaviours (speeding when upset, and driving with less care when alone) by both young drivers and males.
- least risk attributed to attitude to driver variables by culpable drivers (and the most by non-culpable drivers);
- less risk attributed to speed/aggression, and impairment distinguishing culpable and non-culpable from non-accident drivers;
- older culpable males made significantly lower risk attributions to impairment than their non-culpable and non-accident counterparts;
- similarly accident-involved males under 45 years (both culpable and non-culpable) were distinguished by their low attributions of risk to impairment;
- NON-CULPABLE young drivers distinguished by low risk attributions to pedestrian/cyclist/motorcyclist error.

General Summary

Subjective culpability has emerged from these analyses as a significant discriminator of factors which, according to accident statistics and previous research, consistitute considerable vulnerability to accident involvement, in relation to driver affect/state, self-perception, attitudinal/behavioural tendencies, and attributions of importance to accident risk factors. Some degree of blurring of distinctions occurs accross culpable and non-culpable accident-involvement, however this effect appears to be explicable in terms of both attribution bias (Jones, & Nisbett, 1972; Hewstone, 1989; Preston & Harris, 1965; Clay, 1987), and the lack of awareness of drivers who most frequently commit drink driving and speeding offences (Clayton et al, 1980, 1984; Guppy, 1984, 1988, 1993; Albery, 1991; McLean et al, 1988). Furthermore in some instances, non-culpable drivers were found to exhibit more constructive and safer attitudes and behavioural tendencies than even the non-accident group, supporting the utility of this categorization.

Subjective culpability has been found to be associated with a lower self perception of confidence in the driving situation together with factors which would seem, both intuitively and according to previous and the current research, to predispose drivers to accident involvement. This seems to offer support for Reason et al's (1990) identification of drivers who commit serious or dangerous errors. However it is contrary to their finding relating to frequent traffic violators, who were found to be confident and to consider their driver skills to be superior. Similarly, it is contrary to the suggestion of previous studies such as Finn & Bragg (1986) and Matthews & Moran (1986), that over-confidence may contribute to accidents. However it is unclear whether frequent violators' confidence is in reality a product of superior skills or simply the drivers' illusory perception that this is the case (Reason et al, 1990). This question is not resolved by the current findings that males, and especially young males, attribute less importance to speed and aggression and report higher frequencies of speeding behaviours. These tendencies are similar to the pattern for impairment.

However in light of the higher frequencies of speeding and impairment associated with accident involvement per se, it seems plausible that at least some frequent traffic violators who are included in these accident statistics do not identify themselves as culpably accident involved because they have misperceived their own role in accident occurrence and misattributed responsibility to the "other" driver involved.

Young drivers and males were found to attribute less importance to accident risk factors in general while reporting themselves to be less safe or to place less value on safety than older drivers and females. They also rated their driving skills more highly after controlling for both duration and intensity of driving experience. However males' higher frequencies of drink-driving and young drivers' and males' higher frequencies of speeding behaviours and solo speeding appear to be the norm to which accident involved drivers conform, but with more pronounced tendencies. The fact that many such tendencies are associated with accident involvement but not necessarily subjective culpability suggests that confidence in superior skills by frequent traffic violators is misplaced, at least to some degree, while such confidence in ability may contribute to the attribution bias found in the current study, involving some degree of misattribution to "other drivers" of responsibility for personal accident involvement. The perception of a higher quality of driver skills, anticipatory skills and confidence in drivers who report higher frequencies of speeding and drink-driving behaviours seems to argue that misattribution seems to occur more at the perceptual and cognitive than the motivational levels, i.e. lack of awareness seems stronger than self-defense. The problem may relate partly to lack of awareness or undervaluing of higher order functions relating to the development of judgement and social skills.

Reason et al (1990), Parker et al (1992), and West et al (1993) found evidence of asocial behaviour in young drivers and males. There appears to be considerable evidence that young drivers and males, young males in particular, have considerably greater awareness of and expertise in the handling characteristics of the vehicle than of the skills required for safe and harmonious social interaction on the roads. Considerable consistency has been found between reported and observed asocial driver' attitudes (Wilson, 1987). Such findings are consistent with those of the current research. It appears that adherence to age/ sex norms may contribute to the safety compromise of drivers. This seems particularly evident where the norms change with increasing maturity in the majority of drivers, but earlier norms appear to be conformed to, or to become more pronounced in some individuals who may not have developed more appropriate or effective coping strategies, and whose behaviour appears to be considerably divergent from that of their peers.

The overall impression that emerges is that young drivers and males tend to derive greater pleasure from driving than do females and older drivers, while reporting themselves to be more irritable and riskier drivers. In the latter respects they resemble culpable drivers who appear to be influenced by the same norms, however in other important respects they differ. Older drivers as a group appear to be associated with less enjoyment of driving and less awareness in general within the driving situation, including a lower awareness of non-driving road users. However they do not tend to speed or drink-drive, and are less irritable than younger drivers. Thus their accident risk may relate to perceptual rather than attitudinal or motivational factors, with the exception perhaps of older culpable males' low attribution of risk to impairment. This is consistent with a large body of research on older drivers' problems, while suggesting a relatively minor qualification to Reason et al's (1990) definition of errors (both serious and minor), relating to cognitive failure, a reduced perceptual capacity being entirely consistent with a reduction in both awareness and enjoyment within the driving environment. Young drivers' risk, in contrast, appears in no small measure to relate to motivational factors, including a positive affirmation of risk.

A brief summary relating to traffic offences/recency

Traffic offences involved a minor focus within this study, therefore a brief summary of the main findings only is discussed here. However they do allow a point of comparison regarding the consequences of risky behaviours which may result in an accident, legal penalty, or have no untoward consequences. By comparison with the accident analyses, findings relating to traffic offences were somewhat similar, but weaker. This may be partly due to the detection of offences being rather rarer than their committal, thus allowing some degree of confounding of offender/non-offender status. It may also be influenced by the approach emphasis on recency. Future research may benefit from alternate approaches to the study of offences, such as analysis of distinctions relating to: moving and non-moving offences; specific offences such as speeding, driving while over the legal alcohol limit, or driving without due care and attention; and/or the frequency of offences. As it is not of primary relevance to the objectives of the current study, a comprehensive examination of the explanatory power of the various types of traffic offences will not be carried out here, however such an evaluation may well yield further information of practical value to the problem of accident prevention.

Traffic offenders were distinguished from non-offenders by significantly: higher levels of irritability and lower levels of awareness within the driving situation; perceiving themselves to be less aware (traffic offenders with current endorsement reporting themselves to have less driver awareness than did those without current endorsements), and to a considerably greater degree less safe (or more risky), but more confident; higher frequencies of solo speeding and less awareness of non-driving road users within the driving situation (however these involved rather weak effects only, perhaps suggesting that offenders may differ from non-offenders with regard to the salience of their behaviour within the driving situation to a greater degree than in the frequencies with which they perform any specific behaviours and/or possibly that offenders are more cautious in revealing the frequency with which they exhibit behaviour which they know may incur legal penalties within the driving situation); attribution of less importance to speed and aggression in relation to accident causation, and similarly less importance to impairment in the case of offenders within the 30-44 years age band. Further interactions involved female traffic offenders in the 30-44 years age band, who were distinguished by significantly higher levels of irritability, and lower levels of awareness within the driving situation than all other drivers, as well as perceptions of themselves as more irritable than their older counterparts. Exploration of the underlying causes of these effects may yield safety benefits for this group who may be unaware of their relatively high vulnerability to, not only traffic offences, but also the risk of accident involvement.

In summary, on the whole, traffic offences revealed similar, but weaker and rather sparser effects than did the analyses relating to accidents. Nonetheless the results offer some enlightenment. Notably, traffic offenders were characterized as confident, in contrast to the effect relating to culpability, and consistent with Reason et al's (1990) findings that "subjects who report the most violations also tend to rate themselves as particularly skilful drivers". The association between current endoresements and lower levels of driver awareness suggest that this influence may be relatively transient. The age/sex interactions with traffic offences suggest that particular groups of drivers may benefit from further analysis of factors which appear to increase their vulnerability, not only to legal apprehension, but also to accident involvement.

3) Young Driver Cross-Cultural Accident Involvement/Liability

The third objective "**to identify factors which distinguish young subjectively culpable drivers from their non-culpable and non-accident-involved peers**" evolved from concern about the over-representation of young drivers in the accident statistics (Dept. of Transport, 1990), suggesting the utility of evaluating the nature and degree to which culpable young drivers may differ from their peers. Thus a focus on young drivers seemed appropriate, while a cross-cultural comparison explored the wider applicability of such findings to some extent (within the constraints of the sampling procedure). The results suggest that young drivers (up to 25 years) can be distinguished according to self-reported influence on accident occurrence, while allowing the effects of sex, country, and driving duration and intensity to be examined separately, within a sample of British (drawn from the combined British sample), and Victorian (Australian) drivers, thus allowing cross-cultural comparison.

"Emotional/arousal response within the driving situation"

The main finding was that country was multivariately significant ($p=.010$) in relation to intimidation ($p=.007$) due to the lower levels of intimidation while driving reported by British drivers by comparison with the Australians, which seemed largely due to the lower level of intimidation reported by non-culpable accident-involved British males.

A modest effect which emerged following covariate control revealed that culpable drivers could be distinguished from non-culpable and non-accident-involved drivers by significantly higher reported levels of irritation and intimidation when driving.

Thus, in the virtual absence of significant effects, it seems that the response of drivers under 25 years to the driving environment may be characterized by greater similarities than differences, and with the exception of the sole multivariate effect reported above, that this holds for both cultures.

"Driver self-perception"

Two of the three main effects were significant at multivariate level: sex ($p=.001$) and accident involvement ($p<.001$). At univariate level, three factors were significant in relation to sex: irritable ($p=.009$), safe ($p=.004$), and confident ($p=.031$); while all four factors had univariate significance in relation to accident involvement: irritable ($p=.006$), safe ($p<.001$), confident ($p=.014$), and aware ($p<.001$).

The main findings were that culpable drivers rated themselves as significantly more irritable, less safe, less confident, and less aware than did non-culpable and non-accident-involved drivers. Males consistently rated themselves to be significantly more irritable, less safe, and more confident than did females, although the latter effect was not pronounced. Thus these findings seem to be entirely consistent with those found within the main British sample, and no significant cross cultural differences were detected.

"Driver attitudinal/behavioural tendencies"

No significant multivariate interactions were detected, however two of the three main effects had multivariate significance, country and sex, both of which were highly significant ($p<.001$). The main findings were that: four factors were univariately significant in relation to the main effect for country: frustration ($p=.012$), drink driving ($p=.036$), solo speeding ($p<.001$), and anticipation ($p=.025$). British drivers reported higher levels of frustration, solo speeding behaviours, and anticipation than their Australian counterparts. However, Australian drivers reported higher levels of drink driving behaviours than British drivers. These effects may reflect to some extent differential traffic conditions and cultural influences.

It should be noted that in contrast to the main British sample, drink driving within this analysis did not include estimation of frequency of driving while over the legal limit, and may thus give a relatively weaker and less reliable evaluation of differences in drink driving behaviours, although the sex differences detailed below demonstrate that significant effects can nonetheless be detected.

In relation to the main effect for sex, five of the nine factors were univariately significant: speed ($p=.043$), driver skills ($p<.001$), drink driving ($p=.008$), anticipation ($p=.002$), and perceived control ($p=.021$). In comparison with females, males reported significantly higher levels of speeding behaviours, rated their driver skills more highly, reported higher levels of drink driving behaviours, rated their anticipatory skills at higher levels, and perceived themselves to have more control within the driving situation. These findings are broadly similar to those of the combined British sample. However, the above findings suggest the possibility that young males may feel that they can rely on superior anticipatory and driving skills without necessarily being aware of the degree to which any such advantages may be diminished by drink driving impairment.

No significant effects were detected in relation to accident involvement alone, either at multivariate or univariate level, following control of experience/exposure effects, which seems to suggest that factors other than behavioural tendencies are highly influential in the accident involvement of the young, in interaction with their on-road behaviour.

"Beliefs about accident causation in Britain/Australia"

The main findings were that a significant multivariate interaction was found between accident involvement and country ($p=.009$), relating at univariate level to impairment ($p=.004$). Culpable British drivers rated impairment as significantly less important in relation to accident causation than did all other drivers, which may be partly indicative of the lower profile and intensity of drink driving intervention strategies in Britain as compared to Australia. Multivariate significance was also found for two of the three main effects, country ($p<.001$), and sex ($p<.001$).

One factor only, impairment ($p<.001$), had univariate significance in relation to country, reflecting the greater importance Australian drivers attributed to impairment with regard to accident causation, by comparison with British drivers. The incongruence between the risk attributed to drink driving, and reported frequencies of drink driving by Australians suggests that this discrepancy warrants more comprehensive examination within a larger and perhaps more representative sample of Australians. However, this effect is explicable in attributional terms, with the risk attributable to alcohol impairment being assumed to pertain to other drivers who may be considered less capable of avoiding accidents when drink driving. This explanation is consistent with the tendency of drivers who drink the greatest quantities most frequently to assume lower personal risk (Clayton et al, 1980, 1984; Guppy, 1984, 1993; Albery, 1991; McLean et al, 1988).

Four of the five factors in this analysis were univariately significant in relation to sex: attitude to driver variables ($p=.044$), attitude to other road users ($p<.001$), speed and aggression ($p<.001$), and impairment ($p<.001$). Females attributed more importance to: driver variables, other (non-driving) road users' errors, speed and aggression, as well as impairment, in relation to accident causation than did males.

In summary: the analyses focusing on drivers up to 25 years within Britain and Australia were in general consistent with those of the main analyses. However very few cross cultural differences were detected, and distinctions according to accident involvement and culpability were relatively weak and sparse. However culpable drivers were clearly distinguished by their significantly differing self perceptions, which were entirely in accordance with the findings of the main sample, whereas weak effects relating to higher levels of negative affect emerged within this younger sample, but were below significance in the main sample. These findings suggest that a focus on differences within younger driver groups may be worthwhile, but a larger sample would be expected to allow clearer distinctions to emerge. Nonetheless, the ability to clearly distinguish culpable drivers within a sample of drivers up to the age of 25 years, of moderate size, seems to have considerable implications for accident prevention. Thus while reservations relating to the generalizability of the Australian sample must be maintained, the degree of consistency between the cross-cultural sample and the larger British sample is of interest, suggesting which factors have stability beyond the confines of culture and age, and which appear to be specifically associated with a particular age group or culture.

General Discussion

Previous research has strongly suggested that bias exists in relation to the attribution of causal responsibility to self and others in a variety of situations (Jones & Nisbett, 1972; Watson, 1982; Hewstone, 1989). Clay (1987) found evidence suggesting that this finding extended to drivers' causal attributions for accidents. Preston & Harris (1965) found that drivers deemed culpable by traffic police for their accidents differed considerably from the police in their estimations of their own culpability, considering other drivers to have greater responsibility for their accidents than they did themselves. The current findings support the evidence for a self-favouring bias in causal attributions relating to road accidents which is consistent with the differential salience of the behaviour of self and others hypothesized by Jones & Nisbett (1972), without ruling out the possibility that motivational issues also contribute to such bias (Hewstone, 1989).

If drivers tend to be relatively unaware of their personal contribution to accident occurrence, this would seem to offer an explanation at perceptual and cognitive levels for drivers' global positive self ratings. However the question arises with regard to drivers' self awareness, what are the criteria on which drivers base their estimations of themselves as "good drivers" and given the age/sex patterns in accident statistics, do such naturally occurring groups rate themselves positively on the basis of the same criteria, or do their value judgements reflect divergent priorities in relation to driving. The current findings seem to suggest that the criteria do differ.

Despite the evidence of causal attribution bias it was nonetheless possible to distinguish between drivers according to self-reported accident involvement and subjective culpability according to criteria which were far from suggesting social desirability bias. Although some blurring of the distinctions between culpable and non-culpable drivers appeared evident in relation to reported drink-driving and speeding behaviours, this seems explicable in terms of Reason et al's (1990) evidence of the high level of confidence reported by drivers who frequently commit violations, together with the findings that drivers who most frequently commit violations tend to have the lowest expectations of negative consequences (Clayton et al, 1980, 1984; Guppy 1984, 1987, 1988, 1993; Albery, 1991). Furthermore this tendency was evident amongst drivers involved in accidents which resulted in serious consequences which were investigated in depth (McLean et al, 1988).

It seems that the causal attribution tendencies of such drivers may warrant closer attention with a view to developing strategies to change misattributions, especially where they lead, not only to the driver's failure to realize his/her personal contribution to accident involvement, but where hostility is misdirected at the "other driver" as a consequence (Knapper & Cropley, 1980).

The significant association between accident-involvement and low attributions of importance to speed and aggression, and impairment strongly suggest misattribution of responsibility for personal accident-involvement on the part of some drivers within the group designating themselves non-culpable. It is difficult to envisage why non-culpable drivers should be involved in accidents to which they do not contribute while persisting in risky practices in common with their culpable counterparts. Failure to avoid an accident because of inappropriate speed nonetheless contributes to the problem, regardless of who initiates it. Similarly, avoidance failure would seem to apply to drink-drivers who are also well represented in the accident group. It is difficult to explain their accident involvement adequately in totally non-contributory terms. These findings are consistent with the attribution bias found within the current study and also the findings of previous research (Preston & Harris, 1965; Clay, 1987).

Non-accident, non-culpable and culpable drivers have been identified as distinct groups within the current analyses, albeit with some blurring of distinctions suggestive of attribution bias which was confirmed within the current analyses. Both the potential and importance of distinguishing between drivers on the basis of culpability raised by Banks et al (1977) (in relation to a clearly defined accident group) are supported in the current analyses (in relation to accidents with a much broader range of consequences), as are the implications of attribution bias identified by Jones & Nisbett (1972) and analysed by Watson (1982) and Hewstone (1989), and more specifically identified in relation to road accidents by Preston & Harris (1965). Both culpable and non-culpable accident-involved drivers were characterized by placing less importance on risk in the driving situation, especially drink-driving and speed and aggression. Culpable drivers were distinguished by their attachment of less importance to risk associated with lack of attention, lack of anticipation, lack of consideration, close following and improper overtaking (attitude to driver variables).

Regarding emotional/state response to driving, accident groups were more frequently influenced by negative affect, with intimidation, fear and upset distinguishing culpable drivers from 30 years onwards. Culpable drivers described themselves as less safe or positively affirming risk, more irritable, less aware and less confident. Both accident groups reported higher frequencies of safety compromising behaviours, notably speeding and drink-driving.

It seems that drivers rate themselves as "good drivers" considerably according to perceptions of themselves as confident, decisive and experienced. Transgression of safety guidelines and laws, and social interaction skills such as consideration, appear to have little impact on such assessments. Social norms appear to be highly influential, compromising the safety of young males in particular. The greater risk propensity of both subjectively culpable and non-culpable accident groups is consistent with the evidence of attribution bias found in this study, and supports the findings of Preston & Harris (1965) and Clay (1987) with regard to attribution bias favouring self by comparison with other drivers. It also supports the survey findings of Clayton et al (1980, 1984), Guppy (1984, 1987, 1988, 1993), Albery (1991), that the most frequent offenders consider the risks associated with their behaviour to involve less risk than do non-offenders. McLean et al's (1988) similar findings relating to in-depth accident investigations are also supported. The current findings are also consistent with the findings of Reason et al (1990) with regard to the most frequent offenders expressing the highest confidence in their driving skills, and Parker et al (1992) regarding frequent offender groups being far more aware of the potentially positive benefits rather than the potentially serious, negative consequences of their risky behaviours. Similarly West et al (1993) reported evidence of self-interest taking precedence over shared interest within the driving situation by drivers exhibiting "mild social deviance" and having a considerably higher rate of accident-involvement than drivers who did not share these characteristics.

Reason et al identified important behavioural distinctions but did not examine them in relation to accident involvement. Parker et al's (1992) application of Ajzen's theory of planned behaviour encompasses risky behaviours which may be considered on the whole as intentional, addressing the problem of traffic violations identified by Reason et al (1990) as involving "motivational factors", to the exclusion of serious errors and minor slips which were considered to involve "failures of cognitive competence". However this application appears to have fairly limited applicability to accident involvement per se and does not address the issue of culpability. West et al's approach incorporates "lack of thoroughness" with asocial behaviour and speeding, and appears to have considerable distinguishing power in relation to accident involvement, although speeding behaviours were examined to the exclusion of other driver behaviours, allowing no point of comparison. However the current research findings suggest that there are many significant distinctions in accordance with age, sex, accident involvement and subjective culpability, which have considerable relevance to the problem of accident prevention. Alcohol-impaired driving, speeding behaviours (relating considerably to competitive speeding), and solo speeding (speeding when upset and taking less care when driving alone), emerged as significant factors in relation to subjectively culpable and non-culpable accident-involvement.

The current approach encompasses affective, cognitive and behavioural associations with accidents, both culpable and non-culpable. This distinction is clear in regard to many factors relating to vulnerability, or risk propensity, and accidents. Some blurring across the concepts of culpability and non-culpability occurs, which is predicted by causal attribution theory, and therefore explicable in terms of perceptual salience and cognitive misattribution. The repetitive or habitual nature of behaviours associated with accidents seems to be explicable in terms of both negative affect (irritability, intimidation, frustration), and positive affect relating to pride and confidence in skills to which some considerable effort has been applied, life stage, the assertion of autonomy, establishment of personal identity, and the influence of peer pressure and communal expectations on the young male in particular. Thus the current research findings appear to complement the findings of recent studies, while offering an explanation at perceptual and cognitive levels for the persistence of the risky behaviours they identify, despite the occurrence of negative consequences.

Examining drivers' self-reported accident histories including their subjective assessments of their own and others' culpability and the influence of vehicular and environmental factors, has allowed drivers' awareness of their potential for active accident avoidance to be evaluated. Examination of drivers' affective, cognitive and behavioural responses within the driving environment together with an assessment of their perception of themselves as drivers allowed simultaneous evaluation of risk perception, estimation of negative affect and some measure of stress (Gulian et al, 1989) together with an estimation of how frequently specific behaviours were reported to occur.

The emergence of factors associated in a large body of previous literature with safety compromise and accident involvement as being clearly associated with accident involvement and to a lesser degree culpability seems to indicate that it is possible to identify factors which increase drivers' accident vulnerability in relation to self-reported accident-involvement and subjective culpability. The fact that such factors can be linked to drivers' own accident analyses suggests that such information can be passed on to drivers in a manner which could be meaningful and relevant. Evidence of misattribution of responsibility for accidents seems to provide some explanatory power, suggesting that the natural learning curve, which may include a variety of negative consequences, may be shortened by addressing the issue of causal misattribution, in order to change any false perceptions regarding the superiority of skills, imperviousness to the effects of impairing agents, and invincibility on the roads, all of which support the use of high speeds in inappropriate conditions.

The current study has drawn on a wide variety of previous findings and taken a relatively comprehensive approach to evaluation of safety compromise. The results appear to offer an increase in the explanatory potential of the persistence of behaviours which result in culpable accident involvement. The results suggest that accident prevention could benefit from further examination of the potential of drivers' subjective culpability and causal attribution tendencies to explain drivers', often relatively unwitting, exposure to risk.

CONCLUSIONS

A tendency for drivers to attribute relatively more responsibility to other drivers with whom they were involved in accidents, than to themselves, and similarly to attribute more potential for accident avoidance to such other drivers (tentatively concluded by Clay, 1987) seems to be supported within this study. This effect was maintained, albeit considerably reduced, within a group of drivers deemed to be culpable by police accident investigative teams. However, the magnitude of reduction seems to suggest the potential for increasing drivers' awareness of possible accident influence and therefore also of prevention, by making information available to them in a manner which they may find constructive and personally relevant.

Even a relatively minor tendency to misattribute responsibility to others for negative consequences such as accidents, would seem to have implications not only for accident prevention, but also the quality of social interaction on the roads, and the potential for drivers to learn from experience. Therefore, the issue of attribution tendencies and their possible consequences seems worthwhile exploring further.

The current study allowed distinctions to be made between drivers in accordance with self-reported accident involvement and culpability in relation to driver affect/state, self-perception, attributions for accident causation, and attitudinal/behavioural tendencies. Such distinctions seemed to be meaningful in terms of driver susceptibility to accident risk. The pattern of response for accident involvement and culpability effects was also examined in relation to the norms which emerged for age and sex, while the effects of driving experience duration and intensity were examined separately.

There seemed to be many similarities between the patterns of response of young males and culpable drivers, with a few notable exceptions. Culpable drivers reported relatively similar behavioural tendencies with regard to speeding and drink driving, they tended to make relatively low risk estimates regarding accident causation in general, while rating themselves as risky, in common with young males. However, in marked contrast to young males in general, they rated themselves as relatively lacking in confidence and awareness within the driving situation. Thus the features which emerged seemed together to suggest a considerable potential for safety compromise, albeit, a compromise of which culpable drivers may be relatively oblivious (Preston & Harris, 1965).

Recent driver behaviour models have addressed the issues of: the nature and influence of intention on safety compromise, (violations, serious errors, minor slips) and the populations with which they are associated (Reason et al, 1990); motivational factors underlying the (hypothetical) commital of four driving violations (Parker et al, 1992); the influence of mild social deviance and decision-making style on driver safety (West et al, 1993). Together these studies provide useful insight into accident occurrence and potential preventative strategies, and the populations which may be over-involved.

The current study appears to support, complement, and to some degree elaborate on the findings of the above studies. It identifies the affect, risk perceptions, behavioural tendencies and self perceptions of the statistically at risk group, young males, in common with recent models, but in greater detail. It also identifies factors which distinguish both culpable and non-culpable accident-involved drivers, providing detail of similarities and differences from the age/sex norms. It offers insight into their self-perception and the value they place on risk for example. It also offers an explanation for the persistence of risky behaviours amongst young males despite this group incurring a significantly higher rate of negative consequences such as accidents. The greater salience of "others'" behaviour than one's own in the interpretation of events with negative consequences, predicted by causal attribution theory, offers an explantion at both perceptual and cognitive levels. Such misattribution may be encouraged by reliance on fast reactions, together with the highly developed skills which they perceive themselves to have, and limited awareness of the considerable influence of mood and other impairment, and speed, especially when they occur together.

Parker et al's (1992) application of Ajzen's theory of planned behaviour examined attitudes to four hypothetical traffic violations widely acknowledged as associated with accidents, intentions to commit such violations, perceived advantages and disadvantages of their commital, and perceived approval/disapproval of significant others to their committal. This allowed the statistically at risk young males to be identified, however it proved to be a relatively poor indicator of accident involvement within the previous three years.

The current study, by comparison, identifies beliefs about accident causation, the influence of emotion and state of arousal, stable reported behavioural tendencies (which Ajzen, 1988 notes gives a clearer indication of future behaviour then individual instances) and driver self-perception, in relation to age/sex norms, and comprehensive association with accidents identifying fairly distinct non-accident, non-culpable, and culpable accident-involved driver groups, according to criteria which have been identified in accident statistics and previous research findings as clearly compromising safety.

The divergence of motivational and cognitive compromise in relation to the degree of intentionality related to violations and errors identified by Reason et al (1990), appears to be mirrored to some degree in subjectively culpable and non-culpable accident groups, the latter including a proportion of drivers who appear to misattribute responsibility to "other" drivers, which appears to be consistent with Reason et al's identification of self-ratings of "superior skills" in frequent traffic violators. Thus the current study seems to support and elaborate these findings, offering an explanation at perceptual and cognitive levels.

While it is useful to identify characteristics associated with driver groups over-represented in accident statistics, it also seems important to identify characteristics which these groups share with drivers with accident histories in general, and culpable histories in particular, ascertaining similarities and differences to render targetted preventative strategies more effective and to enable such groups to find the strategies relevant and meaningful in terms of personal belief systems, affect, and usual behavioural practices.

The current study identifies convergence with, and divergence from, the age/sex norms of drivers groups which are over-represented in accident statistics. It also indicates the degree to which such patterns resemble those relating to both culpable and non-culpable accident-involvement. West et al (1993) identified mild social deviance in association with "low thoroughness" and speeding as contributing to accident risk. The current study's identification of negative affect, drink-driving, lower levels of reported awareness relating to alertness, decisiveness, attentiveness, anticipation, as well as a variety of speeding behaviours appear to support and elaborate these findings, identifying their relationships with age, sex, and accident groups.

There is evidence that attribution bias affects the interpretation of events, perhaps those with negative consequences in particular. This effect appears to be influenced considerably by the greater salience of the behaviour of "others", which may be observed on a single occasion, as opposed to behaviour of the self, which tends to be inferred in accordance with a more generalized behaviour pattern (Jones & Nisbett, 1972; Hewstone, 1989). There is furthermore evidence that misattribution occurs within the driving situation in relation to simple analyses of influence over, and responsibility for, accident occurrence (Preston & Harris, 1965; Clay, 1987). This suggests that attribution bias could have implications for effective accident prevention.

The issue of responsibility for road traffic accidents, no less than many other human behaviours, seems to necessitate acknowledgement of the fact that situational control is rarely absolute, when temporal, interaction, and social influences are taken into consideration, but equally rarely is control entirely absent. Analyses of driver behaviour, when they do address the issue of accident involvement rather than simply risks associated with such involvement, generally appear to avoid the issue of responsibility for such events.

However the issue of culpability, albeit applied retrospectively, appears to involve important distinctions between drivers (Preston & Harris, 1965; Banks et al, 1977) potentially allowing the problems faced by such drivers to be more effectively targetted and addressed. Furthermore, there is evidence that it may be possible to identify tendencies associated with driver vulnerability to accident involvement, prior to such involvement (Beirness & Simpson, 1990) thus facilitating emphasis on behaviours which tend to have positive outcomes rather than simply warnings about avoidance of those which tend to result in negative consequences.

Responsibility for negative consequences raises the issue of influence, in particular when it relates to behaviours which conform to the prevailing socio-cultural norms. Thus the issue of responsibility for road traffic accidents may be more usefully and appropriately addressed by an examination of patterns of driver behaviour, belief, emotional/state response, and self perception associated with age/sex norms as well as accident involvement and culpability. The issues of misattribution of responsibility to others for negative consequences, and patterns suggestive of collective influence over individual behaviour appear to be essentially linked, and together seem to have considerable implications for accident prevention.

Recent studies have utilized models which identified socio-cultural patterns of behaviour and examined motivational issues associated with such behaviours. However, while allowing considerable insight into the mechanisims involved in maintenance of attitudes associated with accident risk, they do not strongly link these to accident involvement histories. The current study benefits from the insight afforded by Reason et al (1990) and Parker et al (1992), complementing and supporting their findings, while examining how age/sex tendencies relating to beliefs and behaviour are associated with, and conform to or diverge from, such patterns. In particular, examination of drivers' analyses of their own roles in accident involvement, offers an explanation for the maintenance of risky attitudes and behaviours in the face of negative consequences such as accidents, at perceptual and cognitive levels. Reason et al identified the important role of mood in serious errors in particular, as well as violations and minor slips. The current findings are consistent with this, and similarly allow emotional/state impairment to be examined in conjunction with cognitive and behavioural influences on accident susceptibility, however in contrast with Reason et al's study, links are made in the current research with reported instances of actual involvement in accidents and subjective culpability for their occurrence.

The current study identified both a tendency to misattribute responsibility to other drivers for accidents in which they were involved while driving in a proportion of drivers who designated themselves as non-culpable, and also a propensity for behaviours which compromise safety. The factors which emerged within accident groups, in the absence of an effect relating to culpability, were found to be those which are widely acknowledged as increasing the vulnerability of drivers to accident involvement, albeit unwittingly. Although the frequent committal of behaviours such as speeding and drink driving appear to be strongly associated with a positive affirmation of risk, such association also involves little expectation of negative consequences, and a focus of awareness on anticipated benefits (Parker et al, 1992). This being the case, such information could be employed in informing appropriate and effective preventative strategies. Evaluation of the degree to which risky behaviours are encouraged by social norms, misinformation and/or the need to diffuse negative affect would seem to help increase the effectiveness of countermeasure development. Such factors could be examined in depth in future research. The current study offers explanatory power relating not only to involvement in accidents, but also explores the issue of influence over their occurrence. Future research could examine the strength of association between reported subjective responsibility and the degree of risk to which drivers expose themselves.

ATTRIBUTIONAL IMPLICATIONS

The main findings of the current study suggest that drivers may tend to consider salient others within the driving situation (Jones & Nisbett, 1972) to have influenced their accident involvement to a greater degree than they have themselves, and similarly, to have had greater potential for accident avoidance than they did themselves. Furthermore this effect, although considerably weakened and less stable, seems to persist despite their being deemed culpable by police accident investigative teams, a finding broadly consistent with those of Preston & Harris (1965).

In light of a possible tendency to consider others to be more responsible for accident involvement, which may be a tendency prevalent in many cultures (Hewstone, 1989), it is of no small interest that it seems possible nonetheless, to distinguish drivers according to self-reported accident involvement and culpability in a manner which seems to be meaningful in terms of their potential susceptibility to accident involvement.

However culpable drivers may not necessarily be aware of the degree to which they differ from other drivers with regard to the factors which allow such distinctions, nor the possible magnitude or manner of involvement of such factors in accidents. Thus, although it is possible to identify drivers whose responses within the driving environment, beliefs about accident causation, driving behaviours, and perceptions of self may contribute to the risks to which they, albeit unwittingly, may expose themselves and others in the driving environment, enabling drivers to increase their own and others safety on the roads would seem to require the problems to be addressed in a manner which the particular driver groups would find meaningful and relevant.

In order to address the problem of information deficits, revealed within the literature and also identified within the current analyses, it seems necessary to acknowledge that access to information requires more than simply its availability. The issue of relevance also needs to be addressed. Drivers who habitually speed and/or drink and drive, may well receive occasional traffic citations for doing so, and may thus be very likely to be aware of the belief that such behaviours are considered to increase the risk of accidents, but not necessarily to share such a belief. In fact Guppy (1993) found that drivers classified as offenders in terms of their speeding or drink driving behaviours tended to make lower estimations of the probability of being accident involved or apprehended while performing such behaviours, than did control groups.

If drivers do not anticipate (Jones, 1986) the possibility of accident involvement despite the performance of behaviours which may be construed as risky, then in the event of accident occurrence, they may be inclined to focus on factors other than such behaviour on their own part (Jones & Nisbett, 1972). They may reason therefore that the other driver is likely to have been more influential with regard to the accident, and therefore to have had greater potential for accident avoidance.

Several factors may contribute to such reasoning with regard to causal attributions. The habitual performance of particular behaviours such as speeding or drink driving, together with the relative rarity of accidents, may suggest to the driver, no less than the road safety researcher, that such behaviours are neither necessary nor sufficient for accident involvement (McGraw, 1987), however with regard to behavioural implications they may differ. Although accidents may be statistically rare, and the performance of particular behaviours may not inevitably lead to accidents, any such performance may nonetheless significantly increase the probability of accident occurrence.

Furthermore, where any action or inaction and its consequences are perceived to be incongruent, for example severe consequences following what is perceived to be a minor infraction, this may quite reasonably be expected to reduce the magnitude of any subsequent attribution of responsibility to the self (Fincham & Jaspers, 1980). Thus for example, the driver who is relatively unaware of the implications of inappropriate speed, and/or the capacity of other factors to potentiate the effects of even moderate impairment, may assume limited responsibility in the event of an accident, and reason therefore that salient others within the driving situation must have been more influential in such occurrence.

It seems that culpable drivers may be relatively unaware of their contribution to accident occurrence (Preston & Harris, 1965), and thus their potential for active accident avoidance, which may among other factors, be affected by a relative lack of awareness within the driving situation, perhaps mediated at least partly by effects of life stress (Mayer & Treat et al, 1977; Gulian et al, 1989) with which they may have difficulty in coping (Folkman et al, 1981; Bandura, 1977; Malatesta & Wilson, 1988). Thus, there would seem to be benefits, not only in increasing drivers' awareness of their potential to avoid accidents, but also the collective potential and responsibility for reducing the effects of a climate which may compromise, in particular, the safety of the young male (Waller & Waller, 1987).

The overall impression which emerges in relation to culpable accident involvement is that it involves less control by culpable drivers than drivers in general over their response potential and therefore also of their vehicles in relation to the driving environment, although the evidence suggests that they may fail to realise that such differences occur. Where problems relate to lifestyle, social conditions etc., bringing the consequences of such problems to the attention of appropriate bodies/policy makers may result in the facilitation of constructive change in relation to enduring, preventative strategies, however in terms of immediate needs, at the least, those who encounter the problems could be made aware of the added risks to which they expose themselves and how such risks may be countered, with appropriate referrals for help where indicated.

The capability to distinguish drivers on the basis of accident involvement and liability allows factors which increase or decrease safety to be more clearly identified. It also allows the influence of norms and peer pressure to be more readily ascertained and therefore for such insight to inform countermeasure development. Devising preventative strategies following consultation with, or employment of, peer groups may be especially effective (Clark & Powell, 1984).

PRACTICAL IMPLICATIONS

These analyses together seem to allow emergence of various features which may help to identify vulnerability to culpable accident involvement, while suggesting that such features are not generally permanent, but may be influenced considerably by age/sex norms. The degree to which socio-cultural norms appear to be relevant seems to suggest a need for emphasis on intervention at the primary, or preventative level (Waller & Waller, 1987), encompassing broadly based strategies such as random breath testing with high profile media involvement (Johnston, 1987), and emphasis on influencing young people's attitudes at the training and pre-training stages (Beirness & Simpson, 1990). Persistence and exaggeration of risky behaviours beyond the age/sex norms (Jessor, 1987; Jonah, 1990) seems to suggest the need for a comprehensive programme of intervention on several levels, including detection, treatment, and strategies designed to prevent primary occurrence and avoid recurrence, i.e. to prevent perpetuation through successive generations of young drivers, of problems strongly implicated in accident involvement (Waller & Waller, 1987).

The possiblity of distinguishing between drivers in accordance with self-reported accident involvement and culpability seems to offer considerable potential for gaining insight into factors which may contribute to accidents and thus help to inform effective accident prevention strategies.

The degree to which similarities emerged between the norms for young drivers, and males, especially in combination, and the patterns of response for culpable drivers, seems to suggest the need for a focus on factors which may encourage such norms (Waller & Waller, 1987) as well as the constraints to which young drivers may be subject (Jessor, 1987).

Thus an emphasis on broadly based strategies designed to encourage and enable safer practices to be carried out when practicable seems to be indicated. Such measures may include: making public transport an economically and practically, viable alternative to driving in congested conditions, speeding on motorways, or driving when impaired by alcohol, fatigue, upset, or illness; server intervention schemes in pubs; random breath testing with high media profile; availability of low alcohol beers; and evaluating ways of improving driver training, testing, and licensing. With regard to the latter factors, encouraging development, not only of skills relating to vehicle control, but also judgement and social skills, would seem to allow young drivers to develop a more realistic and appropriate awareness of what constitutes "good" driving.

An emphasis on collective responsibility for the influences to which drivers are subject and the conditions in which they must drive would seem to be both fairer and potentially more effective than simply blaming individual drivers for their responses to such influences and conditions (Waller & Waller, 1987) following accident involvement. However, in order to help drivers to avoid accidents, we also need to enable them to become more aware of the ways in which they may be compromising both their own safety and that of others.

While identifying the similarities between young drivers, males, and accident involved drivers, especially culpable drivers, is valuable with regard to targetting groups which are vulnerable to accident involvement, identification of factors which distinguish culpable drivers from the "at risk" groups may be of greater importance. Informing drivers of the consequences which appear to be associated with habitual driver behaviours, such as speeding, especially when they occur in combination with negative mood changes and reduced awareness within the driving environment, may help drivers who frequently speed to identify the source of increased risk. While warnings about behaviour which is routinely carried out, generally without any negative consequences occurring, may tend to be dismissed, identification of the combination of factors which may induce considerable risk increments may render various risky scenarios more readily recognizable and the information more relevant and acceptable.

Furthermore, analysis of the attribution processes and tendencies of accident-involved drivers, especially those who exhibit relatively asocial tendencies, such as frequently ignoring traffic laws, and who tend to be dismissive of risk, may facilitate the development of effective intervention strategies which could interrupt recidivist cycles relating to reduced control within the driving situation due to any combination of inappropriate speed, alcohol-impairment, reduced state of arousal, or a heightened emotional state.

The practical implications of a tendency to attribute responsibility for accidents either to others or to external factors in general, particularly where a considerable degree of culpability appears to have been established, would seem to suggest a lost opportunity for learning by experience. The consequences of failure to use such experiences in a constructive way appear to be threefold. Firstly, if we tend to consider ourselves minimally or not at all responsible for the negative consequences of events for which we were in no small measure actually responsible, but are inclined to assume that others are "to blame", this may be likely to both induce and reflect a negative attitude to others. At least some degree of anger and frustration would appear to be an almost inevitable result, with obvious implications for subsequent social interaction (Kelley, 1972; Knapper & Cropley, 1980).

Secondly, the assumption that "others" are usually at fault, together with the negative feelings which this will probably arouse, are not likely to encourage a critical appraisal of one's own driving skills, or the degree to which interaction with other road users is constructive or considerate. Thus a climate may well be created which not only fosters ill-feeling, but also a driving style which lacks safety, consideration and skilled control.

Thirdly, the degree to which road safety initiatives may be applauded by the majority of drivers as applicable to others but irrelevant and unnecessary for themselves, has obvious implications for the potential effectiveness of such programmes. If such a generalised, albeit even very moderate, attributional tendency does exist, as the initial evidence seems to suggest, it would seem appropriate to tackle this problem in conjunction with other driver-oriented road safety initiatives, in order to render them more effective.

The objective of increasing drivers' awareness of the implications of their attitudes would seem to be challenging, rather than daunting, considering their implicit interest in accident avoidance and thus journey completion. Where insight into accident causation and the impartial apportioning of responsibility is strongly resisted, this may well be indicative of problems of a more complex nature, of greater intensity, and/or more firmly entrenched than those relating to widely held or communal attributional styles.

However, in general, any tendency of drivers to misattribute responsibility should be amenable to constructive change. The potential benefits of reducing anger and hostility on the roads and facilitating active accident prevention, suggest that the possibility of attaining such an objective is worth exploring.

IMPLICATIONS FOR FUTURE RESEARCH

Very few studies seem to have examined the way in which drivers attribute responsibility for accidents in which they have been involved, with the notable exception of a fairly small (n=100), but well designed and useful study by Preston & Harris (1965). However, such attributions seem, potentially, to allow insight into drivers' awareness of contribution to accident causation, the possibility of avoiding accidents, as well as perceived relevance of information designed to prevent accidents. Therefore, it seems worthwhile evaluating drivers' attributions for differential patterns of response in relation to age, sex, driving experience (duration, intensity), accident experience (frequency, recency) and consequences.

A tendency to attribute more responsibility to other drivers than to the self for accidents, suggested by the current study, may be due to information processing deficits, as the strong association between culpability and a relatively low level of awareness would seem to support, or defensive attribution, or most likely some combination of both (Hewstone, 1989). Such issues could be usefully explored and the findings applied in the design of accident prevention strategies. A comprehensive examination of the influence of consequences, varying in degree from minor damage only to serious injury (excluding fatal accidents for ethical reasons) would help to clarify this issue. Similarly, examination of attributional tendencies in relation to single or multiple vehicle accidents, and in relation to the relative contribution of potential causes, while controlling for road and weather conditions, and mechanical failure, may allow further insight into the cognitive and emotional processes involved in accident analyses.

The degree to which drivers appear to make realistic appraisals of their own and others' roles in accident occurrence could be further explored within longitudinal studies to establish the relative influence of such appraisals, the potential for increasing driver awareness, thus helping to prevent further accident involvement, while perhaps improving the quality of driver interaction.

Similarly, the predictive value of factors which appear to be associated with culpable accident involvement could be usefully explored with a view to increasing drivers' awareness of the risks to which they may be exposing themselves and others. Considering the potential to distinguish culpable and non-culpable drivers in a manner which seems to be relevant in terms of accident susceptibility, which the current study suggests is a viable prospect, the possibility seems to arise of applying such insight to identification of drivers who may be at risk, even prior to accident involvement, particularly during the stage of novice driver, to implement constructive, preventative measures which may enable them to avoid accident involvement.

Future research could also:
a) examine the attributions of habitual traffic offenders i.e. to ascertain what they consider does constitute risk and what has contributed to their accidents if not their own safety compromise;
b) conduct longitudinal studies examining tendencies/changes over time/age/experiential level in cognitive/emotional changes which accompany any significant increase or decrease in risky behaviour or serious consequences;
c) ascertain the influence of coping strategies in accidents in general i.e. traffic, work, home - examine the potential for the preventative role - public health emphasis.
d) clarify the role of confidence in accidents. Prospective studies could ascertain whether lower confidence induces or results from subjectively culpable accident involvement. The association of confidence with violations could also be examined in relation to accident history, number of accidents (controlling for exposure) and "objective" culpability estimates.

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*                                                           *
*    R O A D   S A F E T Y   Q U E S T I O N N A I R E      *
*                                                           *
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DEAR DRIVER

We need YOUR HELP to develop the most effective means of making our roads safer for all road users. This survey is concerned with the prevention of road traffic accidents and requires the frank and honest response of a cross-section of ALL drivers on Britain's roads. It is being carried out, in both Australia and Britain, on behalf of Cranfield Institute of Technology, Bedford, England.

Your opinions and observations, whatever your level of experience as a driver, can be of considerable help to road safety research, so please complete the questionnaire and do say EXACTLY what you think. **YOUR ANONYMITY IS GUARANTEED AS YOUR NAME AND ADDRESS ARE NOT REQUIRED WHEN YOU RESPOND. ALL INFORMATION RECEIVED WILL BE TREATED AS STRICTLY CONFIDENTIAL AND USED FOR RESEARCH PURPOSES ONLY.**

This questionnaire should take not more than about 20-30 minutes of your time to complete.

THANK YOU FOR YOUR HELP AND CO-OPERATION

*Please complete and return this questionnaire AS SOON AS POSSIBLE in the FREEPOST envelope provided.

Road Safety Research
Applied Psychology Unit
Cranfield Inst. of Technology
BEDFORD MK43 0AL
Tel: (0234) 750111

SECTION A

PLEASE LEAVE BLANK

Firstly, a few questions about yourself, your vehicle, and your driving in general.

Please complete ALL the following details and TICK the relevant boxes.

1) Age: . . . . Years

2) Sex: MALE [ ] FEMALE [ ]

3) Marital status: MARRIED/COHABITING [ ] SINGLE [ ]

SEPARATED/DIVORCED [ ] WIDOWED [ ]

4) Occupation: . . . .

5) Is driving an **ESSENTIAL** part of your work? ....

How many hours per week driving does this involve, on average, <u>EXCLUDING</u> TRAVEL TO AND FROM WORK?

.... HOURS

6) What type of vehicle or vehicles do you usually drive e.g. car, transit van, HGV etc? Please specify.

. . . .

7) (a) What make and model is the vehicle you currently/usually drive e.g. Ford Escort, VW Beetle etc.?

. . . .

(b) How would you describe this vehicle? Please tick the MOST RELEVANT box below.

Small car	[ ]	High-powered car (e.g. turbo)	[ ]
Medium-sized car	[ ]	Other (please specify)	[ ]
Large car	[ ]		

8) What is its engine capacity e.g. 1100cc, 2500cc etc?

. cc

9) What is the approximate year of manufacture? . . . .

10) (a) Do you usually live in a town, country, or suburban area? Please circle as appropriate:

TOWN/ COUNTRY/ SUBURB/ OTHER Please specify . . . .

(b) What is your nearest postal town? . . . .

PLEASE LEAVE BLANK

11) How many years have you been driving regularly?

. . . . YEARS

12) How many attempts did you make to get your driving licence?

. . . .

13) Do you have any other driving qualifications? YES [ ] NO [ ]

If YES please specify . . . .

14) How many trips do you usually make per week with yourself as driver? (e.g. Home to work, and Work to home count as TWO trips).

. . . . TRIPS WEEKLY

15) How many miles do you usually drive per week?

. . . . MILES WEEKLY

16) How many endorsements do you have currently on your licence?

. . . . ENDORSEMENTS

17) How many driving convictions (excluding parking) have you ever had?

. . . .

18) What were they for? e.g. drunk driving, speeding etc. Please list:

____

____

____

____

____

SECTION B

PLEASE LEAVE BLANK

Please TICK the ONE BOX ONLY on EACH SCALE below which you consider best applies to you.

I find that driving tends to make me feel:

MORE ANGRY	☐	☐	☐	☐	☐	LESS ANGRY	☐
MORE TENSE	☐	☐	☐	☐	☐	LESS TENSE	☐
MORE FRUSTRATED	☐	☐	☐	☐	☐	LESS FRUSTRATED	☐
MORE CONFIDENT	☐	☐	☐	☐	☐	LESS CONFIDENT	☐
MORE TIRED	☐	☐	☐	☐	☐	LESS TIRED	☐
MORE RELAXED	☐	☐	☐	☐	☐	LESS RELAXED	☐
MORE ALERT	☐	☐	☐	☐	☐	LESS ALERT	☐
MORE IMPATIENT	☐	☐	☐	☐	☐	LESS IMPATIENT	☐
MORE IN CONTROL	☐	☐	☐	☐	☐	LESS IN CONTROL	☐
MORE EXHILARATED	☐	☐	☐	☐	☐	LESS EXHILARATED	☐
MORE EXCITED	☐	☐	☐	☐	☐	LESS EXCITED	☐
MORE STRESSED	☐	☐	☐	☐	☐	LESS STRESSED	☐
MORE IRRITATED	☐	☐	☐	☐	☐	LESS IRRITATED	☐
MORE FEARFUL	☐	☐	☐	☐	☐	LESS FEARFUL	☐
MORE FREE	☐	☐	☐	☐	☐	LESS FREE	☐
MORE INTIMIDATED	☐	☐	☐	☐	☐	LESS INTIMIDATED	☐
MORE UPSET	☐	☐	☐	☐	☐	LESS UPSET	☐

SECTION C

PLEASE LEAVE BLANK

This section is concerned with your personal accident history.

1) Have you been involved in any accidents while driving which have resulted in damage amounting to £150 or more and/or any injury?

YES ..... NO ..... (Please tick whichever is applicable)
If NO go to QUESTION 1, SECTION D.

2) If **YES How many** accidents (as defined above) have you been involved in?

Please specify. . . . .

If you have been involved in **ONE** accident only, while driving, please give details as requested below for ACCIDENT 1, and mark ACCIDENT 2 N/A (NOT APPLICABLE).

3) Please write below the **YEAR** of your **TWO MOST RECENT** accidents (as defined above).

(a) ACCIDENT 1 ....

(b) ACCIDENT 2 ....

4) What **SITES** were involved in your accident(s) e.g. roundabout, junction, motorway, city street etc.?

(a) ACCIDENT 1 - site: ....
(i) Were you injured? YES [ ] NO [ ]
(ii) Was anyone else injured? YES [ ] NO [ ]

(b) ACCIDENT 2 - site: ....
(i) Were you injured? YES [ ] NO [ ]
(ii) Was anyone else injured? YES [ ] NO [ ]

5) Please indicate on the scales below the degree to which you consider each of the following factors influenced ACCIDENT 1.
PLEASE TICK ONE BOX ONLY ON EVERY SCALE BELOW

A C C I D E N T 1

(a) **MYSELF (my own driving)**

Totally	Considerably	Moderately	Minimally	Not at all
☐	☐	☐	☐	☐

(b) **OTHER DRIVER (OR DRIVERS)**

Totally	Considerably	Moderately	Minimally	Not at all
☐	☐	☐	☐	☐

☐ Not applicable (i.e. there were NO OTHER DRIVERS INVOLVED)

PLEASE LEAVE BLANK

(c) **OTHER (NON-DRIVING) ROAD USER** e.g. pedestrian, cyclist, motorcyclist.

Totally	Considerably	Moderately	Minimally	Not at all
☐	☐	☐	☐	☐

☐ Not applicable (i.e. there were NO OTHER {NON-DRIVING} ROAD USERS INVOLVED)

(d) **ROAD CONDITIONS**

Totally	Considerably	Moderately	Minimally	Not at all
☐	☐	☐	☐	☐

(e) **WEATHER CONDITIONS**

Totally	Considerably	Moderately	Minimally	Not at all
☐	☐	☐	☐	☐

(f) **MECHANICAL PROBLEMS**

Totally	Considerably	Moderately	Minimally	Not at all
☐	☐	☐	☐	☐

(g) **OTHER (PLEASE SPECIFY)** . . . .

Totally	Considerably	Moderately	Minimally	Not at all
☐	☐	☐	☐	☐

6) Is there anything you consider that **YOU** could have done to prevent **ACCIDENT** 1 from occurring?

(a) YES ..... NO .....
(b) If YES please specify.

____

____

7) Is there anything you consider that any **OTHER ROAD USER (INCLUDING OTHER DRIVER OR DRIVERS)** could have done to prevent **ACCIDENT** 1 from occurring?

(a) YES ..... NO .....
(b) If YES please specify.

____

____

IF YOU HAVE BEEN INVOLVED IN <u>ONE ACCIDENT ONLY</u> PLEASE GO NOW TO Q11

8) Please indicate on the scales below the degree to which you consider each of the following factors influenced ACCIDENT 2. **PLEASE TICK ONE BOX ONLY ON EVERY SCALE BELOW**

PLEASE LEAVE BLANK

A C C I D E N T 2

(a) **MYSELF (my own driving)**

Totally	Considerably	Moderately	Minimally	Not at all	
☐	☐	☐	☐	☐	☐

(b) **OTHER DRIVER (OR DRIVERS)**

Totally	Considerably	Moderately	Minimally	Not at all	
☐	☐	☐	☐	☐	☐

☐ Not applicable (i.e. there were NO OTHER DRIVERS INVOLVED)

(c) **OTHER (NON-DRIVING) ROAD USER** e.g. pedestrian, cyclist, motorcyclist.

Totally	Considerably	Moderately	Minimally	Not at all	
☐	☐	☐	☐	☐	☐

☐ Not applicable (i.e. there were NO OTHER {NON-DRIVING} ROAD USERS INVOLVED)

(d) **ROAD CONDITIONS**

Totally	Considerably	Moderately	Minimally	Not at all	
☐	☐	☐	☐	☐	☐

(e) **WEATHER CONDITIONS**

Totally	Considerably	Moderately	Minimally	Not at all	
☐	☐	☐	☐	☐	☐

(f) **MECHANICAL PROBLEMS**

Totally	Considerably	Moderately	Minimally	Not at all	
☐	☐	☐	☐	☐	☐

(g) **OTHER (PLEASE SPECIFY)** . . . .

Totally	Considerably	Moderately	Minimally	Not at all	
☐	☐	☐	☐	☐	☐

PLEASE LEAVE BLANK

9) Is there anything you consider that **YOU** could have done to prevent **ACCIDENT 2** from occurring?

(a) YES ..... NO .....
(b) If **YES** please specify.

10) Is there anything you consider that any **OTHER ROAD USER (INCLUDING OTHER DRIVER OR DRIVERS)** could have done to prevent **ACCIDENT 2** from occurring?

(a) YES ..... NO .....
(b) If **YES** please specify.

11) What, in your opinion, would be the most effective way of preventing similar accidents from occurring in the future? Please specify.

<u>PREVENTATIVE MEASURES</u>:

<u>FOR ACCIDENTS SIMILAR TO ACCIDENT 1</u>

<u>FOR ACCIDENTS SIMILAR TO ACCIDENT 2</u>

PLEASE LEAVE BLANK

SECTION D

The following section is about accidents in Britain, in general.

1) What do you consider the major causes of road traffic accidents in this country to be? Please indicate **BY TICKING ONE BOX ONLY** on **EACH OF THE SCALES** below, the degree of importance the following factors have for accident causation in your opinion.

(a) **FAILURE TO GIVE WAY**

Very high in importance	High	Moderate	Low	Very low in importance	
☐	☐	☐	☐	☐	☐

(b) **FATIGUE**

Very high in importance	High	Moderate	Low	Very low in importance	
☐	☐	☐	☐	☐	☐

(c) **INTOXICATION (ALCOHOL)**

Very high in importance	High	Moderate	Low	Very low in importance	
☐	☐	☐	☐	☐	☐

(d) **CYCLIST/MOTORCYCLIST ERROR**

Very high in importance	High	Moderate	Low	Very low in importance	
☐	☐	☐	☐	☐	☐

(e) **IMPROPER OVERTAKING**

Very high in importance	High	Moderate	Low	Very low in importance	
☐	☐	☐	☐	☐	☐

(f) **CLOSE FOLLOWING**

Very high in importance	High	Moderate	Low	Very low in importance	
☐	☐	☐	☐	☐	☐

(g) **PEDESTRIAN AT FAULT**

Very high in importance	High	Moderate	Low	Very low in importance	
☐	☐	☐	☐	☐	☐

(h) **LACK OF CONSIDERATION**

Very high in importance	High	Moderate	Low	Very low in importance	
☐	☐	☐	☐	☐	☐

PLEASE LEAVE BLANK

(i) **EXCESS SPEED**

Very high in importance	High	Moderate	Low	Very low in importance	
☐	☐	☐	☐	☐	☐

(j) **MECHANICAL FAILURE**

Very high in importance	High	Moderate	Low	Very low in importance	
☐	☐	☐	☐	☐	☐

(k) **ROAD CONDITIONS**

Very high in importance	High	Moderate	Low	Very low in importance	
☐	☐	☐	☐	☐	☐

(l) **LACK OF ANTICIPATION**

Very high in importance	High	Moderate	Low	Very low in importance	
☐	☐	☐	☐	☐	☐

(m) **AGGRESSIVE DRIVING**

Very high in importance	High	Moderate	Low	Very low in importance	
☐	☐	☐	☐	☐	☐

(n) **DRIVING WHILE UNDER STRESS**

Very high in importance	High	Moderate	Low	Very low in importance	
☐	☐	☐	☐	☐	☐

(o) **WEATHER CONDITIONS**

Very high in importance	High	Moderate	Low	Very low in importance	
☐	☐	☐	☐	☐	☐

(p) **LACK OF ATTENTION**

Very high in importance	High	Moderate	Low	Very low in importance	
☐	☐	☐	☐	☐	☐

(q) **OTHER (PLEASE SPECIFY)** . . . .

Very high in importance	High	Moderate	Low	Very low in importance	
☐	☐	☐	☐	☐	☐

SECTION E

PLEASE LEAVE BLANK

1) Please tick **ONE BOX ONLY** on **EVERY SCALE** below to indicate the point on each scale which you feel best describes **YOUR** driving style.

AGGRESSIVE	☐	☐	☐	☐	☐	DEFENSIVE	☐
ANTICIPATING	☐	☐	☐	☐	☐	NON-ANTICIPATING	☐
ATTENTIVE	☐	☐	☐	☐	☐	INATTENTIVE	☐
CAREFUL	☐	☐	☐	☐	☐	CARELESS	☐
COURTEOUS	☐	☐	☐	☐	☐	IMPOLITE	☐
DECISIVE	☐	☐	☐	☐	☐	INDECISIVE	☐
EXPERIENCED	☐	☐	☐	☐	☐	INEXPERIENCED	☐
INSISTENT	☐	☐	☐	☐	☐	YIELDING	☐
IRRITABLE	☐	☐	☐	☐	☐	PLACID	☐
LAX	☐	☐	☐	☐	☐	PRECISE	☐
NERVOUS	☐	☐	☐	☐	☐	CONFIDENT	☐
PATIENT	☐	☐	☐	☐	☐	IMPATIENT	☐
RECKLESS	☐	☐	☐	☐	☐	CAUTIOUS	☐
RESPONSIBLE	☐	☐	☐	☐	☐	IRRESPONSIBLE	☐
SAFE	☐	☐	☐	☐	☐	RISKY	☐
SELFISH	☐	☐	☐	☐	☐	CONSIDERATE	☐
SLOW	☐	☐	☐	☐	☐	FAST	☐
TOLERANT	☐	☐	☐	☐	☐	INTOLERANT	☐

PLEASE LEAVE BLANK

2) Please tick **ONE BOX ONLY** on **EVERY SCALE** below to indicate the point on each scale which you feel best describes **THE DANGEROUS DRIVER**'s driving style.

AGGRESSIVE	☐	☐	☐	☐	☐	DEFENSIVE	☐
ANTICIPATING	☐	☐	☐	☐	☐	NON-ANTICIPATING	☐
ATTENTIVE	☐	☐	☐	☐	☐	INATTENTIVE	☐
CAREFUL	☐	☐	☐	☐	☐	CARELESS	☐
COURTEOUS	☐	☐	☐	☐	☐	IMPOLITE	☐
DECISIVE	☐	☐	☐	☐	☐	INDECISIVE	☐
EXPERIENCED	☐	☐	☐	☐	☐	INEXPERIENCED	☐
INSISTENT	☐	☐	☐	☐	☐	YIELDING	☐
IRRITABLE	☐	☐	☐	☐	☐	PLACID	☐
LAX	☐	☐	☐	☐	☐	PRECISE	☐
NERVOUS	☐	☐	☐	☐	☐	CONFIDENT	☐
PATIENT	☐	☐	☐	☐	☐	IMPATIENT	☐
RECKLESS	☐	☐	☐	☐	☐	CAUTIOUS	☐
RESPONSIBLE	☐	☐	☐	☐	☐	IRRESPONSIBLE	☐
SAFE	☐	☐	☐	☐	☐	RISKY	☐
SELFISH	☐	☐	☐	☐	☐	CONSIDERATE	☐
SLOW	☐	☐	☐	☐	☐	FAST	☐
TOLERANT	☐	☐	☐	☐	☐	INTOLERANT	☐

3) For **ALL OF THE QUESTIONS BELOW**, please **CIRCLE** whichever **ONE** of the five responses offered **BEST APPLIES TO YOU:**

PLEASE LEAVE BLANK

I drive slower than the traffic flow to keep within the legal speed limits.

ALWAYS USUALLY SOMETIMES RARELY NEVER ☐

I find that cyclists and motorcyclists seem to appear from nowhere on the road.

ALWAYS USUALLY SOMETIMES RARELY NEVER ☐

I expect that most other drivers will drive well.

ALWAYS USUALLY SOMETIMES RARELY NEVER ☐

I find myself taking corners too fast to be fully in control.

ALWAYS USUALLY SOMETIMES RARELY NEVER ☐

I find myself having to cope with slow and incompetent drivers.

ALWAYS USUALLY SOMETIMES RARELY NEVER ☐

I find that I am overtaken by other cars with similar engine capacity to my own.

ALWAYS USUALLY SOMETIMES RARELY NEVER ☐

I find that I can anticipate what other road users will do.

ALWAYS USUALLY SOMETIMES RARELY NEVER ☐

I find other drivers who blast their horns at me very irritating.

ALWAYS USUALLY SOMETIMES RARELY NEVER ☐

I think that I am too cautious in busy traffic.

ALWAYS USUALLY SOMETIMES RARELY NEVER ☐

On social occasions I drink less than I would normally, or not at all, if I intend to drive.

ALWAYS USUALLY SOMETIMES RARELY NEVER ☐

I consider my driving to be

EXCELLENT ABOVE AVERAGE AVERAGE BELOW AVERAGE POOR ☐

PLEASE LEAVE BLANK

I find that pedestrians behave unpredictably on the roads.

ALWAYS	USUALLY	SOMETIMES	RARELY	NEVER

Where skill and fast reactions are required, I find that I can overtake safely.

ALWAYS	USUALLY	SOMETIMES	RARELY	NEVER

When I am angry or upset, I find a short, fast drive makes me feel more relaxed.

ALWAYS	USUALLY	SOMETIMES	RARELY	NEVER

I tend to drive more carefully when I have passengers than when I am alone.

ALWAYS	USUALLY	SOMETIMES	RARELY	NEVER

How often in the last 12 months would you say that you have driven when you thought that you might be over the legal alcohol limit.

NEVER	ONCE OR TWICE	3 TO 5 TIMES	6 TO 10 TIMES	ABOUT ONCE A MONTH	ABOUT ONCE A WEEK	MORE OFTEN

I find rush hour traffic very frustrating.

ALWAYS	USUALLY	SOMETIMES	RARELY	NEVER

I find long, fast trips on the motorway enjoyable.

ALWAYS	USUALLY	SOMETIMES	RARELY	NEVER

I feel that the problems I encounter while driving are beyond my control.

ALWAYS	USUALLY	SOMETIMES	RARELY	NEVER

"Sunday drivers" seem to get in the way, particularly when I have an urgent trip to make.

ALWAYS	USUALLY	SOMETIMES	RARELY	NEVER

I can anticipate hazards on the road.

ALWAYS	USUALLY	SOMETIMES	RARELY	NEVER

PLEASE LEAVE BLANK

My driving skills and judgement are at least equal to that of most people in my own age group.

ALWAYS   USUALLY   SOMETIMES   RARELY   NEVER

I try to prevent other drivers from taking advantage when I have right of way.

ALWAYS   USUALLY   SOMETIMES   RARELY   NEVER

I feel that I am at the mercy of other people's driving style when I am out driving.

ALWAYS   USUALLY   SOMETIMES   RARELY   NEVER

I tend to drive faster than most of my friends.

ALWAYS   USUALLY   SOMETIMES   RARELY   NEVER

I get very angry with other drivers who interfere with my driving because of their own poor anticipation.

ALWAYS   USUALLY   SOMETIMES   RARELY   NEVER

I find that I can drive better after one or two drinks

STRONGLY AGREE   AGREE   NEITHER AGREE NOR DISAGREE   DISAGREE   STRONGLY DISAGREE

* * *   * * *   * * *   * * *

AND FINALLY

Is there anything of importance that **YOU** feel may contribute to road traffic accidents which has not been included in this questionnaire. (Please feel free to continue on the back of this sheet if necessary.)

____

____

____

____

____

Your answers are of considerable importance for this study. Please check that **ALL** questions have been answered **FULLY** before returning the questionnaire in the **FREEPOST ENVELOPE** provided.

THANK YOU VERY MUCH FOR YOUR TIME AND CO-OPERATION

If you have any questions about this study please feel free to contact:
Diane Clay, Applied Psychology Unit, Cranfield Inst of Tech BEDFORD MK43 0AL
Tel: (0234) 750111

ROADS CORPORATION

DRIVER LICENSING
P.O. BOX 777
CARLTON SOUTH 3053

Telephone: 345 4034

Dear Driver

I have enclosed a questionnaire from the Cranfield Institute of Technology asking for your assistance in researching the driving experiences of drivers.

Your name was selected by the Corporation at random from the Corporation's driver licence records.

The Cranfield Institute was not involved in this process, has not been given your name and is therefore not aware in anyway that you have been sent this letter.

Your participation in this programme is entirely voluntary and would be most useful to the Cranfield Institute. Would you please return the questionnaire to the Corporation in the post-free envelope.

You are assured that your licence records remain confidential to the Authority.

Yours sincerely

T. O'Keefe
MANAGER - DRIVER LICENSING

Roads Corporation
P.O. Box 777
Carlton South, VICTORIA 3053

TEL.: (03) 345 6922

Applied Psychology Unit
College of Aeronautics
Cranfield Institute of Technology
Cranfield Bedford MK43 0AL England
Telephone Bedford (0234) 750111
Telex 825072 CITECH G
Fax 0234 750192

Cranfield

Dear Sir/Madam

RE: ROAD SAFETY SURVEY

Recently I sent you a questionnaire concerning your opinions on driving and road accident prevention as part of the Applied Psychology Unit's road safety research programme. Many people have already returned their questionnaires, yielding a lot of useful information. If you are one of these people please ignore this reminder and may I take this opportunity to thank you for your help.

If you have not yet completed the questionnaire it would be greatly appreciated if you would do so as soon as possible. Currently the response rate from the survey of drivers on British roads is smaller than that from the Australian one, so we need more replies to give a truly representative picture of driver opinion in this country. If you have mislaid your copy of the questionnaire please do not hesitate to contact me, and I will be happy to send you another one.

I look forward to hearing from you.

Yours sincerely

Diane Clay

Diane Clay
Road Safety Research
Applied Psychology Unit

Tel: (0234) 750111
ext. 2228 or 2229

401e

1840-1990

15

BEDFORDSHIRE POLICE

EIIR

150 YEARS OF PUBLIC SERVICE

BEDFORDSHIRE POLICE

ROAD TRAFFIC DEPARTMENT, HALSEY ROAD, KEMPSTON, BEDS, MK42 8AX.
TELEPHONE: (0234) 841212.

Dear Sir/Madam,

Ms Clay of Cranfield Institute of Technology is currently conducting detailed research into road accidents in Britain and Australia over a period of three years.

Accidents are a matter of concern to us all, and as you were involved in an accident during the study period I am writing to you to seek your assistance in the research programme.

Ms. Clay has prepared a questionnaire which you are asked to complete. I should, however, point out that you are, of course, under no obligation to do so, but if you are willing to assist in the study, anonymity is guaranteed as the questionnaire contains no identifying marks on it.

The questionnaire should take about 20-30 minutes to complete and will, hopefully, provide information of considerable value for accident prevention. The main areas of interest to the researchers are:

(a) your personal opinions and observations as a driver of the driving environment, other road users, and your own knowledge and skills;

(b) your exposure to risk in terms of your usage of the road;

(c) details of what occurred during your own accident involvement;

(d) your opinions on accident prevention.

There is one further point I should emphasise. If you complete the questionnaire, the information contained in it is solely for the use of the researchers, and should be sent direct to Ms. Clay at Cranfield, who will treat it as totally confidential. Whatever you say, therefore, in the questionnaire cannot influence our decision about any possible Court action arising from the accident, or affect the information that we normally supply to interested parties in respect of possible civil claims.

If you decide to complete the questionnaire, and thereby assist in this extremely worthwhile accident research project, <u>please use the enclosed FREEPOST envelope and forward it direct to Ms. Clay</u>.

Yours faithfully,

<u>Superintendent</u>

Form 401e

1840-1990
150 YEARS OF PUBLIC SERVICE

BEDFORDSHIRE POLICE

ROAD TRAFFIC DEPARTMENT, HALSEY ROAD, KEMPSTON, BEDS, MK42 8AX.
TELEPHONE: (0234) 841212.

Dear Sir/Madam,

Re: ROAD SAFETY SURVEY

Recently I sent you a questionnaire concerning your opinions on driving and road accident prevention as part of the Applied Psychology Unit's road safety research programme. Many people have already returned their questionnaires, yielding a lot of useful information. If you are one of these people please ignore this reminder and may I take this opportunity to thank you for your help.

If you have not yet completed the questionnaire it would be greatly appreciated if you would do so as soon as possible.

As I emphasised in my earlier letter, all survey returns to Ms. Clay are totally anonymous and the work being done is most worthwhile and dependent upon your assistance.

Yours Faithfully,

Superintendent

Warwickshire Constabulary

Peter D. Joslin QPM BA CBIM
Chief Constable

Chief Constable's Office

PO Box 4 Leek Wootton
WARWICK
CV35 7QB

Telephone Warwick (0926) 415000
Telex 31548 (POWARK)
Fax Warwick (0926) 415188

All communications should be addressed to: 'The Chief Constable'

our reference

your reference

date

Dear Sir/Madam

ROAD SAFETY SURVEY

Recently I sent you a questionnaire concerning your opinions on driving and road accident prevention as part of the Applied Psychology Unit's road safety research programme. Many people have already returned their questionnaires, yielding a lot of useful information. If you are one of these people please ignore this reminder and may I take this opportunity to thank you for your help.

If you have not yet completed the questionnaire it would be greatly appreciated if you would do so as soon as possible.

As I emphasised in my earlier letter, all survey returns to Ms Clay are totally anonymous and the work being done is most worthwhile and dependent upon your assistance.

Yours faithfully

Martin B. Richards

INSPECTOR MARTIN RICHARDS
Information Services

The person dealing with this correspondence is:

extension:

APPENDIX C(1): FREQUENCIES - EMOTIONAL/AROUSAL RESPONSE TO DRIVING

The rating percentages were obtained for each of the factors below on a 1-5 scale, according to the degree to which the feelings tended to increase or decrease when driving with 3 as the neutral point; the approach towards 1 indicating reduction in e.g. anger; and the approach towards 5 indicating an increase.

	1 %	2 %	3 %	4 %	5 %
ANGRY	22.5	18.0	48.1	9.1	2.3
TENSE	17.8	18.1	36.4	22.6	5.1
FRUSTRATED	17.6	16.4	40.1	20.6	5.3
CONFIDENT	1.9	4.3	43.2	28.6	22.1
TIRED	11.6	11.2	41.3	27.1	8.7
RELAXED	6.7	24.9	40.7	14.8	12.8
ALERT	0.8	3.2	23.7	34.9	37.4
IMPATIENT	12.5	14.9	40.8	24.4	7.5
IN CONTROL	0.9	2.8	37.0	30.5	28.8
EXHILARATED	6.7	11.6	52.4	17.7	11.7
EXCITED	12.0	13.0	55.7	12.8	6.6
STRESSED	15.2	15.6	38.1	24.6	6.5
IRRITATED	13.8	15.7	42.4	22.1	6.0
FEARFUL	20.6	16.2	46.2	11.9	5.1
FREE	3.8	4.7	28.9	25.7	36.9
INTIMIDATED	24.8	17.2	48.4	6.9	2.7
UPSET	28.2	14.9	49.9	5.0	2.0

APPENDIX C(2): FREQUENCIES - DRIVERS' PERCEPTIONS OF SELF AND THE "DANGEROUS DRIVER"

The two sets of results below, (and continued on the following page) self-ratings, and those for the "dangerous driver", were combined to facilitate comparison. They were rated on 5-point Likert-type scales according to sets of polar opposites e.g. 5=AGGRESSIVE + ; 4=AGGRESSIVE; 3=NEUTRAL POINT; 2=DEFENSIVE; 1=DEFENSIVE + .

	5 %	4 %	3 %	2 %	1 %
AGGRESSIVE/DEFENSIVE					
SELF	2.1	11.0	43.8	25.1	18.0
"DANGEROUS" DRIVER	78.8	13.9	3.4	1.5	2.3
ANTICIPATING/NON-ANTICIPATING					
SELF	39.5	40.6	15.6	3.2	1.1
"DANGEROUS" DRIVER	2.2	3.3	5.9	21.9	66.7
ATTENTIVE/INATTENTIVE					
SELF	35.5	44.0	17.3	2.5	0.6
"DANGEROUS" DRIVER	1.7	2.6	9.3	24.3	62.1
CAREFUL/CARELESS					
SELF	37.4	41.2	18.7	2.5	0.1
"DANGEROUS" DRIVER	0.6	0.6	4.9	22.4	71.5
COURTEOUS/IMPOLITE					
SELF	33.0	40.1	22.8	3.5	0.6
"DANGEROUS" DRIVER	0.4	0.9	9.7	22.2	66.7
DECISIVE/INDECISIVE					
SELF	33.0	37.7	24.9	3.5	0.9
"DANGEROUS" DRIVER	10.1	7.4	14.6	18.6	49.2
EXPERIENCED-INEXPERIENCED					
SELF	40.4	32.8	21.2	4.1	1.5
"DANGEROUS" DRIVER	4.7	6.4	31.3	17.0	40.6
INSISTENT/YIELDING					
SELF	3.9	11.3	50.5	23.3	11.1
"DANGEROUS" DRIVER	52.3	22.4	16.7	4.5	4.1
IRRITABLE/PLACID					
SELF	2.0	9.4	36.5	32.2	19.9
"DANGEROUS" DRIVER	61.7	25.2	11.0	0.9	1.2
LAX/PRECISE					
SELF	0.6	3.0	24.7	44.3	27.4
"DANGEROUS" DRIVER	50.0	24.5	18.7	3.9	2.9

APPENDIX C(2) contd.

The following were rated on 5-point Likert-type scales, according to sets of polar opposites e.g. 5= NERVOUS + ; 4=NERVOUS; 3=NEUTRAL POINT; 2=CONFIDENT; 1=CONFIDENT + .

	5 %	4 %	3 %	2 %	1 %
NERVOUS/CONFIDENT					
SELF	1.2	4.2	15.9	34.1	44.6
"DANGEROUS" DRIVER	30.0	11.6	20.8	9.0	28.6
PATIENT/IMPATIENT					
SELF	24.8	30.6	27.6	12.6	4.4
"DANGEROUS" DRIVER	0.6	0.8	4.0	16.4	78.2
RECKLESS/CAUTIOUS					
SELF	0.2	1.7	22.1	40.5	35.4
"DANGEROUS" DRIVER	78.2	15.9	3.7	0.7	1.5
RESPONSIBLE/ IRRESPONSIBLE					
SELF	47.4	38.3	12.4	1.6	0.3
"DANGEROUS" DRIVER	0.9	0.7	3.9	19.7	74.8
SAFE/RISKY					
SELF	42.6	41.7	13.6	1.8	0.4
"DANGEROUS" DRIVER	0.7	0.4	3.9	17.9	77.0
SELFISH/CONSIDERATE					
SELF	0.5	3.8	21.3	40.2	34.2
"DANGEROUS" DRIVER	72.0	20.8	5.2	0.8	1.2
SLOW/FAST					
SELF	4.0	6.0	47.6	32.2	10.2
"DANGEROUS" DRIVER	6.3	3.4	19.7	11.1	59.4
TOLERANT/INTOLERANT					
SELF	24.0	33.9	30.8	9.9	1.3
"DANGEROUS" DRIVER	0.6	0.4	7.4	19.5	72.2

APPENDIX C(3): FREQUENCIES - ATTITUDINAL/BEHAVIOURAL TENDENCIES

All data below indicate percentage of driver sample making each specific response.

The following statements were rated according to the 5-point scales detailed below.

I drive slower than the traffic flow to keep within the legal speed limits

ALWAYS	USUALLY	SOMETIMES	RARELY	NEVER
%	%	%	%	%
4.0	31.1	34.1	25.0	5.8

I find that cyclists and motorcyclists seem to appear from nowhere on the road

ALWAYS	USUALLY	SOMETIMES	RARELY	NEVER
%	%	%	%	%
2.5	8.8	43.7	39.3	5.7

I expect that most other drivers will drive well

ALWAYS	USUALLY	SOMETIMES	RARELY	NEVER
%	%	%	%	%
1.1	42.1	25.6	23.0	8.2

I find myself taking corners too fast to be fully in control

ALWAYS	USUALLY	SOMETIMES	RARELY	NEVER
%	%	%	%	%
0.6	1.0	14.6	59.0	24.7

I find myself having to cope with slow and incompetent drivers

ALWAYS	USUALLY	SOMETIMES	RARELY	NEVER
%	%	%	%	%
3.3	14.3	67.5	14.4	0.5

I find that I am overtaken by other cars with similar engine capacity to my own

ALWAYS	USUALLY	SOMETIMES	RARELY	NEVER
%	%	%	%	%
2.7	17.1	59.0	19.2	2.0

I find that I can anticipate what other road users will do

ALWAYS	USUALLY	SOMETIMES	RARELY	NEVER
%	%	%	%	%
3.9	72.8	20.7	2.0	0.5

APPENDIX C(3) contd.

I find other drivers who blast their horns at me very irritating

ALWAYS	USUALLY	SOMETIMES	RARELY	NEVER
%	%	%	%	%
24.1	24.7	22.2	23.5	5.4

I think that I am too cautious in busy traffic

ALWAYS	USUALLY	SOMETIMES	RARELY	NEVER
%	%	%	%	%
2.6	8.8	31.8	42.2	14.7

On social occasions I drink less than I would normally, or not at all, if I intend to drive

ALWAYS	USUALLY	SOMETIMES	RARELY	NEVER
%	%	%	%	%
71.4	13.0	2.1	2.2	11.3

I consider my driving to be

EXCELLENT	ABOVE AVERAGE	AVERAGE	BELOW AVERAGE	POOR
%	%	%	%	%
3.6	46.9	48.7	0.7	0.1

I find that pedestrians behave unpredictably on the roads

ALWAYS	USUALLY	SOMETIMES	RARELY	NEVER
%	%	%	%	%
2.2	12.0	62.1	22.2	1.5

Where skill and fast reactions are required, I find that I can overtake safely

ALWAYS	USUALLY	SOMETIMES	RARELY	NEVER
%	%	%	%	%
17.8	56.7	16.1	7.3	2.1

When I am angry or upset, I find a short, fast drive makes me feel more relaxed

ALWAYS	USUALLY	SOMETIMES	RARELY	NEVER
%	%	%	%	%
2.7	7.2	12.1	27.0	51.0

I tend to drive more carefully when I have passengers than when I am alone

ALWAYS	USUALLY	SOMETIMES	RARELY	NEVER
%	%	%	%	%
24.8	35.4	15.8	12.0	12.0

APPENDIX C(3) contd.

How often in the last 12 months would you say that you have driven when you thought that you might be over the legal alcohol limit?

NEVER	ONCE OR TWICE	3 TO 5 TIMES	6 TO 10 TIMES	ABOUT ONCE A MONTH	ABOUT ONCE A WEEK	MORE OFTEN
%	%	%	%	%	%	%
78.6	15.6	3.3	1.0	0.6	0.7	0.1

I find rush hour traffic very frustrating

ALWAYS	USUALLY	SOMETIMES	RARELY	NEVER
%	%	%	%	%
18.8	25.8	37.7	14.1	3.6

I find long, fast trips on the motorway enjoyable

ALWAYS	USUALLY	SOMETIMES	RARELY	NEVER
%	%	%	%	%
6.8	23.5	23.1	28.9	17.6

I feel that the problems I encounter while driving are beyond my control

ALWAYS	USUALLY	SOMETIMES	RARELY	NEVER
%	%	%	%	%
4.0	20.5	25.3	32.0	18.3

"Sunday drivers" seem to get in the way, particularly when I have an urgent trip to make

ALWAYS	USUALLY	SOMETIMES	RARELY	NEVER
%	%	%	%	%
11.4	17.1	43.7	22.9	4.8

I can anticipate hazards on the road

ALWAYS	USUALLY	SOMETIMES	RARELY	NEVER
%	%	%	%	%
7.4	74.7	16.5	1.2	0.2

My driving skills and judgement are at least equal to that of most people in my own age group

ALWAYS	USUALLY	SOMETIMES	RARELY	NEVER
%	%	%	%	%
31.5	61.4	5.9	0.9	0.3

I try to prevent other drivers from taking advantage when I have right of way

ALWAYS	USUALLY	SOMETIMES	RARELY	NEVER
%	%	%	%	%
6.0	23.4	38.2	25.6	6.9

APPENDIX C(3) contd.

I feel that I am at the mercy of other people's driving style when I am out driving

ALWAYS	USUALLY	SOMETIMES	RARELY	NEVER
%	%	%	%	%
5.9	11.3	37.4	31.8	13.6

I tend to drive faster than most of my friends

ALWAYS	USUALLY	SOMETIMES	RARELY	NEVER
%	%	%	%	%
1.4	8.0	32.2	45.7	12.8

I get very angry with other drivers who interfere with my driving because of their own poor anticipation

ALWAYS	USUALLY	SOMETIMES	RARELY	NEVER
%	%	%	%	%
6.0	18.7	39.3	29.0	6.9

I find that I can drive better after one or two drinks

ALWAYS	USUALLY	SOMETIMES	RARELY	NEVER
%	%	%	%	%
0.5	0.8	8.0	17.6	73.2

APPENDIX C(4): FREQUENCIES - ATTRIBUTIONS FOR ROAD TRAFFIC ACCIDENTS IN BRITAIN

The table below summarizes attributions made by drivers of major causes of road traffic accidents in Britain on a scale of 1-5 according to degree of importance in the respondent's opinion.

1=Very low importance 2=Low 3=Moderate 4=High 5=Very high in in importance

	1 %	2 %	3 %	4 %	5 %
FAILURE TO GIVE WAY	0.8	6.9	32.8	38.1	21.5
FATIGUE	0.6	6.9	30.5	41.4	20.6
INTOXICATION (ALCOHOL)	0.2	4.3	17.7	26.3	51.4
CYCLIST/MOTORCYCLIST	3.6	20.8	42.4	25.0	08.1
IMPROPER OVERTAKING	0.1	3.0	16.8	45.1	35.0
CLOSE FOLLOWING	0.2	1.9	12.3	45.0	40.7
PEDESTRIAN AT FAULT	5.9	31.7	44.2	13.8	4.5
LACK OF CONSIDERATION	0.3	3.8	18.9	43.3	33.8
EXCESS SPEED	0.4	3.6	12.9	39.9	43.1
MECHANICAL FAILURE	9.5	41.5	36.3	9.1	3.6
ROAD CONDITIONS	1.1	9.5	35.0	37.5	16.8
LACK OF ANTICIPATION	0.4	2.9	24.7	49.2	22.8
AGGRESSIVE DRIVING	0.6	2.5	16.4	45.0	35.5
DRIVING WHILE UNDER STRESS	0.8	8.8	36.7	40.2	13.5
WEATHER CONDITIONS	0.9	6.9	32.9	39.4	19.9
LACK OF ATTENTION	0.2	1.5	18.1	51.8	28.4

APPENDIX D(1): SIGNIFICANCE AND PREDICTIVE VALUE OF CAUSAL ATTRIBUTIONS FOR ROAD ACCIDENTS

Combined British Sample (excluding Police Accident Data)

Influence attributed to self and other (non-driving) road user for first reported accident (general sample)

Crosstabulation: A1SELF
By A1ORDU

A1ORDU-> / A1SELF	Count / Row Pct / Adj Res	1	2	3	4	5	Row Total
	1	51 78.5% 1.0	4 6.2% .5	0 .0% -2.1	3 4.6% -2.0	7 10.8% 2.2	65 37.1%
	2	17 65.4% -1.1	1 3.8% -.3	2 7.7% 1.0	5 19.2% 1.5	1 3.8% -.4	26 14.9%
	3	21 61.8% -1.9	1 2.9% -.6	2 5.9% .6	10 29.4% 3.9	0 .0% -1.6	34 19.4%
	4	27 79.4% .8	3 8.8% 1.1	3 8.8% 1.6	0 .0% -2.3	1 2.9% -.8	34 19.4%
	5	14 87.5% 1.3	0 .0% -1.0	0 .0% -.9	1 6.3% -.6	1 6.3% .1	16 9.1%
	Column Total	130 74.3%	9 5.1%	7 4.0%	19 10.9%	10 5.7%	175 100.0%

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F.< 5
34.57278	16	.0045	.640	19 OF 25 (76.0%)

Statistic	Symmetric	With A1SELF Dependent	With A1ORDU Dependent
Lambda	.06452	.09091	.00000

Influence attributed to self and road conditions for first reported accident (general sample)

Crosstabulation: A1SELF
By A1RDCON

A1RDCON-> / A1SELF	Count / Row Pct / Adj Res	1	2	3	4	5	Row Total
	1	154 70.3% 6.5	17 7.8% -1.6	24 11.0% -1.7	18 8.2% -4.3	6 2.7% -2.4	219 40.6%
	2	37 45.7% -1.5	8 9.9% -.2	12 14.8% .2	17 21.0% 1.2	7 8.6% 1.3	81 15.0%
	3	30 36.1% -3.4	6 7.2% -1.0	12 14.5% .1	27 32.5% 4.3	8 9.6% 1.8	83 15.4%
	4	34 39.5% -2.8	15 17.4% 2.3	16 18.6% 1.3	15 17.4% .3	6 7.0% .6	86 15.9%
	5	34 47.9% -1.0	10 14.1% 1.1	12 16.9% .7	12 16.9% .1	3 4.2% -.5	71 13.1%
	Column Total	289 53.5%	56 10.4%	76 14.1%	89 16.5%	30 5.6%	540 100.0%

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F.< 5
61.90855	16	.0000	3.944	4 OF 25 (16.0%)

Statistic	Symmetric	With A1SELF Dependent	With A1RDCON Dependent
Lambda	.01923	.03427	.00000

Influence attributed to self and weather conditions for first reported accident (general sample)

Crosstabulation: A1SELF
By A1WEATH

A1WEATH-> / A1SELF	Count / Row Pct / Adj Res	1	2	3	4	5	Row Total
	1	169 77.2% 5.4	18 8.2% .9	14 6.4% -2.7	11 5.0% -4.8	7 3.2% -1.7	219 40.6%
	2	47 58.0% -1.1	7 8.6% .6	10 12.3% .5	12 14.8% .4	5 6.2% .4	81 15.0%
	3	38 45.8% -3.6	1 1.2% -2.3	10 12.0% .4	25 30.1% 4.8	9 10.8% 2.5	83 15.4%
	4	46 53.5% -2.1	7 8.1% .4	15 17.4% 2.2	15 17.4% 1.2	3 3.5% -.8	86 15.9%
	5	43 60.6% -.6	5 7.0% .0	9 12.7% .6	10 14.1% .1	4 5.6% .2	71 13.1%
	Column Total	343 63.5%	38 7.0%	58 10.7%	73 13.5%	28 5.2%	540 100.0%

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F.< 5
62.46012	16	.0000	3.681	5 OF 25 (20.0%)

Statistic	Symmetric	With A1SELF Dependent	With A1WEATH Dependent
Lambda	.03282	.05296	.00000

Influence attributed to self and mechanical problems for first reported accident (general sample)

Crosstabulation: A1SELF
By A1MECH

A1MECH-> A1SELF	Count / Row Pct / Adj Res	1	2	3	4	5	Row Total
	1	204 94.0% 1.0	2 .9% -1.5	1 .5% -2.1	1 .5% -1.2	9 4.1% 2.5	217 40.3%
	2	75 92.6% .0	2 2.5% .3	4 4.9% 2.0	0 .0% -1.0	0 .0% -1.5	81 15.1%
	3	73 88.0% -1.7	3 3.6% 1.1	3 3.6% 1.1	3 3.6% 2.4	1 1.2% -.7	83 15.4%
	4	78 90.7% -.7	3 3.5% 1.0	2 2.3% .2	2 2.3% 1.2	1 1.2% -.7	86 16.0%
	5	68 95.8% 1.1	1 1.4% -.4	1 1.4% -.4	0 .0% -1.0	1 1.4% -.5	71 13.2%
	Column Total	498 92.6%	11 2.0%	11 2.0%	6 1.1%	12 2.2%	538 100.0%

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F.< 5
25.66675	16	.0589	.792	20 OF 25 (80.0%)

Statistic	Symmetric	With A1SELF Dependent	With A1MECH Dependent
Lambda	.01662	.01869	.00000

Influence attributed to self and other (non-driving) road user for second reported accident (general sample)

Crosstabulation: A2SELF
By A2ORDU

A2ORDU-> / A2SELF	Count / Row Pct / Adj Res	1	2	3	4	5	Row Total
	1	36 94.7% 2.2	0 .0% -1.2	0 .0% -1.2	0 .0% -2.4	2 5.3% 1.6	38 43.2%
	2	13 92.9% .9	0 .0% -.6	0 .0% -.6	1 7.1% -.1	0 .0% -.6	14 15.9%
	3	11 84.6% -.1	1 7.7% 1.4	0 .0% -.6	1 7.7% -.0	0 .0% -.6	13 14.8%
	4	8 50.0% -4.4	1 6.3% 1.2	2 12.5% 3.0	5 31.3% 3.8	0 .0% -.7	16 18.2%
	5	7 100.0% 1.1	0 .0% -.4	0 .0% -.4	0 .0% -.8	0 .0% -.4	7 8.0%
	Column Total	75 85.2%	2 2.3%	2 2.3%	7 8.0%	2 2.3%	88 100.0%

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F.< 5
33.28239	16	.0068	.159	20 OF 25 (80.0%)

Statistic	Symmetric	With A2SELF Dependent	With A2ORDU Dependent
Lambda	.12698	.16000	.00000

Influence attributed to self and road conditions for second reported accident (general sample)

Crosstabulation: A2SELF
By A2RDCON

A2RDCON-> / A2SELF (Count / Row Pct / Adj Res)	1	2	3	4	5	Row Total
1	82 70.7% 1.6	9 7.8% -.7	12 10.3% .2	5 4.3% -3.4	8 6.9% 2.1	116 47.7%
2	22 61.1% -.6	4 11.1% .5	3 8.3% -.3	5 13.9% .5	2 5.6% .5	36 14.8%
3	22 61.1% -.6	5 13.9% 1.1	4 11.1% .3	5 13.9% .5	0 .0% -1.3	36 14.8%
4	19 55.9% -1.3	2 5.9% -.7	4 11.8% .4	9 26.5% 2.9	0 .0% -1.3	34 14.0%
5	14 66.7% .1	2 9.5% .1	1 4.8% -.8	4 19.0% 1.1	0 .0% -1.0	21 8.6%
Column Total	159 65.4%	22 9.1%	24 9.9%	28 11.5%	10 4.1%	243 100.0%

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F.< 5
23.03553	16	.1128	.864	17 OF 25 (68.0%)

Statistic	Symmetric	With A2SELF Dependent	With A2RDCON Dependent
Lambda	.01896	.03150	.00000

Influence attributed to self and weather conditions for second reported accident (general sample)

Crosstabulation: A2SELF
By A2WEATH

A2WEATH-> / A2SELF	Count / Row Pct / Adj Res	1	2	3	4	5	Row Total
1		88 76.5% 1.7	8 7.0% 1.4	8 7.0% .2	5 4.3% -4.0	6 5.2% 1.2	115 47.3%
2		24 66.7% -.6	1 2.8% -.6	4 11.1% 1.2	5 13.9% .1	2 5.6% .6	36 14.8%
3		25 69.4% -.3	1 2.8% -.6	3 8.3% .5	7 19.4% 1.1	0 .0% -1.3	36 14.8%
4		19 55.9% -2.1	0 .0% -1.4	1 2.9% -.9	13 38.2% 4.5	1 2.9% -.3	34 14.0%
5		17 77.3% .7	2 9.1% .9	0 .0% -1.3	3 13.6% .0	0 .0% -1.0	22 9.1%
	Column Total	173 71.2%	12 4.9%	16 6.6%	33 13.6%	9 3.7%	243 100.0%

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F.< 5
35.93103	16	.0030	.815	17 OF 25 (68.0%)

Statistic	Symmetric	With A2SELF Dependent	With A2WEATH Dependent
Lambda	.04040	.06250	.00000

Influence attributed to self and mechanical problems for second reported accident (general sample)

Crosstabulation: A2SELF
By A2MECH

A2MECH-> / A2SELF	Count / Row Pct / Adj Res	1	2	3	4	5	Row Total
	1	109 97.3% 1.3	1 .9% -1.2	2 1.8% .7	0 .0% -1.3	0 .0% -.9	112 46.9%
	2	35 97.2% .6	1 2.8% .3	0 .0% -.7	0 .0% -.6	0 .0% -.4	36 15.1%
	3	33 94.3% -.3	0 .0% -.9	0 .0% -.7	2 5.7% 3.4	0 .0% -.4	35 14.6%
	4	30 88.2% -2.2	3 8.8% 3.0	1 2.9% 1.0	0 .0% -.6	0 .0% -.4	34 14.2%
	5	21 95.5% .0	0 .0% -.7	0 .0% -.6	0 .0% -.5	1 4.5% 3.1	22 9.2%
	Column Total	228 95.4%	5 2.1%	3 1.3%	2 .8%	1 .4%	239 100.0%

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F.< 5
33.36005	16	.0066	.092	20 OF 25 (80.0%)

Statistic	Symmetric	With A2SELF Dependent	With A2MECH Dependent
Lambda	.03623	.03937	.00000

APPENDIX D(2): THE INFLUENCE OF RECENCY AND INJURY ON CAUSAL ATTRIBUTION TENDENCIES FOR ROAD ACCIDENTS

The influence of recency on subjective culpability

Crosstabulation: CULP
By YRACC

YRACC-> CULP	Count / Row Pct / Adj Res	YEAR OF ACCIDENT Pre 1980 1.00	1980-83 2.00	1984-87 3.00	1988-91 4.00	Row Total
	1.00	47 25.7% 2.1	17 9.3% -.8	49 26.8% -1.1	70 38.3% -.2	183 32.7%
	2.00	68 18.1% -2.1	43 11.4% .8	118 31.4% 1.1	147 39.1% .2	376 67.3%
	Column Total	115 20.6%	60 10.7%	167 29.9%	217 38.8%	559 100.0%

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F.< 5
4.87962	3	.1808	19.642	None

Statistic	Symmetric	With CULP Dependent	With YRACC Dependent
Lambda	.00000	.00000	.00000

The influence of injury on subjective culpability

Crosstabulation: CULP
By INJURY

INJURY-> / CULP	Count / Row Pct / Adj Res	None .00	Self only 1.00	Both 2.00	Other only 3.00	Row Total
	1.00 Not culpable	139 76.0% -1.8	22 12.0% 2.5	8 4.4% .5	14 7.7% -.2	183 32.7%
	2.00 Culpable	310 82.4% 1.8	22 5.9% -2.5	13 3.5% -.5	31 8.2% .2	376 67.3%
	Column Total	449 80.3%	44 7.9%	21 3.8%	45 8.1%	559 100.0%

Chi-Square	D.F.	Significance	Min E.F.	Cells with E.F.< 5
6.92823	3	.0742	6.875	None

Statistic	Symmetric	With CULP Dependent	With INJURY Dependent
Lambda	.00000	.00000	.00000

APPENDIX E: P C A FULL POST-ROTATION FACTOR MATRICES

DRIVER AFFECT/STATE

	Factor 1 Irritation	Factor 2 Intimidation	Factor 3 Unawareness	Factor 4 Excitement
Irritated	.81113	.17871	-.07751	-.05321
Frustrated	.80164	.21910	-.10514	-.01292
Tense	.76219	.30173	-.09610	-.13677
Angry	.73817	.28227	-.14197	-.04735
Stressed	.72523	.34058	-.12454	-.11458
Impatient	.71362	-.01357	-.08471	.11861
Relaxed	-.58320	-.18866	.24059	.23378
Tired	.53765	.18594	-.30951	-.02227
Intimidated	.25996	.78319	-.13894	-.06037
Fearful	.26498	.77230	-.04357	.07421
Upset	.49009	.63862	-.20761	-.01631
Free	-.13530	-.42392	.27092	.39743
Alert	-.18020	.04559	.85059	-.02803
In control	-.17792	-.35122	.71800	.17548
Confident	-.20551	-.45017	.55142	.17969
Excited	.01553	.02441	-.02866	.88382
Exhilarated	-.09354	-.03404	.13749	.84830

DRIVER SELF PERCEPTION

	Factor 1 Irritable	Factor 2 Safe	Factor 3 Confident	Factor 4 Aware
Irritable	.79436	-.08838	-.16094	-.07792
Patient	-.73796	.28050	.12487	.05502
Tolerant	-.70316	.33324	.16984	.06935
Selfish	.56148	-.46891	-.09032	-.11266
Insistent	.56027	.03053	.35263	-.20635
Courteous	-.51298	.40540	.05911	.23170
Safe	-.15388	.69095	.33792	.14904
Careful	-.18759	.66887	.09128	.44819
Responsible	-.15738	.65824	.37758	.17883
Reckless	.31348	-.65630	-.03240	-.10072
Slow	-.22578	.49879	-.43276	-.12833
Aggressive	.44765	-.47314	.24645	-.03288
Nervous	.13445	-.00427	-.82081	-.05845
Decisive	-.04530	.08920	.67585	.34736
Experienced	-.03546	.24880	.59780	.20799
Attentive	-.09600	.28767	.17461	.78571
Anticipating	-.13948	.01670	.21538	.78366
Lax	.20489	-.21495	-.41278	-.44564

DRIVER ATTITUDINAL/BEHAVIOURAL TENDENCIES

	Factor 1 Speed	Factor 2 Frus	Factor 3 Alc	Factor 4 Drskill	Factor 5 Solospd	Factor 6 Antic	Factor 7 Attodr	Factor 8 Awarordu	Factor 9 Pcdcntrl
Var.1	.64612	.11588	.08999	-.02651	.19137	.03777	.16179	-.04576	.08069
2	-.59725	-.12645	.05127	-.09295	.03548	.05946	.05712	.15554	.12837
3	-.56147	-.08313	-.11023	-.00978	-.01167	.03949	-.32804	.27615	-.01301
4	-.49856	.13814	-.04216	-.29454	.32425	-.05757	-.11937	.04105	.20073
5	.47864	-.27220	.00524	.02915	.28098	.22157	-.01573	.24527	.18361
6	.03744	.63673	.02845	-.12419	-.03503	-.04905	.05247	.03708	.21115
7	.07608	.62749	.08765	.08655	.23001	-.05378	.16801	.09321	.06917
8	-.07711	.60871	.03464	-.08144	.04641	.05516	-.03156	.08013	-.03456
9	.32655	.54801	-.05442	.24602	.17078	-.08049	-.13030	.04664	.07888
10	.28592	.44536	.07349	.01827	.18737	.10660	.41585	.15608	.16208
11	.05623	.08475	.74130	.00842	.01130	-.00920	-.14267	.03157	.11152
12	.09778	.06505	-.72681	-.01111	-.10276	.02313	-.04405	-.03665	.12954
13	.13756	.09443	.71127	-.00770	-.01852	-.02335	.05786	-.07924	.06239
14	.05363	.01508	-.04672	.78608	.01454	.01861	-.04755	-.03106	-.02538
15	.07873	.03326	.15574	.55398	.00339	.23739	.30360	-.02708	-.00103
16	.16567	-.08943	.01098	.49732	.18573	.25598	.07381	.27607	.03091
17	.29720	.10933	.16985	-.38824	.26828	-.07790	.00370	.32547	.07481
18	-.08013	.10325	.04549	.03439	.81687	.02065	.05802	-.05259	.03060
19	.29673	.20923	.04933	.04569	.62053	-.07969	.04202	.05361	-.03309
20	.07974	-.00177	-.02187	.04390	-.00288	.83113	-.08939	-.14103	-.07183
21	-.09156	-.03034	-.04944	.25066	-.05762	.71965	.08991	.03912	-.07499
22	-.04423	.07159	.08944	-.09293	.00151	.13909	-.75295	.07488	.04428
23	.18059	.25415	.01932	.03681	.09093	.22237	.57932	.20330	.13549
24	-.09957	.09226	-.07479	.04575	.01521	-.04277	.12990	.72244	-.08460
25	-.19005	.18393	.05474	-.02827	-.04356	-.05986	-.10903	.67822	.13114
26	.13553	.09898	.00328	.01583	.02969	-.02784	-.01842	-.00344	.81873
27	-.27996	.17059	.04979	-.05810	.00673	-.13155	.10148	.04822	.61591

ATTRIBUTIONS FOR ROAD TRAFFIC ACCIDENTS IN BRITAIN

	Factor 1 Att/DrivVars	Factor 2 Rd/WeathCond	Factor 3 Att/OthRdUs	Factor 4 Impairment	Factor 5 Speed/Aggression
Lack of Anticipation	.74213	.25691	-.00119	.04872	-.02230
Lack of Consideration	.70365	-.02733	.13078	.06494	.10072
Lack of Attention	.57620	.35598	.02148	.25804	-.02032
Close Following	.52562	-.00388	.12150	-.00121	.38946
Improper Overtaking	.50935	-.06983	.25561	.12338	.36597
Weather Conditions	.07230	.83679	.07712	.08725	.09685
Road Conditions	.11002	.80781	.18067	.07886	.07107
Pedestrian at Fault	.21991	.11700	.80136	.08100	.00685
Cyclist/M/cyc. Error	.05294	.06108	.79919	.11685	.09160
Mechanical Failure	.03036	.32592	.53223	.31246	.17132
Fatigue	.10279	.23161	.09559	.74270	.04795
Intoxication (Alcohol)	-.09170	.10189	.14979	.65014	.35161
Failure to Give Way	.36500	-.12108	.14562	.60970	-.05930
Driving/Under Stress	.30926	.33745	.21552	.34054	.22191
Excess Speed	.00245	.13002	.06787	.13780	.81170
Aggressive Driving	.42711	.11009	.04959	.07751	.62832

APPENDIX F(1): ACCIDENT INVOLVEMENT AND SUBJECTIVE CULPABILITY - EMOTIONAL/AROUSAL RESPONSES TO DRIVING (MANCOVA)

CELL MEANS AND STANDARD DEVIATIONS

VARIABLE: IRRITABILITY

FACTOR		MEAN	STD. DEV.	N
UNDER 30 YRS	(MALE)			
ACCIDENTS:	NONE	23.620	6.209	92
	NON CULPABLE	22.172	5.880	29
	CULPABLE	23.622	6.211	119
	(FEMALE)			
ACCIDENTS:	NONE	21.544	5.322	103
	NON CULPABLE	21.727	6.670	22
	CULPABLE	23.529	5.865	68
30-44 YRS:	(MALE)			
ACCIDENTS:	NONE	22.621	6.735	87
	NON CULPABLE	23.667	6.346	45
	CULPABLE	24.667	5.471	123
	(FEMALE)			
ACCIDENTS:	NONE	22.536	6.353	110
	NON CULPABLE	23.556	6.253	27
	CULPABLE	24.323	6.556	62
45 YRS +	(MALE)			
ACCIDENTS:	NONE	22.817	7.349	104
	NON CULPABLE	21.773	7.364	44
	CULPABLE	23.937	6.535	128
	(FEMALE)			
ACCIDENTS:	NONE	21.048	7.740	84
	NON CULPABLE	25.800	6.951	15
	CULPABLE	22.182	6.789	33

VARIABLE: INTIMIDATION

FACTOR				
UNDER 30 YRS	(MALE)			
ACCIDENTS:	NONE	8.935	2.862	92
	NON CULPABLE	8.207	3.589	29
	CULPABLE	8.790	2.780	119
	(FEMALE)			
ACCIDENTS:	NONE	8.728	3.150	103
	NON CULPABLE	8.045	2.591	22
	CULPABLE	8.926	2.639	68
30-44 YRS	(MALE)			
ACCIDENTS:	NONE	9.874	3.147	87
	NON CULPABLE	9.756	3.127	45
	CULPABLE	10.333	2.540	123
	(FEMALE)			
ACCIDENTS:	NONE	9.527	2.917	110
	NON CULPABLE	9.778	3.523	27
	CULPABLE	10.645	2.987	62

VARIABLE: INTIMIDATION (contd.)

FACTOR		MEAN	STD. DEV.	N
45 YRS +	(MALE)			
ACCIDENTS:	NONE	10.221	3.591	104
	NON CULPABLE	10.545	2.807	44
	CULPABLE	10.594	3.266	128
	(FEMALE)			
ACCIDENTS:	NONE	9.036	3.486	84
	NON CULPABLE	9.867	4.291	15
	CULPABLE	10.121	3.130	33

VARIABLE: UNAWARENESS

FACTOR				
UNDER 30 YRS	(MALE)			
ACCIDENTS:	NONE	6.283	2.201	92
	NON CULPABLE	6.586	2.079	29
	CULPABLE	6.462	1.939	119
	(FEMALE)			
ACCIDENTS:	NONE	6.155	1.883	103
	NON CULPABLE	5.864	1.754	22
	CULPABLE	6.529	2.004	68
30-44 YRS	(MALE)			
ACCIDENTS:	NONE	6.506	2.209	87
	NON CULPABLE	6.622	2.434	45
	CULPABLE	7.057	1.896	123
	(FEMALE)			
ACCIDENTS:	NONE	6.236	1.990	110
	NON CULPABLE	6.407	2.546	27
	CULPABLE	7.210	2.105	62
45 YRS +	(MALE)			
ACCIDENTS:	NONE	6.260	2.481	104
	NON CULPABLE	6.614	2.345	44
	CULPABLE	6.953	2.058	128
	(FEMALE)			
ACCIDENTS:	NONE	5.893	2.318	84
	NON CULPABLE	6.533	2.475	15
	CULPABLE	6.515	2.373	33

VARIABLE: EXCITEMENT

FACTOR				
UNDER 30 YRS	(MALE)			
ACCIDENTS:	NONE	6.913	1.566	92
	NON CULPABLE	6.724	1.306	29
	CULPABLE	6.739	1.889	119
	(FEMALE)			
ACCIDENTS:	NONE	6.087	1.681	103
	NON CULPABLE	6.273	1.638	22
	CULPABLE	6.426	1.489	68

VARIABLE: EXCITEMENT (contd.)

FACTOR		MEAN	STD. DEV.	N
30-44 YRS	(MALE)			
ACCIDENTS:	NONE	5.885	1.870	87
	NON CULPABLE	6.311	1.635	45
	CULPABLE	6.041	1.399	123
	(FEMALE)			
ACCIDENTS:	NONE	6.027	1.600	110
	NON CULPABLE	5.852	1.955	27
	CULPABLE	5.903	1.799	62
45 YRS +	(MALE)			
ACCIDENTS:	NONE	5.548	1.869	104
	NON CULPABLE	5.341	1.524	44
	CULPABLE	5.703	1.681	128
	(FEMALE)			
ACCIDENTS:	NONE	5.893	2.042	84
	NON CULPABLE	5.733	1.981	15
	CULPABLE	5.758	1.937	33

VARIABLE: YEARS DRIVING

FACTOR				
UNDER 30 YRS	(MALE)			
ACCIDENTS:	NONE	5.065	3.718	92
	NON CULPABLE	7.276	3.261	29
	CULPABLE	6.210	3.923	119
	(FEMALE)			
ACCIDENTS:	NONE	4.757	3.374	103
	NON CULPABLE	6.091	3.100	22
	CULPABLE	5.206	3.230	68
30-44 YRS	(MALE)			
ACCIDENTS:	NONE	16.575	6.971	87
	NON CULPABLE	17.644	5.010	45
	CULPABLE	17.154	5.872	123
	(FEMALE)			
ACCIDENTS:	NONE	13.445	6.680	110
	NON CULPABLE	14.889	7.089	27
	CULPABLE	15.371	6.257	62
45 YRS +	(MALE)			
ACCIDENTS:	NONE	34.115	12.346	104
	NON CULPABLE	33.955	10.352	44
	CULPABLE	33.641	8.950	128
	(FEMALE)			
ACCIDENTS:	NONE	23.762	10.091	84
	NON CULPABLE	24.133	7.661	15
	CULPABLE	24.000	10.118	33

VARIABLE: MILES WEEKLY

FACTOR				
UNDER 30 YRS	(MALE)			
ACCIDENTS:	NONE	244.207	215.842	92
	NON CULPABLE	285.517	546.721	29
	CULPABLE	344.613	404.451	119

VARIABLE: MILES WEEKLY (contd.)

FACTOR		MEAN	STD. DEV.	N
UNDER 30 YRS (FEMALE)				
ACCIDENTS:	NONE	101.592	119.274	103
	NON CULPABLE	199.318	231.889	22
	CULPABLE	183.485	188.306	68
30-44 YRS (MALE)				
ACCIDENTS:	NONE	272.126	401.598	87
	NON CULPABLE	310.556	245.612	45
	CULPABLE	401.659	357.461	123
(FEMALE)				
ACCIDENTS:	NONE	120.891	135.536	110
	NON CULPABLE	166.889	153.114	27
	CULPABLE	159.984	174.903	62
45 YRS + (MALE)				
ACCIDENTS:	NONE	200.788	269.053	104
	NON CULPABLE	250.636	237.860	44
	CULPABLE	306.695	227.860	128
(FEMALE)				
ACCIDENTS:	NONE	105.060	103.454	84
	NON CULPABLE	189.333	143.201	15
	CULPABLE	194.273	390.857	33

SIGNIFICANT COVARIATE RESULTS (DRIVING DURATION & INTENSITY)
MULTIVARIATE RESULTS

Multivariate tests of significance (S=2 M=1/2 N=635)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.98186	2.92	8.00	2544.00	.003

UNIVARIATE RESULTS

None significant

INDIVIDUAL UNIVARIATE EFFECTS ATTRIBUTABLE TO COVARIATES (YEARS DRIVING AND WEEKLY MILEAGE)

Dependent Variable	Covariate	t-value	Sig of t
INTIMIDATION	MLSWKLY	-2.261	.024
UNAWARENESS	MLSWKLY	-2.190	.029

Adjusted and Estimated Means
Variable .. IRRITABILITY

CELL	Obs. Mean	Adj. Mean	Est. Mean	Raw Resid.	Std. Resid.
1	23.620	23.322	23.620	.000	.000
2	22.172	21.899	22.172	.000	.000
3	23.622	23.281	23.622	.000	.000
4	21.544	21.340	21.544	.000	.000
5	21.727	21.486	21.727	.000	.000
6	23.529	23.279	23.529	.000	.000
7	22.621	22.580	22.621	.000	.000
8	23.667	23.625	23.667	.000	.000
9	24.667	24.549	24.667	.000	.000
10	22.536	22.528	22.536	.000	.000
11	23.556	23.549	23.556	.000	.000
12	24.323	24.333	24.323	.000	.000
13	22.817	23.249	22.817	.000	.000
14	21.773	22.165	21.773	.000	.000
15	23.937	24.283	23.937	.000	.000
16	21.048	21.298	21.048	.000	.000
17	25.800	26.000	25.800	.000	.000
18	22.182	22.375	22.182	.000	.000

Variable .. INTIMIDATION

CELL	Obs. Mean	Adj. Mean	Est. Mean	Raw Resid.	Std. Resid.
1	8.935	8.948	8.935	.000	.000
2	8.207	8.250	8.207	.000	.000
3	8.790	8.875	8.790	.000	.000
4	8.728	8.640	8.728	.000	.000
5	8.045	8.027	8.045	.000	.000
6	8.926	8.897	8.926	.000	.000
7	9.874	9.907	9.874	.000	.000
8	9.756	9.817	9.756	.000	.000
9	10.333	10.459	10.333	.000	.000
10	9.527	9.454	9.527	.000	.000
11	9.778	9.737	9.778	.000	.000
12	10.645	10.599	10.645	.000	.000
13	10.221	10.205	10.221	.000	.000
14	10.545	10.565	10.545	.000	.000
15	10.594	10.653	10.594	.000	.000
16	9.036	8.951	9.036	.000	.000
17	9.867	9.842	9.867	.000	.000
18	10.121	10.100	10.121	.000	.000

Adjusted and Estimated Means

Variable .. UNAWARENESS

CELL	Obs. Mean	Adj. Mean	Est. Mean	Raw Resid.	Std. Resid.
1	6.283	6.379	6.283	.000	.000
2	6.586	6.686	6.586	.000	.000
3	6.462	6.598	6.462	.000	.000
4	6.155	6.187	6.155	.000	.000
5	5.864	5.932	5.864	.000	.000
6	6.529	6.596	6.529	.000	.000
7	6.506	6.531	6.506	.000	.000
8	6.622	6.657	6.622	.000	.000
9	7.057	7.139	7.057	.000	.000
10	6.236	6.212	6.236	.000	.000
11	6.407	6.395	6.407	.000	.000
12	7.210	7.190	7.210	.000	.000
13	6.260	6.120	6.260	.000	.000
14	6.614	6.499	6.614	.000	.000
15	6.953	6.868	6.953	.000	.000
16	5.893	5.785	5.893	.000	.000
17	6.533	6.463	6.533	.000	.000
18	6.515	6.448	6.515	.000	.000

Variable .. EXCITEMENT

CELL	Obs. Mean	Adj. Mean	Est. Mean	Raw Resid.	Std. Resid.
1	6.913	6.820	6.913	.000	.000
2	6.724	6.645	6.724	.000	.000
3	6.739	6.648	6.739	.000	.000
4	6.087	6.002	6.087	.000	.000
5	6.273	6.191	6.273	.000	.000
6	6.426	6.338	6.426	.000	.000
7	5.885	5.879	5.885	.000	.000
8	6.311	6.311	6.311	.000	.000
9	6.041	6.030	6.041	.000	.000
10	6.027	6.008	6.027	.000	.000
11	5.852	5.841	5.852	.000	.000
12	5.903	5.896	5.903	.000	.000
13	5.548	5.685	5.548	.000	.000
14	5.341	5.473	5.341	.000	.000
15	5.703	5.828	5.703	.000	.000
16	5.893	5.956	5.893	.000	.000
17	5.733	5.793	5.733	.000	.000
18	5.758	5.816	5.758	.000	.000

APPENDIX F(2): ACCIDENT INVOLVEMENT AND SUBJECTIVE CULPABILITY - DRIVER SELF PERCEPTION (MANCOVA)

CELL MEANS AND STANDARD DEVIATIONS

VARIABLE: IRRITABLE

FACTOR		MEAN	STD. DEV.	N
UNDER 30 YRS (MALE)				
ACCIDENTS:	NONE	15.076	3.638	92
	NON CULPABLE	14.633	3.700	30
	CULPABLE	15.622	4.004	119
	(FEMALE)			
ACCIDENTS:	NONE	14.223	3.794	103
	NON CULPABLE	13.905	4.657	21
	CULPABLE	15.273	4.044	66
30-44 YRS:	(MALE)			
ACCIDENTS:	NONE	14.417	4.172	84
	NON CULPABLE	13.933	3.997	45
	CULPABLE	14.951	3.719	123
	(FEMALE)			
ACCIDENTS:	NONE	13.044	3.519	113
	NON CULPABLE	13.241	3.124	29
	CULPABLE	14.683	3.680	63
45 YRS +	(MALE)			
ACCIDENTS:	NONE	12.398	4.126	113
	NON CULPABLE	12.318	3.728	44
	CULPABLE	13.312	4.795	138
	(FEMALE)			
ACCIDENTS:	NONE	11.656	3.700	90
	NON CULPABLE	12.000	5.071	15
	CULPABLE	12.735	4.010	34

VARIABLE: SAFE

FACTOR				
UNDER 30 YRS (MALE)				
ACCIDENTS:	NONE	21.848	3.049	92
	NON CULPABLE	20.933	3.912	30
	CULPABLE	20.546	4.104	119
	(FEMALE)			
ACCIDENTS:	NONE	23.029	3.011	103
	NON CULPABLE	23.619	2.539	21
	CULPABLE	21.258	3.656	66
30-44 YRS	(MALE)			
ACCIDENTS:	NONE	23.310	3.151	84
	NON CULPABLE	22.911	2.991	45
	CULPABLE	21.854	2.724	123
	(FEMALE)			
ACCIDENTS:	NONE	23.646	2.825	113
	NON CULPABLE	23.517	3.181	29
	CULPABLE	21.889	3.033	63

VARIABLE: SAFE (contd.)

FACTOR		MEAN	STD. DEV.	N
45 YRS +	(MALE)			
ACCIDENTS:	NONE	24.425	2.927	113
	NON CULPABLE	24.250	3.221	44
	CULPABLE	22.971	3.631	138
	(FEMALE)			
ACCIDENTS:	NONE	24.167	3.149	90
	NON CULPABLE	22.733	3.634	15
	CULPABLE	23.412	2.883	34

VARIABLE: CONFIDENT

FACTOR				
UNDER 30 YRS	(MALE)			
ACCIDENTS:	NONE	12.043	2.550	92
	NON CULPABLE	12.167	1.840	30
	CULPABLE	12.017	2.182	119
	(FEMALE)			
ACCIDENTS:	NONE	11.272	1.874	103
	NON CULPABLE	11.286	1.927	21
	CULPABLE	11.000	2.000	66
30-44 YRS	(MALE)			
ACCIDENTS:	NONE	12.714	1.930	84
	NON CULPABLE	12.822	1.946	45
	CULPABLE	12.569	1.878	123
	(FEMALE)			
ACCIDENTS:	NONE	11.619	2.316	113
	NON CULPABLE	12.621	2.128	29
	CULPABLE	11.127	2.289	63
45 YRS +	(MALE)			
ACCIDENTS:	NONE	13.071	2.030	113
	NON CULPABLE	13.295	1.760	44
	CULPABLE	12.920	1.945	138
	(FEMALE)			
ACCIDENTS:	NONE	12.111	2.368	90
	NON CULPABLE	13.333	1.718	15
	CULPABLE	12.118	2.319	34

VARIABLE: AWARE

FACTOR				
UNDER 30 YRS	(MALE)			
ACCIDENTS:	NONE	12.511	1.947	92
	NON CULPABLE	12.467	1.655	30
	CULPABLE	11.613	2.206	119
	(FEMALE)			
ACCIDENTS:	NONE	11.680	2.134	103
	NON CULPABLE	12.048	1.658	21
	CULPABLE	11.318	1.807	66

VARIABLE: AWARE (contd.)

FACTOR		MEAN	STD. DEV.	N
30-44 YRS	(MALE)			
ACCIDENTS:	NONE	12.619	1.728	84
	NON CULPABLE	12.622	1.556	45
	CULPABLE	12.008	1.831	123
	(FEMALE)			
ACCIDENTS:	NONE	12.372	1.947	113
	NON CULPABLE	12.414	1.900	29
	CULPABLE	11.381	2.003	63
45 YRS +	(MALE)			
ACCIDENTS:	NONE	12.584	2.195	113
	NON CULPABLE	12.818	1.795	44
	CULPABLE	12.225	2.061	138
	(FEMALE)			
ACCIDENTS:	NONE	12.622	1.894	90
	NON CULPABLE	13.067	1.870	15
	CULPABLE	12.353	1.873	34

VARIABLE: YEARS DRIVING

FACTOR				
UNDER 30 YRS	(MALE)			
ACCIDENTS:	NONE	5.011	3.755	92
	NON CULPABLE	7.200	3.231	30
	CULPABLE	6.235	3.892	119
	(FEMALE)			
ACCIDENTS:	NONE	4.883	3.309	103
	NON CULPABLE	5.905	3.048	21
	CULPABLE	5.318	3.202	66
30-44 YRS	(MALE)			
ACCIDENTS:	NONE	16.524	6.934	84
	NON CULPABLE	17.867	5.066	45
	CULPABLE	16.927	5.792	123
	(FEMALE)			
ACCIDENTS:	NONE	13.496	6.620	113
	NON CULPABLE	14.586	7.139	29
	CULPABLE	15.492	6.234	63
45 YRS +	(MALE)			
ACCIDENTS:	NONE	34.345	12.519	113
	NON CULPABLE	33.750	10.379	44
	CULPABLE	33.797	9.104	138
	(FEMALE)			
ACCIDENTS:	NONE	23.911	10.519	90
	NON CULPABLE	24.200	7.739	15
	CULPABLE	24.765	10.916	34

VARIABLE: MILES WEEKLY

FACTOR				
UNDER 30 YRS	(MALE)			
ACCIDENTS:	NONE	241.870	216.940	92
	NON CULPABLE	291.000	538.051	30
	CULPABLE	344.613	403.612	119

VARIABLE: MILES WEEKLY (contd.)

FACTOR		MEAN	STD. DEV.	N
UNDER 30 YRS (FEMALE)				
ACCIDENTS:	NONE	102.757	118.692	103
	NON CULPABLE	206.667	234.976	21
	CULPABLE	184.455	191.507	66
30-44 YRS (MALE)				
ACCIDENTS:	NONE	280.476	406.256	84
	NON CULPABLE	315.444	241.444	45
	CULPABLE	398.976	359.200	123
(FEMALE)				
ACCIDENTS:	NONE	119.832	133.835	113
	NON CULPABLE	161.414	148.996	29
	CULPABLE	160.111	172.932	63
45 YRS + (MALE)				
ACCIDENTS:	NONE	226.788	371.908	113
	NON CULPABLE	253.364	237.720	44
	CULPABLE	298.812	227.603	138
(FEMALE)				
ACCIDENTS:	NONE	104.867	101.513	90
	NON CULPABLE	172.667	137.605	15
	CULPABLE	188.706	386.256	34

SIGNIFICANT COVARIATE RESULTS (DRIVING DURATION & INTENSITY)

MULTIVARIATE RESULTS

Multivariate tests of significance (S=2 M=1/2 N=648 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.93005	11.99	8.00	2598.00	.000

UNIVARIATE RESULTS

Univariate F-tests with (2,1302) DF

Variable	SqMulR	MulR	AdjRsq	HpthMS	ErrorMS	F	Sig of F
SAFE	.005	.07	.004	37.22	10.41	3.58	.028
CONFIDENT	.06	.25	.06	180.03	4.13	43.62	.000
AWARE	.02	.13	.01	40.29	3.79	10.64	.000

INDIVIDUAL UNIVARIATE EFFECTS ATTRIBUTABLE TO COVARIATES (YEARS DRIVING AND WEEKLY MILEAGE)

Dependent Variable	Covariate	t-value	Sig of t
SAFE	YRSDRIV	2.136	.033
CONFIDENT	YRSDRIV	7.182	.000
CONFIDENT	MLSWKLY	5.798	.000
AWARE	YRSDRIV	4.194	.000

Adjusted and Estimated Means
Variable .. IRRITABLE

CELL	Obs. Mean	Adj. Mean	Est. Mean	Raw Resid.	Std. Resid.
1	15.076	14.745	15.076	.000	.000
2	14.633	14.357	14.633	.000	.000
3	15.622	15.312	15.622	.000	.000
4	14.223	13.907	14.223	.000	.000
5	13.905	13.603	13.905	.000	.000
6	15.273	14.958	15.273	.000	.000
7	14.417	14.399	14.417	.000	.000
8	13.933	13.948	13.933	.000	.000
9	14.951	14.930	14.951	.000	.000
10	13.044	12.964	13.044	.000	.000
11	13.241	13.186	13.241	.000	.000
12	14.683	14.652	14.683	.000	.000
13	12.398	12.880	12.398	.000	.000
14	12.318	12.780	12.318	.000	.000
15	13.312	13.769	13.312	.000	.000
16	11.656	11.865	11.656	.000	.000
17	12.000	12.208	12.000	.000	.000
18	12.735	12.957	12.735	.000	.000

Variable .. SAFE

CELL	Obs. Mean	Adj. Mean	Est. Mean	Raw Resid.	Std. Resid.
1	21.848	22.163	21.848	.000	.000
2	20.933	21.218	20.933	.000	.000
3	20.546	20.884	20.546	.000	.000
4	23.029	23.275	23.029	.000	.000
5	23.619	23.893	23.619	.000	.000
6	21.258	21.535	21.258	.000	.000
7	23.310	23.348	23.310	.000	.000
8	22.911	22.934	22.911	.000	.000
9	21.854	21.944	21.854	.000	.000
10	23.646	23.679	23.646	.000	.000
11	23.517	23.544	23.517	.000	.000
12	21.889	21.891	21.889	.000	.000
13	24.425	23.976	24.425	.000	.000
14	24.250	23.830	24.250	.000	.000
15	22.971	22.574	22.971	.000	.000
16	24.167	23.923	24.167	.000	.000
17	22.733	22.518	22.733	.000	.000
18	23.412	23.190	23.412	.000	.000

Adjusted and Estimated Means
Variable .. CONFIDENT

CELL	Obs. Mean	Adj. Mean	Est. Mean	Raw Resid.	Std. Resid.
1	12.043	12.673	12.043	.000	.000
2	12.167	12.620	12.167	.000	.000
3	12.017	12.461	12.017	.000	.000
4	11.272	12.069	11.272	.000	.000
5	11.286	11.907	11.286	.000	.000
6	11.000	11.679	11.000	.000	.000
7	12.714	12.671	12.714	.000	.000
8	12.822	12.665	12.822	.000	.000
9	12.569	12.367	12.569	.000	.000
10	11.619	11.927	11.619	.000	.000
11	12.621	12.821	12.621	.000	.000
12	11.127	11.279	11.127	.000	.000
13	13.071	12.117	13.071	.000	.000
14	13.295	12.343	13.295	.000	.000
15	12.920	11.913	12.920	.000	.000
16	12.111	11.867	12.111	.000	.000
17	13.333	12.995	13.333	.000	.000
18	12.118	11.730	12.118	.000	.000

Variable .. AWARE

CELL	Obs. Mean	Adj. Mean	Est. Mean	Raw Resid.	Std. Resid.
1	12.511	12.868	12.511	.000	.000
2	12.467	12.740	12.467	.000	.000
3	11.613	11.898	11.613	.000	.000
4	11.680	12.089	11.680	.000	.000
5	12.048	12.390	12.048	.000	.000
6	11.318	11.686	11.318	.000	.000
7	12.619	12.611	12.619	.000	.000
8	12.622	12.561	12.622	.000	.000
9	12.008	11.947	12.008	.000	.000
10	12.372	12.512	12.372	.000	.000
11	12.414	12.507	12.414	.000	.000
12	11.381	11.447	11.381	.000	.000
13	12.584	12.051	12.584	.000	.000
14	12.818	12.294	12.818	.000	.000
15	12.225	11.683	12.225	.000	.000
16	12.622	12.450	12.622	.000	.000
17	13.067	12.862	13.067	.000	.000
18	12.353	12.125	12.353	.000	.000

APPENDIX F(3): ACCIDENT INVOLVEMENT AND SUBJECTIVE CULPABILITY - DRIVER ATTITUDINAL/BEHAVIOURAL TENDENCIES (MANCOVA)

VARIABLE: SPEED

FACTOR		MEAN	STD. DEV.	N
UNDER 30 YRS	(MALE)			
ACCIDENTS:	NONE	15.837	2.996	92
	NON CULPABLE	16.097	2.468	31
	CULPABLE	16.059	2.948	118
	(FEMALE)			
ACCIDENTS:	NONE	14.519	2.539	104
	NON CULPABLE	14.304	2.653	23
	CULPABLE	15.723	2.875	65
30-44 YRS	(MALE)			
ACCIDENTS:	NONE	14.704	2.839	81
	NON CULPABLE	15.071	2.933	42
	CULPABLE	15.317	2.726	123
	(FEMALE)			
ACCIDENTS:	NONE	14.188	2.392	117
	NON CULPABLE	14.483	2.355	29
	CULPABLE	14.578	2.630	64
45 YRS +	(MALE)			
ACCIDENTS:	NONE	13.973	2.833	111
	NON CULPABLE	13.156	2.477	45
	CULPABLE	14.437	2.747	126
	(FEMALE)			
ACCIDENTS:	NONE	13.451	2.849	91
	NON CULPABLE	14.250	1.865	12
	CULPABLE	14.000	2.535	34

VARIABLE: FRUSTRATION

FACTOR				
UNDER 30 YRS	(MALE)			
ACCIDENTS:	NONE	16.957	2.991	92
	NON CULPABLE	16.968	4.223	31
	CULPABLE	16.669	3.308	118
	(FEMALE)			
ACCIDENTS:	NONE	16.125	3.222	104
	NON CULPABLE	16.957	3.198	23
	CULPABLE	17.246	3.544	65
30-44 YRS	(MALE)			
ACCIDENTS:	NONE	15.901	3.200	81
	NON CULPABLE	15.881	3.094	42
	CULPABLE	15.878	3.418	123
	(FEMALE)			
ACCIDENTS:	NONE	14.932	3.221	117
	NON CULPABLE	16.310	2.917	29
	CULPABLE	16.063	3.152	64

VARIABLE: FRUSTRATION (contd.)

FACTOR		MEAN	STD. DEV.	N
45 YRS +	(MALE)			
ACCIDENTS:	NONE	15.297	3.224	111
	NON CULPABLE	13.911	3.315	45
	CULPABLE	14.468	3.303	126
45 YRS+	(FEMALE)			
ACCIDENTS:	NONE	15.066	3.785	91
	NON CULPABLE	16.833	4.130	12
	CULPABLE	15.294	3.850	34

VARIABLE: DRIVER SKILLS

FACTOR				
UNDER 30 YRS	(MALE)			
ACCIDENTS:	NONE	14.402	1.453	92
	NON CULPABLE	13.968	1.722	31
	CULPABLE	13.983	1.525	118
	(FEMALE)			
ACCIDENTS:	NONE	13.385	1.597	104
	NON CULPABLE	13.522	1.377	23
	CULPABLE	13.677	1.437	65
30-44 YRS	(MALE)			
ACCIDENTS:	NONE	13.568	1.589	81
	NON CULPABLE	13.786	1.570	42
	CULPABLE	13.667	1.592	123
	(FEMALE)			
ACCIDENTS:	NONE	13.051	1.591	117
	NON CULPABLE	13.517	1.526	29
	CULPABLE	13.141	1.390	64
45 YRS +	(MALE)			
ACCIDENTS:	NONE	13.541	1.512	111
	NON CULPABLE	13.422	1.602	45
	CULPABLE	13.246	1.532	126
	(FEMALE)			
ACCIDENTS:	NONE	13.099	1.391	91
	NON CULPABLE	13.083	1.676	12
	CULPABLE	13.324	1.609	34

VARIABLE: DRINK DRIVING

FACTOR				
UNDER 30 YRS	(MALE)			
ACCIDENTS:	NONE	3.761	1.455	92
	NON CULPABLE	5.000	2.394	31
	CULPABLE	4.788	2.371	118
	(FEMALE)			
ACCIDENTS:	NONE	3.692	1.323	104
	NON CULPABLE	3.870	1.254	23
	CULPABLE	3.923	1.594	65

VARIABLE: DRINK DRIVING (contd.)

FACTOR		MEAN	STD. DEV.	N
30-44 YRS	(MALE)			
ACCIDENTS:	NONE	4.494	1.918	81
	NON CULPABLE	4.690	2.170	42
	CULPABLE	4.862	2.121	123
	(FEMALE)			
ACCIDENTS:	NONE	3.923	1.571	117
	NON CULPABLE	3.759	1.215	29
	CULPABLE	4.172	1.751	64
45 YRS +	(MALE)			
ACCIDENTS:	NONE	5.243	1.936	111
	NON CULPABLE	4.200	1.575	45
	CULPABLE	4.714	1.918	126
	(FEMALE)			
ACCIDENTS:	NONE	4.538	1.803	91
	NON CULPABLE	3.833	1.403	12
	CULPABLE	4.059	1.556	34

VARIABLE: SOLO SPEEDING

FACTOR				
UNDER 30 YRS	(MALE)			
ACCIDENTS:	NONE	6.348	1.751	92
	NON CULPABLE	6.839	2.146	31
	CULPABLE	6.432	1.672	118
	(FEMALE)			
ACCIDENTS:	NONE	5.875	2.075	104
	NON CULPABLE	6.565	1.532	23
	CULPABLE	6.092	1.860	65
30-44 YRS	(MALE)			
ACCIDENTS:	NONE	5.321	1.499	81
	NON CULPABLE	5.190	1.954	42
	CULPABLE	5.309	1.640	123
	(FEMALE)			
ACCIDENTS:	NONE	4.880	1.651	117
	NON CULPABLE	5.034	1.679	29
	CULPABLE	5.344	1.819	64
45 YRS +	(MALE)			
ACCIDENTS:	NONE	4.820	1.744	111
	NON CULPABLE	4.133	1.914	45
	CULPABLE	4.587	1.684	126
	(FEMALE)			
ACCIDENTS:	NONE	4.407	1.966	91
	NON CULPABLE	4.583	2.065	12
	CULPABLE	5.000	1.706	34

VARIABLE: ANTICIPATION

FACTOR		MEAN	STD. DEV.	N
UNDER 30 YRS (MALE)				
ACCIDENTS:	NONE	7.793	0.871	92
	NON CULPABLE	7.742	1.064	31
	CULPABLE	7.559	1.098	118
	(FEMALE)			
ACCIDENTS:	NONE	7.490	1.043	104
	NON CULPABLE	7.696	0.974	23
	CULPABLE	7.369	0.802	65
30-44 YRS (MALE)				
ACCIDENTS:	NONE	7.852	0.853	81
	NON CULPABLE	7.929	1.135	42
	CULPABLE	7.813	0.899	123
	(FEMALE)			
ACCIDENTS:	NONE	7.573	0.903	117
	NON CULPABLE	7.483	0.871	29
	CULPABLE	7.531	0.816	64
45 YRS + (MALE)				
ACCIDENTS:	NONE	7.703	0.859	111
	NON CULPABLE	7.800	0.815	45
	CULPABLE	7.683	0.918	126
	(FEMALE)			
ACCIDENTS:	NONE	7.670	0.731	91
	NON CULPABLE	7.083	1.165	12
	CULPABLE	7.735	0.618	34

VARIABLE: NEGATIVE ATTITUDE TO OTHER DRIVERS

FACTOR				
UNDER 30 YRS (MALE)				
ACCIDENTS:	NONE	5.902	1.177	92
	NON CULPABLE	5.710	1.071	31
	CULPABLE	6.161	1.147	118
	(FEMALE)			
ACCIDENTS:	NONE	6.192	1.133	104
	NON CULPABLE	5.870	1.217	23
	CULPABLE	6.108	1.002	65
30-44 YRS (MALE)				
ACCIDENTS:	NONE	5.963	1.054	81
	NON CULPABLE	5.952	1.268	42
	CULPABLE	5.837	1.074	123
	(FEMALE)			
ACCIDENTS:	NONE	5.966	1.121	117
	NON CULPABLE	6.000	1.069	29
	CULPABLE	6.172	0.985	64
45 YRS + (MALE)				
ACCIDENTS:	NONE	6.396	1.178	111
	NON CULPABLE	6.044	1.021	45
	CULPABLE	6.381	1.057	126

VARIABLE: NEGATIVE ATTITUDE TO OTHER DRIVERS (contd.)

FACTOR		MEAN	STD. DEV.	N
45 YRS+	(FEMALE)			
ACCIDENTS:	NONE	6.352	0.935	91
	NON CULPABLE	6.000	1.044	12
	CULPABLE	6.265	0.864	34

VARIABLE: AWARENESS OF OTHER ROAD USERS

FACTOR				
UNDER 30 YRS	(MALE)			
ACCIDENTS:	NONE	5.598	1.438	92
	NON CULPABLE	5.194	1.276	31
	CULPABLE	5.271	1.338	118
	(FEMALE)			
ACCIDENTS:	NONE	5.663	1.187	104
	NON CULPABLE	5.739	1.356	23
	CULPABLE	5.615	1.114	65
30-44 YRS	(MALE)			
ACCIDENTS:	NONE	5.481	1.246	81
	NON CULPABLE	5.429	1.172	42
	CULPABLE	5.179	1.268	123
	(FEMALE)			
ACCIDENTS:	NONE	5.547	1.063	117
	NON CULPABLE	5.793	1.207	29
	CULPABLE	5.469	1.154	64
45 YRS +	(MALE)			
ACCIDENTS:	NONE	5.793	1.161	111
	NON CULPABLE	5.644	1.209	45
	CULPABLE	5.468	1.143	126
	(FEMALE)			
ACCIDENTS:	NONE	5.714	0.922	91
	NON CULPABLE	6.000	1.348	12
	CULPABLE	5.794	1.149	34

VARIABLE: PERCEIVED CONTROL

FACTOR				
UNDER 30 YRS	(MALE)			
ACCIDENTS:	NONE	5.174	1.648	92
	NON CULPABLE	5.258	1.932	31
	CULPABLE	5.288	1.675	118
	(FEMALE)			
ACCIDENTS:	NONE	5.413	1.623	104
	NON CULPABLE	5.348	1.301	23
	CULPABLE	5.738	1.384	65
30-44 YRS	(MALE)			
ACCIDENTS:	NONE	5.420	1.702	81
	NON CULPABLE	5.810	1.978	42
	CULPABLE	5.260	1.796	123
	(FEMALE)			
ACCIDENTS:	NONE	5.137	1.581	117
	NON CULPABLE	5.552	1.723	29
	CULPABLE	5.547	1.542	64

VARIABLE: PERCEIVED CONTROL (contd.)

FACTOR		MEAN	STD. DEV.	N
45 YRS +	(MALE)			
ACCIDENTS:	NONE	5.045	1.528	111
	NON CULPABLE	5.422	1.840	45
	CULPABLE	4.794	1.740	126
	(FEMALE)			
ACCIDENTS:	NONE	5.143	1.697	91
	NON CULPABLE	4.750	2.454	12
	CULPABLE	5.324	1.718	34

VARIABLE: YEARS DRIVING

FACTOR				
UNDER 30 YRS	(MALE)			
ACCIDENTS:	NONE	4.935	3.703	92
	NON CULPABLE	7.032	3.311	31
	CULPABLE	5.966	3.297	118
	(FEMALE)			
ACCIDENTS:	NONE	5.010	3.305	104
	NON CULPABLE	6.000	3.060	23
	CULPABLE	5.215	3.214	65
30-44 YRS	(MALE)			
ACCIDENTS:	NONE	16.086	7.075	81
	NON CULPABLE	18.119	5.100	42
	CULPABLE	17.008	5.826	123
	(FEMALE)			
ACCIDENTS:	NONE	13.094	6.682	117
	NON CULPABLE	14.586	7.139	29
	CULPABLE	15.312	6.349	64
45 YRS +	(MALE)			
ACCIDENTS:	NONE	33.856	12.323	111
	NON CULPABLE	35.022	11.009	45
	CULPABLE	33.738	9.448	126
	(FEMALE)			
ACCIDENTS:	NONE	24.033	9.839	91
	NON CULPABLE	25.250	7.098	12
	CULPABLE	25.353	10.680	34

VARIABLE: MILES WEEKLY

FACTOR				
UNDER 30 YRS	(MALE)			
ACCIDENTS:	NONE	238.228	216.015	92
	NON CULPABLE	284.032	530.428	31
	CULPABLE	354.864	407.231	118
	(FEMALE)			
ACCIDENTS:	NONE	97.000	116.985	104
	NON CULPABLE	191.304	229.794	23
	CULPABLE	177.569	185.984	65

VARIABLE: MILES WEEKLY (contd.)

FACTOR			MEAN	STD. DEV.	N
30-44 YRS	(MALE)				
	ACCIDENTS:	NONE	270.062	412.980	81
		NON CULPABLE	304.643	247.909	42
		CULPABLE	395.967	359.030	123
	(FEMALE)				
	ACCIDENTS:	NONE	135.786	218.527	117
		NON CULPABLE	161.414	148.996	29
		CULPABLE	157.797	172.550	64
45 YRS +	(MALE)				
	ACCIDENTS:	NONE	241.946	385.315	111
		NON CULPABLE	229.156	224.451	45
		CULPABLE	300.603	225.250	126
	(FEMALE)				
	ACCIDENTS:	NONE	107.659	102.300	91
		NON CULPABLE	162.500	137.783	12
		CULPABLE	207.824	400.441	34

SIGNIFICANT COVARIATE RESULTS (DRIVING DURATION & INTENSITY)
MULTIVARIATE RESULTS

Multivariate tests of significance (S=2 M=3 N=639)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.95125	3.60	18.00	2560.00	.000

UNIVARIATE RESULTS

Univariate F-tests with (2,1288) DF

Variable	SqMulR	MulR	AdjRsq	HpthMS	ErrorMS	F	Sig of F
SPEED	.009	.10	.008	43.47	7.39	5.89	.003
DRIVER SKILLS	.010	.10	.009	15.77	2.33	6.77	.001
DRINKDRIVING	.006	.08	.004	12.83	3.34	3.84	.022
ANTICIPATION	.023	.15	.021	12.19	.82	14.91	.000

INDIVIDUAL UNIVARIATE EFFECTS ATTRIBUTABLE TO COVARIATES (YEARS DRIVING AND WEEKLY MILEAGE)

Dependent Variable	Covariate	t-value	Sig of t
SPEED	MLSWKLY	3.416	.001
DRIVER SKILLS	YRSDRIV	2.759	.006
DRIVER SKILLS	MLSWKLY	2.380	.017
DRINK DRIVING	YRSDRIV	2.582	.010
SOLO SPEEDING	YRSDRIV	-2.081	.038
ANTICIPATION	YRSDRIV	2.311	.021
ANTICIPATION	MLSWKLY	4.901	.000

Adjusted and Estimated Means
Variable .. SPEED

CELL	Obs. Mean	Adj. Mean	Est. Mean	Raw Resid.	Std. Resid.
1	15.837	15.855	15.837	.000	.000
2	16.097	16.068	16.097	.000	.000
3	16.059	15.970	16.059	.000	.000
4	14.519	14.663	14.519	.000	.000
5	14.304	14.361	14.304	.000	.000
6	15.723	15.794	15.723	.000	.000
7	14.704	14.664	14.704	.000	.000
8	15.071	14.996	15.071	.000	.000
9	15.317	15.163	15.317	.000	.000
10	14.188	14.276	14.188	.000	.000
11	14.483	14.544	14.483	.000	.000
12	14.578	14.641	14.578	.000	.000
13	13.973	13.913	13.973	.000	.000
14	13.156	13.104	13.156	.000	.000
15	14.437	14.324	14.437	.000	.000
16	13.451	13.536	13.451	.000	.000
17	14.250	14.283	14.250	.000	.000
18	14.000	13.992	14.000	.000	.000

Variable .. FRUSTRATION

CELL	Obs. Mean	Adj. Mean	Est. Mean	Raw Resid.	Std. Resid.
1	16.957	16.864	16.957	.000	.000
2	16.968	16.891	16.968	.000	.000
3	16.669	16.585	16.669	.000	.000
4	16.125	16.032	16.125	.000	.000
5	16.957	16.872	16.957	.000	.000
6	17.246	17.155	17.246	.000	.000
7	15.901	15.894	15.901	.000	.000
8	15.881	15.890	15.881	.000	.000
9	15.878	15.879	15.878	.000	.000
10	14.932	14.901	14.932	.000	.000
11	16.310	16.292	16.310	.000	.000
12	16.063	16.049	16.063	.000	.000
13	15.297	15.428	15.297	.000	.000
14	13.911	14.051	13.911	.000	.000
15	14.468	14.598	14.468	.000	.000
16	15.066	15.120	15.066	.000	.000
17	16.833	16.897	16.833	.000	.000
18	15.294	15.359	15.294	.000	.000

Adjusted and Estimated Means
Variable .. DRIVER SKILLS .

CELL	Obs. Mean	Adj. Mean	Est. Mean	Raw Resid.	Std. Resid.
1	14.402	14.589	14.402	.000	.000
2	13.968	14.105	13.968	.000	.000
3	13.983	14.113	13.983	.000	.000
4	13.385	13.620	13.385	.000	.000
5	13.522	13.708	13.522	.000	.000
6	13.677	13.881	13.677	.000	.000
7	13.568	13.566	13.568	.000	.000
8	13.786	13.739	13.786	.000	.000
9	13.667	13.606	13.667	.000	.000
10	13.051	13.144	13.051	.000	.000
11	13.517	13.577	13.517	.000	.000
12	13.141	13.190	13.141	.000	.000
13	13.541	13.264	13.541	.000	.000
14	13.422	13.132	13.422	.000	.000
15	13.246	12.951	13.246	.000	.000
16	13.099	13.027	13.099	.000	.000
17	13.083	12.972	13.083	.000	.000
18	13.324	13.195	13.324	.000	.000

Variable .. DRINK DRIVING

CELL	Obs. Mean	Adj. Mean	Est. Mean	Raw Resid.	Std. Resid.
1	3.761	3.980	3.761	.000	.000
2	5.000	5.190	5.000	.000	.000
3	4.788	5.010	4.788	.000	.000
4	3.692	3.883	3.692	.000	.000
5	3.870	4.060	3.870	.000	.000
6	3.923	4.125	3.923	.000	.000
7	4.494	4.519	4.494	.000	.000
8	4.690	4.685	4.690	.000	.000
9	4.862	4.893	4.862	.000	.000
10	3.923	3.976	3.923	.000	.000
11	3.759	3.790	3.759	.000	.000
12	4.172	4.190	4.172	.000	.000
13	5.243	4.944	5.243	.000	.000
14	4.200	3.878	4.200	.000	.000
15	4.714	4.428	4.714	.000	.000
16	4.538	4.391	4.538	.000	.000
17	3.833	3.674	3.833	.000	.000
18	4.059	3.906	4.059	.000	.000

Adjusted and Estimated Means
Variable .. SOLO SPEEDING

CELL	Obs. Mean	Adj. Mean	Est. Mean	Raw Resid.	Std. Resid.
1	6.348	6.178	6.348	.000	.000
2	6.839	6.694	6.839	.000	.000
3	6.432	6.266	6.432	.000	.000
4	5.875	5.718	5.875	.000	.000
5	6.565	6.414	6.565	.000	.000
6	6.092	5.931	6.092	.000	.000
7	5.321	5.304	5.321	.000	.000
8	5.190	5.199	5.190	.000	.000
9	5.309	5.294	5.309	.000	.000
10	4.880	4.834	4.880	.000	.000
11	5.034	5.006	5.034	.000	.000
12	5.344	5.326	5.344	.000	.000
13	4.820	5.055	4.820	.000	.000
14	4.133	4.386	4.133	.000	.000
15	4.587	4.815	4.587	.000	.000
16	4.407	4.516	4.407	.000	.000
17	4.583	4.705	4.583	.000	.000
18	5.000	5.119	5.000	.000	.000

Variable .. ANTICIPATION

CELL	Obs. Mean	Adj. Mean	Est. Mean	Raw Resid.	Std. Resid.
1	7.793	7.883	7.793	.000	.000
2	7.742	7.795	7.742	.000	.000
3	7.559	7.591	7.559	.000	.000
4	7.490	7.639	7.490	.000	.000
5	7.696	7.796	7.696	.000	.000
6	7.369	7.482	7.369	.000	.000
7	7.852	7.839	7.852	.000	.000
8	7.929	7.885	7.929	.000	.000
9	7.813	7.739	7.813	.000	.000
10	7.573	7.641	7.573	.000	.000
11	7.483	7.528	7.483	.000	.000
12	7.531	7.572	7.531	.000	.000
13	7.703	7.561	7.703	.000	.000
14	7.800	7.654	7.800	.000	.000
15	7.683	7.517	7.683	.000	.000
16	7.670	7.664	7.670	.000	.000
17	7.083	7.044	7.083	.000	.000
18	7.735	7.675	7.735	.000	.000

Adjusted and Estimated Means

Variable .. NEGATIVE ATTITUDE TO OTHER DRIVERS

CELL	Obs. Mean	Adj. Mean	Est. Mean	Raw Resid.	Std. Resid.
1	5.902	5.936	5.902	.000	.000
2	5.710	5.741	5.710	.000	.000
3	6.161	6.201	6.161	.000	.000
4	6.192	6.215	6.192	.000	.000
5	5.870	5.897	5.870	.000	.000
6	6.108	6.136	6.108	.000	.000
7	5.963	5.969	5.963	.000	.000
8	5.952	5.956	5.952	.000	.000
9	5.837	5.851	5.837	.000	.000
10	5.966	5.970	5.966	.000	.000
11	6.000	6.002	6.000	.000	.000
12	6.172	6.171	6.172	.000	.000
13	6.396	6.352	6.396	.000	.000
14	6.044	5.996	6.044	.000	.000
15	6.381	6.341	6.381	.000	.000
16	6.352	6.324	6.352	.000	.000
17	6.000	5.973	6.000	.000	.000
18	6.265	6.241	6.265	.000	.000

Variable .. AWARENESS OF OTHER ROAD USERS

CELL	Obs. Mean	Adj. Mean	Est. Mean	Raw Resid.	Std. Resid.
1	5.598	5.564	5.598	.000	.000
2	5.194	5.160	5.194	.000	.000
3	5.271	5.227	5.271	.000	.000
4	5.663	5.645	5.663	.000	.000
5	5.739	5.713	5.739	.000	.000
6	5.615	5.589	5.615	.000	.000
7	5.481	5.474	5.481	.000	.000
8	5.429	5.423	5.429	.000	.000
9	5.179	5.160	5.179	.000	.000
10	5.547	5.546	5.547	.000	.000
11	5.793	5.793	5.793	.000	.000
12	5.469	5.471	5.469	.000	.000
13	5.793	5.836	5.793	.000	.000
14	5.644	5.693	5.644	.000	.000
15	5.468	5.505	5.468	.000	.000
16	5.714	5.746	5.714	.000	.000
17	6.000	6.029	6.000	.000	.000
18	5.794	5.818	5.794	.000	.000

Adjusted and Estimated Means
Variable .. PERCEIVED CONTROL

CELL	Obs. Mean	Adj. Mean	Est. Mean	Raw Resid.	Std. Resid.
1	5.174	5.091	5.174	.000	.000
2	5.258	5.192	5.258	.000	.000
3	5.288	5.218	5.288	.000	.000
4	5.413	5.323	5.413	.000	.000
5	5.348	5.269	5.348	.000	.000
6	5.738	5.654	5.738	.000	.000
7	5.420	5.416	5.420	.000	.000
8	5.810	5.822	5.810	.000	.000
9	5.260	5.269	5.260	.000	.000
10	5.137	5.105	5.137	.000	.000
11	5.552	5.532	5.552	.000	.000
12	5.547	5.532	5.547	.000	.000
13	5.045	5.164	5.045	.000	.000
14	5.422	5.549	5.422	.000	.000
15	4.794	4.915	4.794	.000	.000
16	5.143	5.186	5.143	.000	.000
17	4.750	4.805	4.750	.000	.000
18	5.324	5.381	5.324	.000	.000

APPENDIX F(4): ACCIDENT INVOLVEMENT AND SUBJECTIVE CULPABILITY - ATTRIBUTIONS FOR ROAD TRAFFIC ACCIDENTS IN BRITAIN (MANCOVA)

VARIABLE: ATTITUDE TO DRIVER VARIABLES

FACTOR		MEAN	STD. DEV.	N
UNDER 30 YRS	(MALE)			
ACCIDENTS:	NONE	19.837	2.814	92
	NON CULPABLE	20.103	2.895	29
	CULPABLE	19.681	2.833	116
	(FEMALE)			
ACCIDENTS:	NONE	20.198	2.624	106
	NON CULPABLE	20.609	2.872	23
	CULPABLE	20.162	2.155	68
30-44 YRS	(MALE)			
ACCIDENTS:	NONE	20.386	2.785	88
	NON CULPABLE	21.111	2.279	45
	CULPABLE	20.234	2.741	124
	(FEMALE)			
ACCIDENTS:	NONE	20.792	2.530	120
	NON CULPABLE	20.207	2.470	29
	CULPABLE	19.968	2.239	62
45 YRS +	(MALE)			
ACCIDENTS:	NONE	20.579	2.784	114
	NON CULPABLE	21.542	2.073	48
	CULPABLE	20.355	2.605	138
	(FEMALE)			
ACCIDENTS:	NONE	21.170	2.345	94
	NON CULPABLE	22.063	2.955	16
	CULPABLE	20.703	2.581	37

VARIABLE: ATTITUDE TO OTHER ROAD USERS

FACTOR				
UNDER 30 YRS	(MALE)			
ACCIDENTS:	NONE	8.065	1.808	92
	NON CULPABLE	6.759	1.596	29
	CULPABLE	8.078	2.382	116
	(FEMALE)			
ACCIDENTS:	NONE	8.708	2.225	106
	NON CULPABLE	8.478	2.391	23
	CULPABLE	8.471	1.783	68
30-44 YRS	(MALE)			
ACCIDENTS:	NONE	8.034	2.109	88
	NON CULPABLE	8.511	2.128	45
	CULPABLE	7.798	2.000	124
	(FEMALE)			
ACCIDENTS:	NONE	9.117	1.997	120
	NON CULPABLE	9.310	1.650	29
	CULPABLE	8.355	1.874	62

VARIABLE: ATTITUDE TO OTHER ROAD USERS (contd.)

FACTOR			MEAN	STD. DEV.	N
45 YRS +	(MALE)				
	ACCIDENTS:	NONE	8.772	2.277	114
		NON CULPABLE	8.750	2.572	48
		CULPABLE	8.036	1.727	138
	(FEMALE)				
	ACCIDENTS:	NONE	9.255	2.300	94
		NON CULPABLE	9.375	2.630	16
		CULPABLE	9.270	1.774	37

VARIABLE: SPEED AND AGGRESSION

FACTOR					
UNDER 30 YRS	(MALE)				
	ACCIDENTS:	NONE	8.185	1.437	92
		NON CULPABLE	7.552	1.404	29
		CULPABLE	7.948	1.479	116
	(FEMALE)				
	ACCIDENTS:	NONE	8.425	1.218	106
		NON CULPABLE	8.739	1.544	23
		CULPABLE	8.500	1.264	68
30-44 YRS	(MALE)				
	ACCIDENTS:	NONE	8.159	1.364	88
		NON CULPABLE	8.333	1.462	45
		CULPABLE	8.008	1.462	124
	(FEMALE)				
	ACCIDENTS:	NONE	8.900	1.126	120
		NON CULPABLE	7.828	1.834	29
		CULPABLE	8.000	1.280	62
45 YRS +	(MALE)				
	ACCIDENTS:	NONE	8.535	1.311	114
		NON CULPABLE	8.667	1.243	48
		CULPABLE	8.072	1.248	138
	(FEMALE)				
	ACCIDENTS:	NONE	8.989	1.042	94
		NON CULPABLE	8.875	1.088	16
		CULPABLE	8.486	1.387	37

VARIABLE: ROAD AND WEATHER CONDITIONS

FACTOR					
UNDER 30 YRS	(MALE)				
	ACCIDENTS:	NONE	7.250	1.720	92
		NON CULPABLE	6.759	1.766	29
		CULPABLE	7.276	1.722	116
	(FEMALE)				
	ACCIDENTS:	NONE	7.472	1.422	106
		NON CULPABLE	7.130	1.576	23
		CULPABLE	7.706	1.404	68

VARIABLE: ROAD AND WEATHER CONDITIONS (contd.)

FACTOR		MEAN	STD. DEV.	N
30-44 YRS	(MALE)			
ACCIDENTS:	NONE	7.136	1.606	88
	NON CULPABLE	7.178	1.910	45
	CULPABLE	6.919	1.765	124
	(FEMALE)			
ACCIDENTS:	NONE	7.408	1.429	120
	NON CULPABLE	7.103	1.496	29
	CULPABLE	6.984	1.312	62
45 YRS +	(MALE)			
ACCIDENTS:	NONE	7.465	1.586	114
	NON CULPABLE	7.500	1.444	48
	CULPABLE	6.986	1.657	138
	(FEMALE)			
ACCIDENTS:	NONE	7.670	1.527	94
	NON CULPABLE	7.063	2.265	16
	CULPABLE	7.730	1.575	37

VARIABLE: IMPAIRMENT

FACTOR		MEAN	STD. DEV.	N
UNDER 30 YRS	(MALE)			
ACCIDENTS:	NONE	15.163	2.235	92
	NON CULPABLE	14.379	2.077	29
	CULPABLE	14.707	2.624	116
	(FEMALE)			
ACCIDENTS:	NONE	15.585	2.124	106
	NON CULPABLE	15.652	2.838	23
	CULPABLE	14.824	2.116	68
30-44 YRS	(MALE)			
ACCIDENTS:	NONE	15.125	1.964	88
	NON CULPABLE	14.778	2.265	45
	CULPABLE	14.645	2.516	124
	(FEMALE)			
ACCIDENTS:	NONE	15.917	1.895	120
	NON CULPABLE	15.379	2.527	29
	CULPABLE	15.032	2.217	62
45 YRS +	(MALE)			
ACCIDENTS:	NONE	15.842	2.592	114
	NON CULPABLE	15.833	2.571	48
	CULPABLE	14.616	2.290	138
	(FEMALE)			
ACCIDENTS:	NONE	16.372	2.355	94
	NON CULPABLE	15.437	3.032	16
	CULPABLE	16.378	2.289	37

VARIABLE: YEARS DRIVING

FACTOR		MEAN	STD. DEV.	N
UNDER 30 YRS	(MALE)			
ACCIDENTS:	NONE	4.967	3.743	92
	NON CULPABLE	7.034	3.386	29
	CULPABLE	6.026	3.340	116
	(FEMALE)			
ACCIDENTS:	NONE	4.981	3.298	106
	NON CULPABLE	6.000	3.060	23
	CULPABLE	5.132	3.246	68
30-44 YRS	(MALE)			
ACCIDENTS:	NONE	16.443	7.040	88
	NON CULPABLE	17.889	5.046	45
	CULPABLE	17.016	5.786	124
	(FEMALE)			
ACCIDENTS:	NONE	13.158	6.698	120
	NON CULPABLE	14.586	7.139	29
	CULPABLE	15.306	6.421	62
45 YRS +	(MALE)			
ACCIDENTS:	NONE	33.965	12.372	114
	NON CULPABLE	33.896	10.215	48
	CULPABLE	34.239	8.951	138
	(FEMALE)			
ACCIDENTS:	NONE	24.553	10.440	94
	NON CULPABLE	24.688	7.726	16
	CULPABLE	24.865	10.459	37

VARIABLE: MILES WEEKLY

FACTOR				
UNDER 30 YRS	(MALE)			
ACCIDENTS:	NONE	239.315	218.097	92
	NON CULPABLE	263.966	542.098	29
	CULPABLE	356.069	409.867	116
	(FEMALE)			
ACCIDENTS:	NONE	100.792	117.838	106
	NON CULPABLE	191.304	229.794	23
	CULPABLE	175.059	182.094	68
30-44 YRS	(MALE)			
ACCIDENTS:	NONE	270.398	399.613	88
	NON CULPABLE	306.556	245.588	45
	CULPABLE	392.371	358.955	124
	(FEMALE)			
ACCIDENTS:	NONE	134.692	216.004	120
	NON CULPABLE	161.414	148.996	29
	CULPABLE	161.839	173.834	62
45 YRS +	(MALE)			
ACCIDENTS:	NONE	243.877	382.346	114
	NON CULPABLE	238.271	233.686	48
	CULPABLE	287.696	222.774	138
	(FEMALE)			
ACCIDENTS:	NONE	104.596	100.282	94
	NON CULPABLE	183.750	140.137	16
	CULPABLE	195.703	385.766	37

SIGNIFICANT COVARIATE RESULTS (DRIVING DURATION & INTENSITY)
MULTIVARIATE RESULTS

Multivariate tests of significance (S=2 M=1 N=661 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.97076	3.96	10.00	2650.00	.000

UNIVARIATE RESULTS

Univariate F-tests with (2,1329) DF

Variable	SqMulR	MulR	AdjRsq	HpthMS	ErrorMS	F	Sig of F
ATTITUDE TO DRIVER VARIABLES	.01	.12	.012	60.32	6.72	8.98	.000

INDIVIDUAL UNIVARIATE EFFECTS ATTRIBUTABLE TO COVARIATES (YEARS DRIVING AND WEEKLY MILEAGE)

Dependent Variable	Covariate	t-value	Sig of t
ATTITUDE TO DRIVER VARIABLES	MLSWKLY	4.18	.000

Adjusted and Estimated Means
Variable .. ATTITUDE TO DRIVER VARIABLES

CELL	Obs. Mean	Adj. Mean	Est. Mean	Raw Resid.	Std. Resid.
1	19.837	19.893	19.837	.000	.000
2	20.103	20.121	20.103	.000	.000
3	19.681	19.610	19.681	.000	.000
4	20.198	20.397	20.198	.000	.000
5	20.609	20.708	20.609	.000	.000
6	20.162	20.283	20.162	.000	.000
7	20.386	20.340	20.386	.000	.000
8	21.111	21.018	21.111	.000	.000
9	20.234	20.058	20.234	.000	.000
10	20.792	20.906	20.792	.000	.000
11	20.207	20.285	20.207	.000	.000
12	19.968	20.041	19.968	.000	.000
13	20.579	20.453	20.579	.000	.000
14	21.542	21.422	21.542	.000	.000
15	20.355	20.182	20.355	.000	.000
16	21.170	21.246	21.170	.000	.000
17	22.063	22.055	22.063	.000	.000
18	20.703	20.682	20.703	.000	.000

Adjusted and Estimated Means
Variable .. ATTITUDE TO OTHER ROAD USERS

CELL	Obs. Mean	Adj. Mean	Est. Mean	Raw Resid.	Std. Resid.
1	8.065	7.920	8.065	.000	.000
2	6.759	6.636	6.759	.000	.000
3	8.078	7.936	8.078	.000	.000
4	8.708	8.572	8.708	.000	.000
5	8.478	8.349	8.478	.000	.000
6	8.471	8.332	8.471	.000	.000
7	8.034	8.025	8.034	.000	.000
8	8.511	8.517	8.511	.000	.000
9	7.798	7.787	7.798	.000	.000
10	9.117	9.078	9.117	.000	.000
11	9.310	9.287	9.310	.000	.000
12	8.355	8.340	8.355	.000	.000
13	8.772	8.976	8.772	.000	.000
14	8.750	8.953	8.750	.000	.000
15	8.036	8.240	8.036	.000	.000
16	9.255	9.356	9.255	.000	.000
17	9.375	9.471	9.375	.000	.000
18	9.270	9.368	9.270	.000	.000

Variable .. SPEED AND AGGRESSION

CELL	Obs. Mean	Adj. Mean	Est. Mean	Raw Resid.	Std. Resid.
1	8.185	8.216	8.185	.000	.000
2	7.552	7.584	7.552	.000	.000
3	7.948	8.004	7.948	.000	.000
4	8.425	8.423	8.425	.000	.000
5	8.739	8.756	8.739	.000	.000
6	8.500	8.515	8.500	.000	.000
7	8.159	8.171	8.159	.000	.000
8	8.333	8.351	8.333	.000	.000
9	8.008	8.047	8.008	.000	.000
10	8.900	8.888	8.900	.000	.000
11	7.828	7.819	7.828	.000	.000
12	8.000	7.990	8.000	.000	.000
13	8.535	8.502	8.535	.000	.000
14	8.667	8.632	8.667	.000	.000
15	8.072	8.049	8.072	.000	.000
16	8.989	8.945	8.989	.000	.000
17	8.875	8.849	8.875	.000	.000
18	8.486	8.462	8.486	.000	.000

Adjusted and Estimated Means
Variable .. ROAD AND WEATHER CONDITIONS

CELL	Obs. Mean	Adj. Mean	Est. Mean	Raw Resid.	Std. Resid.
1	7.250	7.250	7.250	.000	.000
2	6.759	6.756	6.759	.000	.000
3	7.276	7.266	7.276	.000	.000
4	7.472	7.482	7.472	.000	.000
5	7.130	7.134	7.130	.000	.000
6	7.706	7.710	7.706	.000	.000
7	7.136	7.133	7.136	.000	.000
8	7.178	7.171	7.178	.000	.000
9	6.919	6.906	6.919	.000	.000
10	7.408	7.415	7.408	.000	.000
11	7.103	7.108	7.103	.000	.000
12	6.984	6.989	6.984	.000	.000
13	7.465	7.462	7.465	.000	.000
14	7.500	7.498	7.500	.000	.000
15	6.986	6.979	6.986	.000	.000
16	7.670	7.679	7.670	.000	.000
17	7.063	7.065	7.063	.000	.000
18	7.730	7.731	7.730	.000	.000

Variable .. IMPAIRMENT

CELL	Obs. Mean	Adj. Mean	Est. Mean	Raw Resid.	Std. Resid.
1	15.163	15.017	15.163	.000	.000
2	14.379	14.250	14.379	.000	.000
3	14.707	14.536	14.707	.000	.000
4	15.585	15.483	15.585	.000	.000
5	15.652	15.534	15.652	.000	.000
6	14.824	14.700	14.824	.000	.000
7	15.125	15.104	15.125	.000	.000
8	14.778	14.762	14.778	.000	.000
9	14.645	14.592	14.645	.000	.000
10	15.917	15.900	15.917	.000	.000
11	15.379	15.371	15.379	.000	.000
12	15.032	15.033	15.032	.000	.000
13	15.842	16.036	15.842	.000	.000
14	15.833	16.028	15.833	.000	.000
15	14.616	14.799	14.616	.000	.000
16	16.372	16.500	16.372	.000	.000
17	15.437	15.541	15.438	.000	.000
18	16.378	16.480	16.378	.000	.000

APPENDIX G(1): TRAFFIC OFFENCE HISTORY/RECENCY

This set of MANCOVAS is concerned with the relationship between traffic offence history and driver attitude/attribution.

DRIVER AFFECT/STATE IN RELATION TO TRAFFIC OFFENCES

A significant multivariate interaction occurred between age and sex (p=.048). The main effect for age was also multivariately significant (p<.001). Both of these effects related univariately to irritability, intimidation, and unawareness.

AGE BY SEX BY TRAFFIC OFFENCES
A univariately significant interaction between age, sex, and traffic offences was found to relate to irritability (p=.020) and unawareness (p=.009). The findings for the former were that, although irritability increased in a linear fashion in males with a history of traffic offences, female traffic offenders reported the highest levels of driving-related irritability of all drivers, during the ages of 30-44 years, reporting in sharp contrast however, the lowest levels of irritability of all drivers, from the age of 45 years. Following covariate control older females with current endorsements were found to report significantly lower levels of irritability within the driving situation than all other drivers (t=3.09, p=.002).

A further interaction effect revealed that middle-aged female traffic offenders reported significantly lower levels of driver awareness than their older counterparts (t=3.14, p=.002), the former with current endorsements reporting the lowest levels of awareness of all drivers, and the latter, also with current endorsements, reporting the highest levels. In contrast, young male traffic offenders reported significantly higher levels of driver awareness than their older counterparts (t=2.03, p=.04). These differing patterns suggest that offences may be mediated by different factors in accordance with life stage and sex.

AGE BY TRAFFIC OFFENCES
A univariately significant age by traffic offences interaction relating to unawareness (p=.033), revealed that, following covariate control, middle-aged traffic offenders were distinguished by their significantly lower level of awareness within the driving environment by comparison with other drivers (t=-2.19,p=.03), which appears to be attributable largely to the low awareness of female offenders within this age group.

AGE BY SEX
Univariately significant age and sex interactions were found in relation to irritability (p=.006), intimidation (p=.008), and unawareness (p=.014). Following covariate control, older males were found to report significantly higher levels of driving-related irritability (t=-3.17, p=.002) and intimidation (t=-3.09, p=.002), but also greater awareness (t=-2.66, p=.008) than did their female counterparts.

AGE
At the univariate level, significant age effects related to irritability (p=.006), intimidation (p<.001), and unawareness (p<.001). Following covariate control, drivers under the age of 45 years were found to be significantly more irritable within the driving situation than older drivers (t=2.59, p=.01), while drivers in the two older groups reported significantly greater intimidation than young drivers (t=-4.57, p=.00001). Drivers in the 30-44 years age band were distinguished by their significantly lower reported driving-related awareness (t=3.54, p=.0004), which seems to be attributable traffic offenders in this age group.

TABLE 27: DRIVER AFFECT/STATE

TABLE 27(A): MULTIVARIATE RESULTS

AGE BY SEX BY TRAFFIC OFFENCES
Multivariate tests of significance (S=4 M=-1/2 N=638 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.98307	1.37	16.00	3908.05	.147

SEX BY TRAFFIC OFFENCES
Multivariate tests of significance (S=2 M=1/2 N=638 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.99759	.39	8.00	2558.00	.928

AGE BY TRAFFIC OFFENCES
Multivariate tests of significance (S=4 M=-1/2 N=638 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.98457	1.25	16.00	3908.05	.223

AGE BY SEX
Multivariate tests of significance (S=2 M=1/2 N=638 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.98787	1.96	8.00	2558.00	.048

TRAFFIC OFFENCES
Multivariate tests of significance (S=2 M=1/2 N=638 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.99555	.71	8.00	2558.00	.679

SEX
Multivariate tests of significance (S=1 M=1 N=638 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.99490	1.64	4.00	1279.00	.162

AGE
Multivariate tests of significance (S=2 M=1/2 N=638 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.96517	5.72	8.00	2558.00	.000

TABLE 27(B): SIGNIFICANT UNIVARIATE RESULTS

AGE BY SEX BY TRAFFIC OFFENCES
Univariate F-tests with (4,1282) DF

Variable	HypthSS	ErrorSS	HypthMS	ErrorMS	F	Sig/F
IRRITABILITY	488.76	53470.89	122.19	41.71	2.93	.020
UNAWARENESS	61.74	5794.68	15.44	4.52	3.41	.009

AGE BY TRAFFIC OFFENCES
Univariate F-tests with (4,1282) DF

Variable	HypthSS	ErrorSS	HypthMS	ErrorMS	F	Sig/F
UNAWARENESS	47.62	5794.68	11.90	4.52	2.63	.033

AGE BY SEX
Univariate F-tests with (2,1282) DF

Variable	HypthSS	ErrorSS	HypthMS	ErrorMS	F	Sig/F
IRRITABILITY	423.11	53470.89	211.56	41.71	5.07	.006
INTIMIDATION	92.35	12095.79	46.17	9.44	4.89	.008
UNAWARENESS	38.82	5794.68	19.41	4.52	4.29	.014

AGE
Univariate F-tests with (2,1282) DF

Variable	HypthSS	ErrorSS	HypthMS	ErrorMS	F	Sig/F
IRRITABILITY	423.36	53470.89	211.68	41.71	5.08	.006
INTIMIDATION	268.56	12095.79	134.28	9.44	14.23	.000
UNAWARENESS	72.80	5794.68	36.40	4.52	8.05	.000

DRIVERS' SELF-PERCEPTION IN RELATION TO TRAFFIC OFFENCES

A significant multivariate interaction was found between age and sex in relation to driver self-perception (p=.010). Significant multivariate effects were also found for two of the three main effects, traffic offences and age, both beyond .001 level.

AGE BY SEX BY TRAFFIC OFFENCES
Following covariate control a significant interaction emerged relating to the significantly higher ratings of self as irritable by middle-aged female traffic offenders by comparison with their older counterparts (t=2.62, p=.009).

AGE BY SEX
At the univariate level, age/sex interactions were found to be significant in relation to drivers' perceptions of themselves as confident (p=.028) and aware (p=.023). Following covariate control, young females were found to rate themselves as significantly less confident than did all other drivers (t=2.19, p=.03). Females' ratings of their driver awareness increased with age, older females being distinguished by their significantly higher reported awareness than all other drivers (t=2.09, p=.04).

TRAFFIC OFFENCES
With regard to traffic offences, univariately significant effects related to drivers' perceptions of themselves as safe (p=.001), confident (p=.001), and aware (p=.018). Following covariate control, drivers with no history of traffic offences were found to perceive themselves to be significantly

safer drivers than did traffic offenders ($t=3.35$, $p=.0008$). However, traffic offenders rated themselves as significantly more confident than did those without such a history ($t=-3.38$, $p=.0008$). Drivers with current endorsements rated themselves as having less driver awareness than did traffic offenders without current endorsements ($t=2.84$, $p=.005$).

AGE

The age effect related at univariate level to drivers' perceptions of themselves as irritable ($p<.001$) and safe ($p=.014$). Following covariate control, drivers in the two younger groups were found to report themselves to be significantly more irritable than did older drivers ($t=4.68$, $p<.00001$). Perceptions of safety were found to increase in a linear fashion with age, significant increments occurring in middle age ($t=-2.23$, $p=.03$) and amongst older drivers ($t=-2.41$, $p=.02$).

TABLE 28: DRIVER SELF PERCEPTION

TABLE 28(A): MULTIVARIATE RESULTS

AGE BY SEX BY TRAFFIC OFFENCES
Multivariate tests of significance (S=4 M=-1/2 N=651 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.98664	1.10	16.00	3987.48	.349

SEX BY TRAFFIC OFFENCES
Multivariate tests of significance (S=2 M=1/2 N=651 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.99498	.82	8.00	2610.00	.583

AGE BY TRAFFIC OFFENCES
Multivariate tests of significance (S=4 M=-1/2 N=651 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.98822	.97	16.00	3987.48	.489

AGE BY SEX
Multivariate tests of significance (S=2 M=1/2 N=651 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.98482	2.51	8.00	2610.00	.010

TRAFFIC OFFENCES
Multivariate tests of significance (S=2 M=1/2 N=651 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.96898	5.18	8.00	2610.00	.000

SEX
Multivariate tests of significance (S=1 M=1 N=651 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.99365	2.08	4.00	1305.00	.081

AGE
Multivariate tests of significance (S=2 M=1/2 N=651 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.97850	3.56	8.00	2610.00	.000

TABLE 28(B): SIGNIFICANT UNIVARIATE RESULTS

AGE BY SEX
Univariate F-tests with (2,1308) DF

Variable	HypthSS	ErrorSS	HypthMS	ErrorMS	F	Sig/F
CONFIDENT	29.33	5351.37	14.66	4.09	3.58	.028
AWARE	29.24	5029.63	14.62	3.85	3.80	.023

TRAFFIC OFFENCES
Univariate F-tests with (2,1308) DF

Variable	HypthSS	ErrorSS	HypthMS	ErrorMS	F	Sig/F
SAFE	142.83	13817.72	71.41	10.56	6.76	.001
CONFIDENT	56.52	5351.37	28.26	4.09	6.91	.001
AWARE	31.03	5029.63	15.51	3.85	4.03	.018

AGE
Univariate F-tests with (2,1308) DF

Variable	HypthSS	ErrorSS	HypthMS	ErrorMS	F	Sig/F
IRRITABLE	352.00	20441.80	176.00	15.63	11.26	.000

DRIVER ATTITUDES/REPORTED BEHAVIOURS IN RELATION TO TRAFFIC OFFENCES

No significant multivariate interactions were detected, however two of the three main effects, sex and age, had multivariate significance, both beyond .001 level.

AGE BY SEX BY TRAFFIC OFFENCES
Following covariate control a significantly higher frequency of solo speeding distinguishing young male traffic offenders was revealed (t=-2.23, p=.03). Older male offenders were distinguished by reporting significantly less awareness of non-driiving road users than all other drivers (t=-2.07, p=.04)

AGE BY SEX
Significant univariate interactions were found in relation to solo speeding (p=.031) and anticipation (p=.034). Following covariate control young males were found to report significantly higher frequencies of solo speeding than all other drivers (t=2.14, p=.03). The latter effect involved males aged 30-44 years reporting significantly higher levels of anticipatory skills than their female counterparts (t=2.30, p=.02), with males in this age group rating their anticipation at a higher level, and females at a lower level, than all other drivers.

AGE BY TRAFFIC OFFENCES
Following covariate control, older traffic offenders were found to report significantly more negative attitudes to other drivers than their counterparts in the two younger groups or than non-offenders (t=-2.32, p=.02).

TRAFFIC OFFENCES

Solo speeding alone was univariately significant (p=.038) in relation to traffic offences. Following covariate control traffic offenders were found to report significantly higher frequencies of speeding behaviours (t=-2.28, p=.02), and solo speeding behaviours (speeding when upset, and taking less care when driving alone) (t=-2.37, p=.02) than did non-offenders.

SEX

Univariately significant effects were found relating to
driver skills (p=.003) and drink driving (p<.001). Following covariate control these were found to relate to males consistently rating their driving skills at a significantly higher level than did females (t=2.95, p=.003) and reporting significantly higher levels of drink-driving behaviours than did females (t=4.22, p=.00003).

AGE

Six of the nine factors in this analysis had univariately significant age effects: speed, frustration, driver skills, and solo speeding all had significance beyond .001 level, negative attitude to other drivers (p=.024), and awareness of other road users (p=.001).

Following covariate control drivers were found to report a significant decrease in speeding behaviours occurring in a linear fashion with increasing age, with decrements at 30 years (t=3.66, p=.0003) and 45 years (t=3.18, p=.002).

Similarly, a linear pattern was found in relation to frustration, with drivers reporting significantly lower levels of frustration with increasing age, particularly differentiating young drivers from those aged 30 and over (t=3.9, p=.00009) and to a lesser degree middle-aged and older drivers (t=3.06, p=.002).

Young drivers were found to rate their driver skills at significantly higher levels than did those aged 30 and over (t=4.42, p=.00001), and similarly to report significantly higher levels of solo speeding behaviours (t=5.14, p<.00001) than the two older groups.

Older drivers reported significantly more negative attitudes to other drivers than did those in the two younger groups (t=-2.58, p=.01). Similarly, drivers aged over 44 years reported being significantly more frequently surprised by the sudden appearance of pedestrians, cyclists, and motorcyclists, than did drivers up to 44 years (t=-3.84, p=.0001).

<u>TABLE 29: DRIVER ATTITUDES/REPORTED BEHAVIOURS</u>

<u>TABLE 29(A): MULTIVARIATE RESULTS</u>

AGE BY SEX BY TRAFFIC OFFENCES

Multivariate tests of significance (S=4 M=2 N=639 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.96653	1.22	36.00	4802.24	.175

SEX BY TRAFFIC OFFENCES

Multivariate tests of significance (S=2 M=3 N=639 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.98777	.88	18.00	2562.00	.605

AGE BY TRAFFIC OFFENCES
Multivariate tests of significance (S=4 M=2 N=639 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.96631	1.23	36.00	4802.24	.167

AGE BY SEX
Multivariate tests of significance (S=2 M=3 N=639 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.98428	1.13	18.00	2562.00	.313

TRAFFIC OFFENCES
Multivariate tests of significance (S=2 M=3 N=639 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.98199	1.30	18.00	2562.00	.177

SEX
Multivariate tests of significance (S=1 M=3 1/2 N=639 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.97615	3.48	9.00	1281.00	.000

AGE
Multivariate tests of significance (S=2 M=3 N=639 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.93005	5.26	18.00	2562.00	.000

TABLE 29(B): SIGNIFICANT UNIVARIATE RESULTS

AGE BY SEX
Univariate F-tests with (4,1289) DF

Variable	HypthSS	ErrorSS	HypthMS	ErrorMS	F	Sig/F
SOLO SPEEDING	21.94	4052.90	10.97	3.14	3.49	.031
ANTICIPATION	5.54	1056.19	2.77	.82	3.38	.034

TRAFFIC OFFENCES
Univariate F-tests with (2,1289) DF

Variable	HypthSS	ErrorSS	HypthMS	ErrorMS	F	Sig/F
SOLO SPEEDING	20.53	4052.90	10.27	3.14	3.27	.038

SEX
Univariate F-tests with (1,1289) DF

Variable	HypthSS	ErrorSS	HypthMS	ErrorMS	F	Sig/F
DRIVER SKILLS	20.44	3021.01	20.44	2.34	8.72	.003
DRINK DRIVING	50.94	3682.43	50.94	2.86	17.83	.000

AGE
Univariate F-tests with (2,1289) DF

Variable	HypthSS	ErrorSS	HypthMS	ErrorMS	F	Sig/F
SPEED	136.65	9524.76	68.32	7.39	9.25	.000
FRUSTRATION	220.64	14457.72	110.32	11.22	9.84	.000
DRIVER SKILLS	46.53	3021.01	23.26	2.34	9.93	.000
SOLO SPEEDING	83.82	4052.90	41.91	3.14	13.33	.000
NEGATIVE ATTITUDE TO OTHER DRIVERS	8.88	1532.84	4.44	1.19	3.73	.024
AWARENESS OF OTHER ROAD USERS	21.22	1855.71	10.61	1.44	7.37	.001

ATTRIBUTIONS FOR ROAD TRAFFIC ACCIDENTS IN BRITAIN IN RELATION TO TRAFFIC OFFENCES

No significant multivariate interactions were detected, however, all three main effects were multivariately significant: traffic offences (p=.002), sex (p=.001), and age (p<.001).

AGE BY SEX BY TRAFFIC OFFENCES
A univariately significant interaction between age, sex, and traffic offences related to impairment (p=.028). Following covariate control older female traffic offenders were distinguished by the significantly greater importance they attributed to impairment in relation to accident causation, by comparison with, not only their male counterparts, but all other drivers (regardless of age, sex, or traffic offence history) (t=-2.17, p=.03).

AGE BY SEX
Following covariate control, older females were distinguished by the significantly greater importance they attributed to accident risk associated with speed and aggression than all other drivers (t=2.18, p=.03).

AGE BY TRAFFIC OFFENCES
Traffic offenders in the 30-44 years age band attributed significantly less importance to impairment in relation to accident causation than did either their younger or older counterparts (t=-2.69, p=.007)

TRAFFIC OFFENCES
A univariately significant effect was found to relate to speed and aggression in relation to traffic offences (p=.001). Covariate control revealed that traffic offenders consistently attributed significantly less importance to speed and aggression in relation to accident causation than did drivers without such a history (t=3.66, p=.0003).

AGE
Four factors were found be univariately significant in relation to age: attitude to other road users (p=.001), speed and aggression (p=.011), road and weather conditions (p=.010) and impairment (p=.001).

Following covariate control drivers were found to attribute significantly more importance to the errors of pedestrians, cyclists and motorcyclists in relation to accident causation, with increasing age. A small increment occurring in middle-age (t=-2.28, p=.02), and a larger increment distinguishing older drivers (t=-3.43, p=.0006).

Drivers in the two younger age groups were found to attribute significantly less importance to speed and aggression in relation to accident causation than did older drivers ($t=-3.02$, $p=.003$).

Young drivers attributed significantly more importance to road and weather conditions in relation to accident causation than did drivers in the two older groups ($t=-2.56$, $p=.01$).

Older drivers attributed significantly more importance to impairment factors in relation to accident causation than did drivers in the two younger groups ($t=-3.74$, $p=.00019$).

SEX

All five factors in this analysis were univariately significant in relation to sex: attitude to driver variables ($p=.008$), attitude to other road users ($p<.001$), speed and aggression ($p=.027$), road and weather conditions ($p=.039$), and impairment ($p<.001$).

Following covariate control males were found to attribute significantly less importance than did females to attitude to driver variables ($t=-2.64$, $p=.008$), the errors of other (non-driving) road users ($t=-3.95$, $p=.00008$), speed and aggression ($t=-2.22$, $p=.03$), road and weather conditions ($t=-2.07$, $p=.04$), and impairment ($t=-3.87$, $p=.00011$).

<u>TABLE 30: ATTRIBUTIONS FOR ROAD TRAFFIC ACCIDENTS IN BRITAIN</u>

<u>TABLE 30(A): MULTIVARIATE RESULTS</u>

AGE BY SEX BY TRAFFIC OFFENCES
Multivariate tests of significance (S=4 M=0 N=662)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.97960	1.37	20.00	4398.79	.124

SEX BY TRAFFIC OFFENCES
Multivariate tests of significance (S=2 M=1 N=662)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.99350	.87	10.00	2652.00	.565

AGE BY TRAFFIC OFFENCES
Multivariate tests of significance (S=4 M=0 N=662)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.98208	1.20	20.00	4398.79	.241

AGE BY SEX
Multivariate tests of significance (S=2 M=1 N=662)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.99121	1.17	10.00	2652.00	.304

TRAFFIC OFFENCES
Multivariate tests of significance (S=2 M=1 N=662)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.97916	2.81	10.00	2652.00	.002

SEX
Multivariate tests of significance (S=1 M=1 1/2 N=662)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.98404	4.30	5.00	1326.00	.001

AGE
Multivariate tests of significance (S=2 M=1 N=662)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.97566	3.29	10.00	2652.00	.000

TABLE 30(B): SIGNIFICANT UNIVARIATE RESULTS

AGE BY SEX BY TRAFFIC OFFENCES
Univariate F-tests with (4,1330) DF

Variable	HypthSS	ErrorSS	HypthMS	ErrorMS	F	Sig/F
IMPAIRMENT	59.39	7238.88	14.85	5.44	2.73	.028

TRAFFIC OFFENCES
Univariate F-tests with (2,1330) DF

Variable	HypthSS	ErrorSS	HypthMS	ErrorMS	F	Sig/F
SPEED AND AGGRESSION	25.76	2379.07	12.88	1.79	7.20	.001

SEX
Univariate F-tests with (1,1330) DF

Variable	HypthSS	ErrorSS	HypthMS	ErrorMS	F	Sig/F
ATTITUDE TO DRIVER VARIABLES	47.08	8984.45	47.08	6.76	6.97	.008
ATTITUDE TO OTHER ROAD USERS	67.85	5793.62	67.85	4.36	15.58	.000
SPEED AND AGGRESSION	8.79	2379.07	8.79	1.79	4.91	.027
ROAD AND WEATHER CONDITIONS	11.07	3448.76	11.07	2.59	4.27	.039
IMPAIRMENT	81.49	7238.88	81.49	3.44	14.97	.000

AGE
Univariate F-tests with (2,1330) DF

Variable	HypthSS	ErrorSS	HypthMS	ErrorMS	F	Sig/F
ATTITUDE TO OTHER ROAD USERS	60.54	5793.62	30.27	4.36	6.95	.001
SPEED AND AGGRESSION	16.31	2379.07	8.16	1.79	4.56	.011
ROAD AND WEATHER CONDITIONS	24.16	3448.76	12.08	2.59	4.66	.010
IMPAIRMENT	76.35	7238.88	38.17	5.44	7.01	.001

APPENDIX G(2): TRAFFIC OFFENCE HISTORY/RECENCY - DRIVER AFFECT/STATE (MANCOVA)

CELL MEANS AND STANDARD DEVIATIONS

VARIABLE: IRRITABILITY

FACTOR		MEAN	STD. DEV.	N
UNDER 30 YRS	(MALE)			
OFFENCES:	NONE	24.059	5.765	136
	OFFENCE HISTORY	22.111	6.687	27
	CURR.ENDORSEMENTS	22.859	6.554	78
	(FEMALE)			
OFFENCES:	NONE	22.275	5.796	160
	OFFENCE HISTORY	22.333	5.148	9
	CURR.ENDORSEMENTS	22.111	5.693	27
30-44 YRS:	(MALE)			
OFFENCES:	NONE	23.874	6.050	127
	OFFENCE HISTORY	23.936	6.037	78
	CURR.ENDORSEMENTS	23.360	6.558	50
	(FEMALE)			
OFFENCES:	NONE	22.821	6.363	173
	OFFENCE HISTORY	24.733	6.239	15
	CURR.ENDORSEMENTS	26.462	6.385	13
45 YRS +	(MALE)			
OFFENCES:	NONE	22.768	7.051	151
	OFFENCE HISTORY	23.451	6.100	91
	CURR.ENDORSEMENTS	24.206	8.910	34
	(FEMALE)			
OFFENCES:	NONE	22.308	7.309	107
	OFFENCE HISTORY	21.000	7.763	16
	CURR.ENDORSEMENTS	17.400	9.168	10

VARIABLE: INTIMIDATION

FACTOR				
UNDER 30 YRS	(MALE)			
OFFENCES:	NONE	9.206	2.921	136
	OFFENCE HISTORY	8.444	3.117	27
	CURR.ENDORSEMENTS	8.090	2.731	78
	(FEMALE)			
OFFENCES:	NONE	8.775	2.918	160
	OFFENCE HISTORY	7.667	2.739	9
	CURR.ENDORSEMENTS	8.741	2.863	27
30-44 YRS	(MALE)			
OFFENCES:	NONE	10.102	3.005	127
	OFFENCE HISTORY	9.846	2.937	78
	CURR.ENDORSEMENTS	10.360	2.371	50
	(FEMALE)			
OFFENCES:	NONE	9.757	3.040	173
	OFFENCE HISTORY	10.200	3.234	15
	CURR.ENDORSEMENTS	11.692	2.496	13

VARIABLE: INTIMIDATION (contd.)

FACTOR		MEAN	STD. DEV.	N
45 YRS +	(MALE)			
OFFENCES:	NONE	10.219	3.360	151
	OFFENCE HISTORY	10.538	3.038	91
	CURR.ENDORSEMENTS	11.206	3.804	34
	(FEMALE)			
OFFENCES:	NONE	9.486	3.562	107
	OFFENCE HISTORY	8.938	2.620	16
	CURR.ENDORSEMENTS	8.700	4.523	10

VARIABLE: UNAWARENESS

FACTOR				
UNDER 30 YRS	(MALE)			
OFFENCES:	NONE	6.801	1.969	136
	OFFENCE HISTORY	5.481	2.376	27
	CURR.ENDORSEMENTS	6.038	1.917	78
	(FEMALE)			
OFFENCES:	NONE	6.256	1.901	160
	OFFENCE HISTORY	6.333	1.414	9
	CURR.ENDORSEMENTS	6.333	2.148	27
30-44 YRS	(MALE)			
OFFENCES:	NONE	6.811	2.235	127
	OFFENCE HISTORY	6.679	2.029	78
	CURR.ENDORSEMENTS	6.920	1.957	50
	(FEMALE)			
OFFENCES:	NONE	6.457	2.139	173
	OFFENCE HISTORY	6.933	2.052	15
	CURR.ENDORSEMENTS	7.769	2.088	13
45 YRS +	(MALE)			
OFFENCES:	NONE	6.351	2.222	131
	OFFENCE HISTORY	7.143	2.234	91
	CURR.ENDORSEMENTS	6.559	2.525	34
	(FEMALE)			
OFFENCES:	NONE	6.252	2.364	107
	OFFENCE HISTORY	5.875	2.217	16
	CURR.ENDORSEMENTS	4.800	2.300	10

VARIABLE: EXCITEMENT

FACTOR				
UNDER 30 YRS	(MALE)			
OFFENCES:	NONE	5.904	0.893	136
	OFFENCE HISTORY	5.778	1.050	27
	CURR.ENDORSEMENTS	5.859	0.922	78
	(FEMALE)			
OFFENCES:	NONE	5.775	1.009	160
	OFFENCE HISTORY	5.444	0.527	9
	CURR.ENDORSEMENTS	5.741	0.594	27

VARIABLE: EXCITEMENT (contd.)

FACTOR		MEAN	STD. DEV.	N
30-44 YRS	(MALE)			
OFFENCES:	NONE	5.772	0.669	127
	OFFENCE HISTORY	5.782	0.816	78
	CURR.ENDORSEMENTS	5.740	0.777	50
	(FEMALE)			
OFFENCES:	NONE	5.659	0.930	173
	OFFENCE HISTORY	5.800	0.676	15
	CURR.ENDORSEMENTS	5.923	0.641	13
45 YRS +	(MALE)			
OFFENCES:	NONE	5.682	0.934	151
	OFFENCE HISTORY	5.769	0.716	91
	CURR.ENDORSEMENTS	5.559	1.133	34
	(FEMALE)			
OFFENCES:	NONE	5.617	0.897	107
	OFFENCE HISTORY	5.625	0.719	16
	CURR.ENDORSEMENTS	5.400	0.878	10

VARIABLE: YEARS DRIVING

FACTOR				
UNDER 30 YRS	(MALE)			
OFFENCES:	NONE	5.676	4.207	136
	OFFENCE HISTORY	8.444	2.547	27
	CURR.ENDORSEMENTS	5.385	3.109	78
	(FEMALE)			
OFFENCES:	NONE	5.075	3.332	160
	OFFENCE HISTORY	5.111	2.759	9
	CURR.ENDORSEMENTS	5.037	3.252	27
30-44 YRS	(MALE)			
OFFENCES:	NONE	15.866	6.152	127
	OFFENCE HISTORY	19.256	6.016	78
	CURR.ENDORSEMENTS	16.580	5.349	50
	(FEMALE)			
OFFENCES:	NONE	13.827	6.654	173
	OFFENCE HISTORY	19.267	3.751	15
	CURR.ENDORSEMENTS	13.769	6.444	13
45 YRS +	(MALE)			
OFFENCES:	NONE	33.272	10.929	151
	OFFENCE HISTORY	35.396	9.532	91
	CURR.ENDORSEMENTS	32.441	11.098	34
	(FEMALE)			
OFFENCES:	NONE	24.224	9.262	107
	OFFENCE HISTORY	22.938	12.041	16
	CURR.ENDORSEMENTS	21.600	11.578	10

VARIABLE: MILES WEEKLY

FACTOR				
UNDER 30 YRS	(MALE)			
OFFENCES:	NONE	225.059	221.239	136
	OFFENCE HISTORY	315.556	370.938	27
	CURR.ENDORSMNTS.	418.500	515.612	78

VARIABLE: MILES WEEKLY (contd.)

FACTOR		MEAN	STD. DEV.	N
UNDER 30 YRS (FEMALE)				
OFFENCES:	NONE	133.731	166.471	160
	OFFENCE HISTORY	153.000	160.151	9
	CURR.ENDORSMNTS.	170.259	166.044	27
30-44 YRS	(MALE)			
OFFENCES:	NONE	332.362	422.865	127
	OFFENCE HISTORY	312.423	257.905	78
	CURR.ENDORSMNTS.	409.500	321.359	50
	(FEMALE)			
OFFENCES:	NONE	117.618	120.321	173
	OFFENCE HISTORY	207.000	210.228	15
	CURR.ENDORSMNTS.	330.769	267.347	13
45 YRS +	(MALE)			
OFFENCES:	NONE	219.291	240.676	151
	OFFENCE HISTORY	298.725	263.507	91
	CURR.ENDORSMNTS.	319.706	225.936	34
	(FEMALE)			
OFFENCES:	NONE	127.729	231.174	107
	OFFENCE HISTORY	208.125	182.838	16
	CURR.ENDORSMNTS.	109.400	74.494	10

SIGNIFICANT COVARIATE RESULTS (DRIVING DURATION & INTENSITY)
MULTIVARIATE RESULTS

Multivariate tests of significance (S=2 M=1/2 N=638 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.97666	3.80	8.00	2558.00	.000

UNIVARIATE RESULTS

Univariate F-tests with (2,1282) DF

Variable	SqMulR	MulR	AdjRsq	HpthMS	ErrorMS	F	Sig of F
EXCITEMENT	.01	.08	.004	2.85	.77	3.71	.025

INDIVIDUAL UNIVARIATE EFFECTS ATTRIBUTABLE TO COVARIATES (YEARS DRIVING AND WEEKLY MILEAGE)

Dependent Variable	Covariate	t-value	Sig of t
EXCITEMENT	YRSDRIV	-2.58729	.010

APPENDIX G(3): TRAFFIC OFFENCE HISTORY/RECENCY - DRIVER SELF PERCEPTION (MANCOVA)

CELL MEANS AND STANDARD DEVIATIONS

VARIABLE: IRRITABLE

FACTOR		MEAN	STD. DEV.	N
UNDER 30 YRS	(MALE)			
OFFENCES:	NONE	15.445	3.694	137
	OFFENCE HISTORY	15.821	3.907	28
	CURR.ENDORSEMENTS	14.844	4.026	77
	(FEMALE)			
OFFENCES:	NONE	14.487	4.069	158
	OFFENCE HISTORY	14.333	3.354	9
	CURR.ENDORSEMENTS	14.846	3.728	26
30-44 YRS:	(MALE)			
OFFENCES:	NONE	14.380	4.080	129
	OFFENCE HISTORY	14.806	3.884	72
	CURR.ENDORSEMENTS	14.824	3.632	51
	(FEMALE)			
OFFENCES:	NONE	13.203	3.476	177
	OFFENCE HISTORY	15.267	2.789	15
	CURR.ENDORSEMENTS	16.357	3.954	14
45 YRS +	(MALE)			
OFFENCES:	NONE	12.287	3.919	157
	OFFENCE HISTORY	13.848	4.566	99
	CURR.ENDORSEMENTS	12.308	5.430	39
	(FEMALE)			
OFFENCES:	NONE	12.053	4.024	114
	OFFENCE HISTORY	11.250	3.624	16
	CURR.ENDORSEMENTS	11.800	3.425	10

VARIABLE: SAFE

FACTOR				
UNDER 30 YRS	(MALE)			
OFFENCES:	NONE	21.234	3.344	137
	OFFENCE HISTORY	21.500	4.123	28
	CURR.ENDORSEMENTS	20.688	4.240	77
	(FEMALE)			
OFFENCES:	NONE	22.684	3.304	158
	OFFENCE HISTORY	22.889	2.713	9
	CURR.ENDORSEMENTS	21.115	3.278	26
30-44 YRS	(MALE)			
OFFENCES:	NONE	22.977	2.978	129
	OFFENCE HISTORY	22.181	3.101	72
	CURR.ENDORSEMENTS	21.882	2.696	51
	(FEMALE)			
OFFENCES:	NONE	23.299	2.967	177
	OFFENCE HISTORY	22.200	3.005	15
	CURR.ENDORSEMENTS	21.429	3.345	14

VARIABLE: INTIMIDATION (contd.)

FACTOR		MEAN	STD. DEV.	N
45 YRS +	(MALE)			
OFFENCES:	NONE	24.427	3.083	157
	OFFENCE HISTORY	22.606	3.158	99
	CURR.ENDORSEMENTS	23.692	4.281	39
	(FEMALE)			
OFFENCES:	NONE	23.877	3.129	114
	OFFENCE HISTORY	24.188	3.544	16
	CURR.ENDORSEMENTS	22.900	2.885	10

VARIABLE: CONFIDENT

FACTOR				
UNDER 30 YRS	(MALE)			
OFFENCES:	NONE	11.613	2.411	137
	OFFENCE HISTORY	12.929	1.783	28
	CURR.ENDORSEMENTS	12.506	2.030	77
	(FEMALE)			
OFFENCES:	NONE	11.152	1.876	158
	OFFENCE HISTORY	11.778	2.333	9
	CURR.ENDORSEMENTS	11.231	2.006	26
30-44 YRS	(MALE)			
OFFENCES:	NONE	12.434	1.995	129
	OFFENCE HISTORY	12.986	1.588	72
	CURR.ENDORSEMENTS	12.784	2.023	51
	(FEMALE)			
OFFENCES:	NONE	11.508	2.282	177
	OFFENCE HISTORY	13.200	1.656	15
	CURR.ENDORSEMENTS	11.143	2.770	14
45 YRS +	(MALE)			
OFFENCES:	NONE	13.057	2.010	157
	OFFENCE HISTORY	12.869	1.888	99
	CURR.ENDORSEMENTS	13.359	1.857	39
	(FEMALE)			
OFFENCES:	NONE	12.061	2.373	114
	OFFENCE HISTORY	13.313	1.621	16
	CURR.ENDORSEMENTS	12.900	2.183	10

VARIABLE: AWARE

FACTOR				
UNDER 30 YRS	(MALE)			
OFFENCES:	NONE	12.029	2.076	137
	OFFENCE HISTORY	13.000	1.905	28
	CURR.ENDORSEMENTS	11.818	2.120	77
	(FEMALE)			
OFFENCES:	NONE	11.639	1.952	158
	OFFENCE HISTORY	12.111	1.364	9
	CURR.ENDORSEMENTS	11.269	2.255	26

VARIABLE: AWARE (contd.)

FACTOR			MEAN	STD. DEV.	N
30-44 YRS	(MALE)				
	OFFENCES:	NONE	12.310	1.780	129
		OFFENCE HISTORY	12.583	1.461	72
		CURR.ENDORSEMENTS	11.980	2.093	51
	(FEMALE)				
	OFFENCES:	NONE	12.102	2.028	177
		OFFENCE HISTORY	12.600	1.352	15
		CURR.ENDORSEMENTS	11.143	1.994	14
45 YRS +	(MALE)				
	OFFENCES:	NONE	12.567	2.083	157
		OFFENCE HISTORY	12.212	2.125	99
		CURR.ENDORSEMENTS	12.590	1.970	39
	(FEMALE)				
	OFFENCES:	NONE	12.518	1.934	114
		OFFENCE HISTORY	13.250	1.483	16
		CURR.ENDORSEMENTS	12.400	1.776	10

VARIABLE: YEARS DRIVING

FACTOR					
UNDER 30 YRS	(MALE)				
	OFFENCES:	NONE	5.708	4.208	137
		OFFENCE HISTORY	8.321	2.583	28
		CURR.ENDORSEMENTS	5.299	3.095	77
	(FEMALE)				
	OFFENCES:	NONE	5.158	3.255	158
		OFFENCE HISTORY	5.111	2.759	9
		CURR.ENDORSEMENTS	5.115	3.290	26
30-44 YRS	(MALE)				
	OFFENCES:	NONE	15.930	6.146	129
		OFFENCE HISTORY	19.028	6.014	72
		CURR.ENDORSEMENTS	16.647	5.317	51
	(FEMALE)				
	OFFENCES:	NONE	13.825	6.633	177
		OFFENCE HISTORY	19.267	3.751	15
		CURR.ENDORSEMENTS	14.357	6.570	14
45 YRS +	(MALE)				
	OFFENCES:	NONE	33.236	11.254	157
		OFFENCE HISTORY	35.606	9.452	99
		CURR.ENDORSEMENTS	33.000	11.079	39
	(FEMALE)				
	OFFENCES:	NONE	24.553	9.933	114
		OFFENCE HISTORY	22.938	12.041	16
		CURR.ENDORSEMENTS	21.600	11.578	10

VARIABLE: MILES WEEKLY

FACTOR					
UNDER 30 YRS	(MALE)				
	OFFENCES:	NONE	227.029	221.704	137
		OFFENCE HISTORY	320.357	364.889	28
		CURR.ENDORSMNTS.	414.714	519.337	77

VARIABLE: MILES WEEKLY (contd.)

FACTOR		MEAN	STD. DEV.	N
UNDER 30 YRS	(FEMALE)			
OFFENCES:	NONE	134.487	167.201	158
	OFFENCE HISTORY	153.000	160.151	9
	CURR.ENDORSMNTS.	173.731	168.330	26
30-44 YRS	(MALE)			
OFFENCES:	NONE	329.845	420.078	129
	OFFENCE HISTORY	330.333	258.529	72
	CURR.ENDORSMNTS.	401.863	322.771	51
	(FEMALE)			
OFFENCES:	NONE	117.734	118.561	177
	OFFENCE HISTORY	207.000	210.228	15
	CURR.ENDORSMNTS.	312.857	265.458	14
45 YRS +	(MALE)			
OFFENCES:	NONE	230.363	299.535	157
	OFFENCE HISTORY	297.768	303.488	99
	CURR.ENDORSMNTS.	317.051	225.011	39
	(FEMALE)			
OFFENCES:	NONE	123.114	223.834	114
	OFFENCE HISTORY	208.125	182.838	16
	CURR.ENDORSMNTS.	109.400	74.494	10

SIGNIFICANT COVARIATE RESULTS (DRIVING DURATION & INTENSITY)
MULTIVARIATE RESULTS

Multivariate tests of significance (S=2 M=1/2 N=651 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.93613	10.95	8.00	2610.00	.000

UNIVARIATE RESULTS

Univariate F-tests with (2,1308) DF

Variable	SqMulR	MulR	AdjRsq	HpthMS	ErrorMS	F	Sig of F
SAFE	.01	.08	.006	48.92	10.56	4.63	.010
CONFIDENT	.06	.23	.054	156.04	4.09	38.14	.000
AWARE	.01	.11	.011	32.05	3.85	8.33	.000

INDIVIDUAL UNIVARIATE EFFECTS ATTRIBUTABLE TO COVARIATES (YEARS DRIVING AND WEEKLY MILEAGE)

Dependent Variable	Covariate	t-value	Sig of t
IRRITABLE	YRSDRIV	-2.29479	.022
SAFE	YRSDRIV	2.34574	.019
SAFE	MLSWKLY	-1.99822	.046
CONFIDENT	YRSDRIV	6.93657	.000
CONFIDENT	MLSWKLY	5.12817	.000
AWARE	YRSDRIV	3.81429	.000

APPENDIX G(4): TRAFFIC OFFENCE HISTORY/RECENCY - DRIVER ATTITUDINAL/BEHAVIOURAL TENDENCIES (MANCOVA)

CELL MEANS AND STANDARD DEVIATIONS

VARIABLE: SPEED

FACTOR		MEAN	STD. DEV.	N
UNDER 30 YRS (MALE)				
OFFENCES:	NONE	15.726	2.811	135
	OFFENCE HISTORY	16.593	3.054	27
	CURR.ENDORSEMENTS	16.187	2.969	80
(FEMALE)				
OFFENCES:	NONE	14.771	2.628	157
	OFFENCE HISTORY	14.444	3.779	9
	CURR.ENDORSEMENTS	15.846	2.796	26
30-44 YRS: (MALE)				
OFFENCES:	NONE	14.821	2.664	125
	OFFENCE HISTORY	15.403	2.837	72
	CURR.ENDORSEMENTS	15.216	3.061	51
(FEMALE)				
OFFENCES:	NONE	14.217	2.314	180
	OFFENCE HISTORY	15.733	2.463	15
	CURR.ENDORSEMENTS	14.533	3.642	15
45 YRS + (MALE)				
OFFENCES:	NONE	13.783	2.644	152
	OFFENCE HISTORY	14.628	2.704	94
	CURR.ENDORSEMENTS	13.667	3.243	36
(FEMALE)				
OFFENCES:	NONE	13.607	2.713	112
	OFFENCE HISTORY	13.714	3.124	14
	CURR.ENDORSEMENTS	14.091	2.166	11

VARIABLE: FRUSTRATION

FACTOR				
UNDER 30 YRS (MALE)				
OFFENCES:	NONE	17.037	2.943	135
	OFFENCE HISTORY	17.481	3.523	27
	CURR.ENDORSEMENTS	16.225	3.738	80
(FEMALE)				
OFFENCES:	NONE	16.643	3.393	157
	OFFENCE HISTORY	18.000	3.082	9
	CURR.ENDORSEMENTS	15.885	3.154	26
30-44 YRS (MALE)				
OFFENCES:	NONE	15.927	3.229	123
	OFFENCE HISTORY	15.889	3.231	72
	CURR.ENDORSEMENTS	15.784	3.529	51
(FEMALE)				
OFFENCES:	NONE	15.339	3.262	180
	OFFENCE HISTORY	15.867	3.292	15
	CURR.ENDORSEMENTS	16.600	2.131	15

VARIABLE: FRUSTRATION (contd.)

FACTOR		MEAN	STD. DEV.	N
45 YRS +	(MALE)			
OFFENCES:	NONE	14.730	3.281	152
	OFFENCE HISTORY	14.957	3.026	94
	CURR.ENDORSEMENTS	13.944	4.000	36
	(FEMALE)			
OFFENCES:	NONE	15.518	3.886	112
	OFFENCE HISTORY	13.929	2.895	14
	CURR.ENDORSEMENTS	14.545	4.204	11

VARIABLE: DRIVER SKILLS

FACTOR				
UNDER 30 YRS	(MALE)			
OFFENCES:	NONE	14.007	1.538	135
	OFFENCE HISTORY	14.704	1.235	27
	CURR.ENDORSEMENTS	14.138	1.613	80
	(FEMALE)			
OFFENCES:	NONE	13.497	1.543	157
	OFFENCE HISTORY	13.444	1.810	9
	CURR.ENDORSEMENTS	13.538	1.303	26
30-44 YRS	(MALE)			
OFFENCES:	NONE	13.512	1.580	123
	OFFENCE HISTORY	13.847	1.607	72
	CURR.ENDORSEMENTS	13.725	1.550	51
	(FEMALE)			
OFFENCES:	NONE	13.133	1.537	180
	OFFENCE HISTORY	13.400	1.404	15
	CURR.ENDORSEMENTS	13.000	1.558	15
45 YRS +	(MALE)			
OFFENCES:	NONE	13.368	1.504	152
	OFFENCE HISTORY	13.436	1.669	94
	CURR.ENDORSEMENTS	13.361	1.334	36
	(FEMALE)			
OFFENCES:	NONE	13.161	1.405	112
	OFFENCE HISTORY	12.786	1.626	14
	CURR.ENDORSEMENTS	13.545	1.864	11

VARIABLE: DRINK DRIVING

FACTOR				
UNDER 30 YRS	(MALE)			
OFFENCES:	NONE	4.007	2.017	135
	OFFENCE HISTORY	4.593	1.866	27
	CURR.ENDORSEMENTS	4.200	1.845	80
	(FEMALE)			
OFFENCES:	NONE	3.541	1.106	157
	OFFENCE HISTORY	3.444	0.882	9
	CURR.ENDORSEMENTS	3.731	1.614	26

VARIABLE: DRINK DRIVING (contd.)

FACTOR		MEAN	STD. DEV.	N
30-44 YRS	(MALE)			
OFFENCES:	NONE	4.382	1.977	123
	OFFENCE HISTORY	4.847	2.147	72
	CURR.ENDORSEMENTS	4.373	1.949	51
	(FEMALE)			
OFFENCES:	NONE	3.672	1.272	180
	OFFENCE HISTORY	3.600	0.910	15
	CURR.ENDORSEMENTS	4.267	2.404	15
45 YRS +	(MALE)			
OFFENCES:	NONE	4.296	1.804	152
	OFFENCE HISTORY	4.617	1.797	94
	CURR.ENDORSEMENTS	4.167	1.859	36
	(FEMALE)			
OFFENCES:	NONE	3.652	1.264	112
	OFFENCE HISTORY	4.143	1.610	14
	CURR.ENDORSEMENTS	3.818	1.401	11

VARIABLE: SOLO SPEEDING

FACTOR				
UNDER 30 YRS	(MALE)			
OFFENCES:	NONE	6.267	1.759	135
	OFFENCE HISTORY	6.667	2.184	27
	CURR.ENDORSEMENTS	6.700	1.594	80
	(FEMALE)			
OFFENCES:	NONE	6.063	1.946	157
	OFFENCE HISTORY	6.000	2.236	9
	CURR.ENDORSEMENTS	6.038	1.949	26
30-44 YRS	(MALE)			
OFFENCES:	NONE	5.333	1.749	123
	OFFENCE HISTORY	5.236	1.588	72
	CURR.ENDORSEMENTS	5.275	1.498	51
	(FEMALE)			
OFFENCES:	NONE	5.011	1.685	180
	OFFENCE HISTORY	4.800	2.178	15
	CURR.ENDORSEMENTS	5.667	1.496	15
45 YRS +	(MALE)			
OFFENCES:	NONE	4.579	1.785	152
	OFFENCE HISTORY	4.745	1.747	94
	CURR.ENDORSEMENTS	4.361	1.659	36
	(FEMALE)			
OFFENCES:	NONE	4.348	1.921	112
	OFFENCE HISTORY	5.286	1.267	14
	CURR.ENDORSEMENTS	5.909	1.921	11

VARIABLE: ANTICIPATION

FACTOR		MEAN	STD. DEV.	N
UNDER 30 YRS	(MALE)			
OFFENCES:	NONE	7.637	1.097	135
	OFFENCE HISTORY	7.481	0.700	27
	CURR.ENDORSEMENTS	7.800	0.947	80

VARIABLE: ANTICIPATION (contd.)

FACTOR		MEAN	STD. DEV.	N
UNDER 30 YRS (FEMALE)				
OFFENCES:	NONE	7.446	0.970	157
	OFFENCE HISTORY	7.889	0.601	9
	CURR.ENDORSEMENTS	7.500	0.990	26
30-44 YRS	(MALE)			
OFFENCES:	NONE	7.805	0.947	123
	OFFENCE HISTORY	7.944	0.785	72
	CURR.ENDORSEMENTS	7.804	1.059	51
	(FEMALE)			
OFFENCES:	NONE	7.578	0.878	180
	OFFENCE HISTORY	7.600	0.632	15
	CURR.ENDORSEMENTS	7.133	0.915	15
45 YRS +	(MALE)			
OFFENCES:	NONE	7.697	0.877	152
	OFFENCE HISTORY	7.745	0.891	94
	CURR.ENDORSEMENTS	7.667	0.862	36
	(FEMALE)			
OFFENCES:	NONE	7.616	0.762	112
	OFFENCE HISTORY	7.857	0.535	14
	CURR.ENDORSEMENTS	7.545	1.036	11

VARIABLE: ATTITUDE TO OTHER DRIVERS

FACTOR				
UNDER 30 YRS (MALE)				
OFFENCES:	NONE	5.919	1.146	135
	OFFENCE HISTORY	6.148	1.099	27
	CURR.ENDORSEMENTS	6.113	1.191	80
	(FEMALE)			
OFFENCES:	NONE	6.115	1.149	157
	OFFENCE HISTORY	6.333	0.866	9
	CURR.ENDORSEMENTS	6.115	0.864	26
30-44 YRS	(MALE)			
OFFENCES:	NONE	5.813	1.148	123
	OFFENCE HISTORY	5.903	0.966	72
	CURR.ENDORSEMENTS	6.098	1.153	51
	(FEMALE)			
OFFENCES:	NONE	6.044	1.108	180
	OFFENCE HISTORY	5.867	0.915	15
	CURR.ENDORSEMENTS	6.067	0.799	15
45 YRS +	(MALE)			
OFFENCES:	NONE	6.382	1.067	152
	OFFENCE HISTORY	6.372	1.126	94
	CURR.ENDORSEMENTS	6.028	1.183	36
	(FEMALE)			
OFFENCES:	NONE	6.250	0.963	112
	OFFENCE HISTORY	6.857	0.535	14
	CURR.ENDORSEMENTS	6.091	0.701	11

VARIABLE: AWARENESS OF OTHER ROAD USERS

FACTOR		MEAN	STD. DEV.	N
UNDER 30 YRS (MALE)				
OFFENCES:	NONE	5.444	1.359	135
	OFFENCE HISTORY	5.667	1.494	27
	CURR.ENDORSEMENTS	5.175	1.348	80
(FEMALE)				
OFFENCES:	NONE	5.720	1.203	157
	OFFENCE HISTORY	5.444	0.882	9
	CURR.ENDORSEMENTS	5.346	1.093	26
30-44 YRS (MALE)				
OFFENCES:	NONE	5.341	1.200	123
	OFFENCE HISTORY	5.389	1.306	72
	CURR.ENDORSEMENTS	5.176	1.292	51
(FEMALE)				
OFFENCES:	NONE	5.611	1.100	180
	OFFENCE HISTORY	5.267	0.799	15
	CURR.ENDORSEMENTS	5.200	1.424	15
45 YRS + (MALE)				
OFFENCES:	NONE	5.697	1.092	152
	OFFENCE HISTORY	5.436	1.249	94
	CURR.ENDORSEMENTS	5.806	1.215	36
(FEMALE)				
OFFENCES:	NONE	5.679	0.851	112
	OFFENCE HISTORY	5.929	1.492	14
	CURR.ENDORSEMENTS	6.364	1.629	11

VARIABLE: PERCEIVED CONTROL

FACTOR				
UNDER 30 YRS (MALE)				
OFFENCES:	NONE	5.267	1.649	135
	OFFENCE HISTORY	5.444	1.672	27
	CURR.ENDORSEMENTS	5.113	1.779	80
(FEMALE)				
OFFENCES:	NONE	5.599	1.544	157
	OFFENCE HISTORY	5.222	0.833	9
	CURR.ENDORSEMENTS	5.115	1.451	26
30-44 YRS (MALE)				
OFFENCES:	NONE	5.496	1.710	123
	OFFENCE HISTORY	5.583	1.963	72
	CURR.ENDORSEMENTS	4.941	1.737	51
(FEMALE)				
OFFENCES:	NONE	5.289	1.577	180
	OFFENCE HISTORY	5.400	1.682	15
	CURR.ENDORSEMENTS	5.600	1.805	15
45 YRS + (MALE)				
OFFENCES:	NONE	5.026	1.691	152
	OFFENCE HISTORY	4.979	1.716	94
	CURR.ENDORSEMENTS	4.889	1.617	36

VARIABLE: PERCEIVED CONTROL (contd.)

FACTOR		MEAN	STD. DEV.	N
45 YRS +	(FEMALE)			
OFFENCES:	NONE	5.196	1.800	112
	OFFENCE HISTORY	4.500	1.454	14
	CURR.ENDORSEMENTS	5.545	1.753	11

VARIABLE: YEARS DRIVING

FACTOR		MEAN	STD. DEV.	N
UNDER 30 YRS	(MALE)			
OFFENCES:	NONE	5.615	4.223	135
	OFFENCE HISTORY	8.222	2.577	27
	CURR.ENDORSEMENTS	5.313	3.104	80
	(FEMALE)			
OFFENCES:	NONE	5.248	3.283	157
	OFFENCE HISTORY	5.111	2.759	9
	CURR.ENDORSEMENTS	4.923	3.261	26
30-44 YRS	(MALE)			
OFFENCES:	NONE	15.732	6.204	123
	OFFENCE HISTORY	19.056	6.182	72
	CURR.ENDORSEMENTS	16.647	5.317	51
	(FEMALE)			
OFFENCES:	NONE	13.567	6.699	180
	OFFENCE HISTORY	19.267	3.751	15
	CURR.ENDORSEMENTS	13.600	6.978	15
45 YRS +	(MALE)			
OFFENCES:	NONE	33.329	11.447	152
	OFFENCE HISTORY	35.213	9.429	94
	CURR.ENDORSEMENTS	33.583	11.936	36
	(FEMALE)			
OFFENCES:	NONE	24.670	9.467	112
	OFFENCE HISTORY	24.714	11.874	14
	CURR.ENDORSEMENTS	22.091	11.104	11

VARIABLE: MILES WEEKLY

FACTOR		MEAN	STD. DEV.	N
UNDER 30 YRS	(MALE)			
OFFENCES:	NONE	221.726	221.438	135
	OFFENCE HISTORY	354.444	377.057	27
	CURR.ENDORSMNTS.	414.788	510.890	80
	(FEMALE)			
OFFENCES:	NONE	128.459	163.324	157
	OFFENCE HISTORY	153.000	160.151	9
	CURR.ENDORSMNTS.	172.500	168.916	26
30-44 YRS	(MALE)			
OFFENCES:	NONE	328.293	428.464	123
	OFFENCE HISTORY	312.486	261.404	72
	CURR.ENDORSMNTS.	401.863	322.771	51
	(FEMALE)			
OFFENCES:	NONE	128.067	183.483	180
	OFFENCE HISTORY	207.000	210.228	15
	CURR.ENDORSMNTS.	300.667	260.123	15

VARIABLE: MILES WEEKLY (contd.)

FACTOR			MEAN	STD. DEV.	N
45 YRS +		(MALE)			
	OFFENCES:	NONE	232.125	307.175	152
		OFFENCE HISTORY	308.681	310.217	94
		CURR.ENDORSMNTS.	298.472	212.817	36
		(FEMALE)			
	OFFENCES:	NONE	127.179	225.730	112
		OFFENCE HISTORY	191.071	194.987	14
		CURR.ENDORSMNTS.	172.182	219.890	11

SIGNIFICANT COVARIATE RESULTS (DRIVING DURATION & INTENSITY)
MULTIVARIATE RESULTS

Multivariate tests of significance (S=2 M=3 N=639 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.96006	2.93	18.00	2562.00	.000

UNIVARIATE RESULTS

Univariate F-tests with (2,1289) DF

Variable	SqMulR	MulR	AdjRsq	HpthMS	ErrorMS	F	Sig of F
SPEED	.01	.10	.008	44.84	7.39	6.07	.002
DRIV.SKILL	.01	.01	.007	12.31	2.34	5.25	.005
ANTICIPTN.	.02	.14	.019	11.00	0.82	13.43	.000

INDIVIDUAL UNIVARIATE EFFECTS ATTRIBUTABLE TO COVARIATES (YEARS DRIVING AND WEEKLY MILEAGE)

Dependent Variable	Covariate	t-value	Sig of t
SPEED	MLSWKLY	3.48248	.001
DRIVER SKILL	YRSDRIV	2.33876	.020
DRIVER SKILL	MLSWKLY	2.19706	.028
ANTICIPATION	YRSDRIV	2.25447	.024
ANTICIPATION	MLSWKLY	4.62074	.000

APPENDIX G(5): TRAFFIC OFFENCE HISTORY/RECENCY - ATTRIBUTIONS FOR ROAD TRAFFIC ACCIDENTS IN BRITAIN (MANCOVA)

CELL MEANS AND STANDARD DEVIATIONS

VARIABLE: ATTITUDE TO DRIVER VARIABLES

FACTOR			MEAN	STD. DEV.	N
UNDER 30 YRS	(MALE)				
	OFFENCES:	NONE	19.375	2.818	136
		OFFENCE HISTORY	20.214	3.095	28
		CURR.ENDORSEMENTS	20.392	2.611	74
	(FEMALE)				
	OFFENCES:	NONE	20.213	2.539	160
		OFFENCE HISTORY	21.333	2.179	9
		CURR.ENDORSEMENTS	20.000	2.309	28
30-44 YRS:	(MALE)				
	OFFENCES:	NONE	20.527	2.652	129
		OFFENCE HISTORY	20.282	2.800	78
		CURR.ENDORSEMENTS	20.460	2.659	50
	(FEMALE)				
	OFFENCES:	NONE	20.423	2.477	182
		OFFENCE HISTORY	21.571	2.209	14
		CURR.ENDORSEMENTS	20.000	2.299	15
45 YRS +	(MALE)				
	OFFENCES:	NONE	20.821	2.637	162
		OFFENCE HISTORY	20.495	2.571	101
		CURR.ENDORSEMENTS	20.162	2.693	37
	(FEMALE)				
	OFFENCES:	NONE	21.176	2.417	119
		OFFENCE HISTORY	20.941	2.585	17
		CURR.ENDORSEMENTS	21.182	3.250	11

VARIABLE: ATTITUDE TO OTHER ROAD USERS

FACTOR					
UNDER 30 YRS	(MALE)				
	OFFENCES:	NONE	7.706	1.878	136
		OFFENCE HISTORY	8.821	2.611	28
		CURR.ENDORSEMENTS	7.932	2.272	74
	(FEMALE)				
	OFFENCES:	NONE	8.656	2.128	160
		OFFENCE HISTORY	9.000	2.345	9
		CURR.ENDORSEMENTS	8.143	1.820	28
30-44 YRS	(MALE)				
	OFFENCES:	NONE	8.062	2.026	129
		OFFENCE HISTORY	7.936	2.200	78
		CURR.ENDORSEMENTS	7.960	2.000	50
	(FEMALE)				
	OFFENCES:	NONE	8.973	1.959	182
		OFFENCE HISTORY	9.000	1.038	14
		CURR.ENDORSEMENTS	8.200	2.336	15

VARIABLE: ATTITUDE TO OTHER ROAD USERS (contd.)

FACTOR		MEAN	STD. DEV.	N
45 YRS +	(MALE)			
OFFENCES:	NONE	8.556	2.046	162
	OFFENCE HISTORY	8.238	2.196	101
	CURR.ENDORSEMENTS	8.405	2.254	37
	(FEMALE)			
OFFENCES:	NONE	9.143	2.132	119
	OFFENCE HISTORY	9.882	2.690	17
	CURR.ENDORSEMENTS	9.727	2.149	11

VARIABLE: SPEED AND AGGRESSION

FACTOR				
UNDER 30 YRS	(MALE)			
OFFENCES:	NONE	8.022	1.518	136
	OFFENCE HISTORY	7.679	1.611	28
	CURR.ENDORSEMENTS	8.041	1.287	74
	(FEMALE)			
OFFENCES:	NONE	8.513	1.249	160
	OFFENCE HISTORY	8.111	1.764	9
	CURR.ENDORSEMENTS	8.464	1.261	28
30-44 YRS	(MALE)			
OFFENCES:	NONE	8.271	1.310	129
	OFFENCE HISTORY	7.949	1.485	78
	CURR.ENDORSEMENTS	7.980	1.610	50
	(FEMALE)			
OFFENCES:	NONE	8.621	1.356	182
	OFFENCE HISTORY	7.500	1.225	14
	CURR.ENDORSEMENTS	7.800	1.082	15
45 YRS +	(MALE)			
OFFENCES:	NONE	8.519	1.207	162
	OFFENCE HISTORY	8.109	1.385	101
	CURR.ENDORSEMENTS	8.216	1.315	37
	(FEMALE)			
OFFENCES:	NONE	8.882	1.106	119
	OFFENCE HISTORY	8.706	1.213	17
	CURR.ENDORSEMENTS	8.727	1.618	11

VARIABLE: ROAD AND WEATHER CONDITIONS

FACTOR				
UNDER 30 YRS	(MALE)			
OFFENCES:	NONE	7.125	1.728	136
	OFFENCE HISTORY	7.500	2.046	28
	CURR.ENDORSEMENTS	7.257	1.605	74
	(FEMALE)			
OFFENCES:	NONE	7.500	1.454	160
	OFFENCE HISTORY	7.778	1.481	9
	CURR.ENDORSEMENTS	7.500	1.374	28

VARIABLE: ROAD AND WEATHER CONDITIONS (contd.)

FACTOR		MEAN	STD. DEV.	N
30-44 YRS	(MALE)			
OFFENCES:	NONE	7.008	1.712	129
	OFFENCE HISTORY	7.179	1.829	78
	CURR.ENDORSEMENTS	6.900	1.669	50
	(FEMALE)			
OFFENCES:	NONE	7.291	1.417	182
	OFFENCE HISTORY	6.714	1.490	14
	CURR.ENDORSEMENTS	7.133	1.246	15
45 YRS +	(MALE)			
OFFENCES:	NONE	7.358	1.621	162
	OFFENCE HISTORY	7.069	1.595	101
	CURR.ENDORSEMENTS	7.270	1.610	37
	(FEMALE)			
OFFENCES:	NONE	7.563	1.696	119
	OFFENCE HISTORY	7.765	1.300	17
	CURR.ENDORSEMENTS	8.000	1.414	11

VARIABLE: IMPAIRMENT

FACTOR				
UNDER 30 YRS	(MALE)			
OFFENCES:	NONE	14.500	2.410	136
	OFFENCE HISTORY	15.821	2.776	28
	CURR.ENDORSEMENTS	15.108	2.174	74
	(FEMALE)			
OFFENCES:	NONE	15.306	2.223	160
	OFFENCE HISTORY	16.333	2.236	9
	CURR.ENDORSEMENTS	15.143	2.289	28
30-44 YRS	(MALE)			
OFFENCES:	NONE	14.961	2.213	129
	OFFENCE HISTORY	14.885	2.433	78
	CURR.ENDORSEMENTS	14.420	2.295	50
	(FEMALE)			
OFFENCES:	NONE	15.654	2.101	182
	OFFENCE HISTORY	14.571	2.311	14
	CURR.ENDORSEMENTS	15.667	1.988	15
45 YRS +	(MALE)			
OFFENCES:	NONE	15.691	2.569	162
	OFFENCE HISTORY	14.752	2.422	101
	CURR.ENDORSEMENTS	14.892	2.295	37
	(FEMALE)			
OFFENCES:	NONE	16.151	2.417	119
	OFFENCE HISTORY	16.647	2.644	17
	CURR.ENDORSEMENTS	17.000	2.098	11

VARIABLE: YEARS DRIVING

FACTOR				
UNDER 30 YRS	(MALE)			
OFFENCES:	NONE	5.574	4.235	136
	OFFENCE HISTORY	8.536	2.546	28
	CURR.ENDORSEMENTS	5.297	3.095	74

VARIABLE: YEARS DRIVING (contd.)

FACTOR			MEAN	STD. DEV.	N
UNDER 30 YRS	(FEMALE)				
	OFFENCES:	NONE	5.194	3.296	160
		OFFENCE HISTORY	5.111	2.759	9
		CURR.ENDORSEMENTS	4.929	3.242	28
30-44 YRS	(MALE)				
	OFFENCES:	NONE	15.868	6.215	129
		OFFENCE HISTORY	18.974	6.017	78
		CURR.ENDORSEMENTS	16.700	5.358	50
	(FEMALE)				
	OFFENCES:	NONE	13.610	6.723	182
		OFFENCE HISTORY	19.286	3.891	14
		CURR.ENDORSEMENTS	13.600	6.978	15
45 YRS +	(MALE)				
	OFFENCES:	NONE	33.457	11.342	162
		OFFENCE HISTORY	34.871	8.974	101
		CURR.ENDORSEMENTS	34.649	10.907	37
	(FEMALE)				
	OFFENCES:	NONE	25.101	9.838	119
		OFFENCE HISTORY	23.118	11.683	17
		CURR.ENDORSEMENTS	22.091	11.104	11

VARIABLE: MILES WEEKLY

FACTOR					
UNDER 30 YRS	(MALE)				
	OFFENCES:	NONE	222.522	222.463	136
		OFFENCE HISTORY	332.857	375.340	28
		CURR.ENDORSMNTS.	425.446	525.580	74
	(FEMALE)				
	OFFENCES:	NONE	131.275	161.966	160
		OFFENCE HISTORY	153.000	160.151	9
		CURR.ENDORSMNTS.	164.536	165.731	28
30-44 YRS	(MALE)				
	OFFENCES:	NONE	326.977	420.857	129
		OFFENCE HISTORY	310.500	258.432	78
		CURR.ENDORSMNTS.	396.900	324.076	50
	(FEMALE)				
	OFFENCES:	NONE	128.011	182.489	182
		OFFENCE HISTORY	219.286	212.502	14
		CURR.ENDORSMNTS.	300.667	260.123	15

VARIABLE: MILES WEEKLY (contd.)

FACTOR			MEAN	STD. DEV.	N
45 YRS +	(MALE)				
	OFFENCES:	NONE	227.407	296.785	162
		OFFENCE HISTORY	303.970	308.730	101
		CURR.ENDORSMNTS.	308.108	228.377	37
	(FEMALE)				
	OFFENCES:	NONE	124.193	220.423	119
		OFFENCE HISTORY	196.471	183.437	17
		CURR.ENDORSMNTS.	172.182	219.890	11

SIGNIFICANT COVARIATE RESULTS (DRIVING DURATION & INTENSITY)
MULTIVARIATE RESULTS

Multivariate tests of significance (S=2 M=1 N=662)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.97449	3.45	10.00	2652.00	.000

UNIVARIATE RESULTS

Univariate F-tests with (2,1330) DF

Variable	SqMulR	MulR	AdjRsq	HpthMS	ErrorMS	F	Sig of F
ATTITUDE TO DRIVER VARIABLES	.01	.10	.009	46.36	6.76	6.86	.001

INDIVIDUAL UNIVARIATE EFFECTS ATTRIBUTABLE TO COVARIATES (YEARS DRIVING AND WEEKLY MILEAGE)

Dependent Variable	Covariate	t-value	Sig of t
ATTITUDE TO DRIVER VARIABLES	MLSWKLY	3.66739	.000

APPENDIX H(1): YOUNG DRIVER CROSS-CULTURAL ACCIDENT INVOLVEMENT/LIABILITY - EMOTIONAL/AROUSAL RESPONSES TO DRIVING (MANCOVA)

CELL MEANS AND STANDARD DEVIATIONS

VARIABLE: IRRITABILITY

FACTOR		MEAN	STD. DEV.	N	ADJ. MEAN
NO ACCIDENTS	(MALE)				
	BRITAIN	24.304	5.914	56	24.355
	AUSTRALIA	22.000	6.445	48	22.071
	(FEMALE)				
	BRITAIN	21.303	5.280	66	21.431
	AUSTRALIA	22.844	5.489	77	22.830
NON-CULPABLE	(MALE)				
ACCIDENTS	BRITAIN	22.000	4.546	10	21.699
	AUSTRALIA	22.889	6.154	18	22.891
	(FEMALE)				
	BRITAIN	20.909	6.348	11	20.876
	AUSTRALIA	20.211	6.754	19	20.226
CULPABLE	(MALE)				
ACCIDENTS	BRITAIN	23.760	6.851	25	23.771
	AUSTRALIA	22.034	7.390	29	22.068
	(FEMALE)				
	BRITAIN	24.524	5.913	21	24.554
	AUSTRALIA	25.227	5.968	22	25.232

VARIABLE: INTIMIDATION

FACTOR					
NO ACCIDENTS	(MALE)				
	BRITAIN	8.714	2.934	56	8.805
	AUSTRALIA	9.458	2.821	48	9.490
	(FEMALE)				
	BRITAIN	8.606	3.083	66	8.468
	AUSTRALIA	9.442	2.872	77	9.328
NON-CULPABLE	(MALE)				
ACCIDENTS	BRITAIN	7.300	3.622	10	7.259
	AUSTRALIA	10.333	1.970	18	10.303
	(FEMALE)				
	BRITAIN	7.818	2.562	11	7.672
	AUSTRALIA	8.421	3.271	19	8.395
CULPABLE	(MALE)				
ACCIDENTS	BRITAIN	9.080	2.812	25	9.528
	AUSTRALIA	8.655	2.857	29	8.711
	(FEMALE)				
	BRITAIN	9.143	2.516	21	9.129
	AUSTRALIA	10.455	2.614	22	10.339

VARIABLE: UNAWARENESS

FACTOR		MEAN	STD. DEV.	N	ADJ. MEAN
NO ACCIDENTS	(MALE)				
	BRITAIN	6.214	1.997	56	6.273
	AUSTRALIA	6.125	1.782	48	6.173
	(FEMALE)				
	BRITAIN	6.091	1.804	66	6.108
	AUSTRALIA	6.273	1.944	77	6.225
NON-CULPABLE	(MALE)				
ACCIDENTS	BRITAIN	6.700	2.058	10	6.529
	AUSTRALIA	6.500	1.823	18	6.491
	(FEMALE)				
	BRITAIN	6.000	1.789	11	5.931
	AUSTRALIA	6.211	1.873	19	6.209
CULPABLE	(MALE)				
ACCIDENTS	BRITAIN	6.680	2.056	25	6.845
	AUSTRALIA	6.172	2.089	29	6.210
	(FEMALE)				
	BRITAIN	6.524	1.887	21	6.534
	AUSTRALIA	7.227	2.389	22	7.188

VARIABLE: EXCITEMENT

FACTOR					
NO ACCIDENTS	(MALE)				
	BRITAIN	5.946	1.017	56	5.945
	AUSTRALIA	5.896	0.722	48	5.885
	(FEMALE)				
	BRITAIN	5.818	1.080	66	5.779
	AUSTRALIA	5.909	0.747	77	5.901
NON-CULPABLE	(MALE)				
ACCIDENTS	BRITAIN	6.200	1.751	10	6.256
	AUSTRALIA	6.056	0.639	18	6.052
	(FEMALE)				
	BRITAIN	5.636	0.674	11	5.629
	AUSTRALIA	6.000	0.745	19	5.994
CULPABLE	(MALE)				
ACCIDENTS	BRITAIN	5.800	0.816	25	5.840
	AUSTRALIA	5.862	0.639	29	5.861
	(FEMALE)				
	BRITAIN	5.810	0.680	21	5.802
	AUSTRALIA	5.591	0.959	22	5.579

VARIABLE: YEARS DRIVING

FACTOR				
NO ACCIDENTS	(MALE)			
	BRITAIN	4.071	3.463	56
	AUSTRALIA	3.875	0.890	48
	(FEMALE)			
	BRITAIN	3.303	2.314	66
	AUSTRALIA	4.052	1.224	77

VARIABLE: YEARS DRIVING (contd.)

FACTOR			MEAN	STD. DEV.	N
NON-CULPABLE	(MALE)				
ACCIDENTS		BRITAIN	5.600	1.506	10
		AUSTRALIA	4.111	0.832	18
	(FEMALE)				
		BRITAIN	4.091	1.446	11
		AUSTRALIA	4.053	1.177	19
CULPABLE	(MALE)				
ACCIDENTS		BRITAIN	4.880	2.261	25
		AUSTRALIA	4.103	0.976	29
	(FEMALE)				
		BRITAIN	4.000	2.049	21
		AUSTRALIA	3.955	0.785	22

VARIABLE: KILOMETRES WEEKLY

FACTOR					
NO ACCIDENTS	(MALE)				
		BRITAIN	365.771	370.481	56
		AUSTRALIA	310.542	238.939	48
	(FEMALE)				
		BRITAIN	151.394	192.024	66
		AUSTRALIA	175.117	159.940	77
NON-CULPABLE	(MALE)				
ACCIDENTS		BRITAIN	243.200	121.103	10
		AUSTRALIA	253.056	198.888	18
	(FEMALE)				
		BRITAIN	144.436	148.678	11
		AUSTRALIA	256.579	205.555	19
CULPABLE	(MALE)				
ACCIDENTS		BRITAIN	700.544	853.952	25
		AUSTRALIA	333.103	268.702	29
	(FEMALE)				
		BRITAIN	267.810	227.130	21
		AUSTRALIA	172.773	120.643	22

SIGNIFICANT COVARIATE RESULTS (DRIVING DURATION & INTENSITY)
MULTIVARIATE RESULTS

Multivariate tests of significance (S=2 M=1/2 N=191 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.95484	2.25	8.00	770.00	.022

UNIVARIATE RESULTS

Univariate F-tests with (2,1282) DF

Variable	SqMulR	MulR	AdjRsq	HpthMS	ErrorMS	F	Sig of F
UNAWARENESS	.02	.12	.010	11.36	3.73	3.04	.049

INDIVIDUAL UNIVARIATE EFFECTS ATTRIBUTABLE TO COVARIATES (YEARS DRIVING AND WEEKLY KILOMETREAGE)

Dependent Variable	Covariate	t-value	Sig of t
INTIMIDATION	KMSWKLY	-2.228	.026
UNAWARENESS	YRSDRIV	2.047	.041

APPENDIX H(2): YOUNG DRIVER CROSS-CULTURAL ACCIDENT INVOLVEMENT/LIABILITY - DRIVER SELF PERCEPTION (MANCOVA)

CELL MEANS AND STANDARD DEVIATIONS

VARIABLE: IRRITABLE

FACTOR		MEAN	STD. DEV.	N	ADJ. MEAN
NO ACCIDENTS	(MALE)				
	BRITAIN	15.143	3.680	56	15.167
	AUSTRALIA	15.064	3.997	47	15.100
	(FEMALE)				
	BRITAIN	14.585	3.901	65	14.672
	AUSTRALIA	14.146	3.266	82	14.159
NON-CULPABLE	(MALE)				
ACCIDENTS	BRITAIN	14.200	4.131	10	14.018
	AUSTRALIA	15.333	3.049	18	15.336
	(FEMALE)				
	BRITAIN	11.909	4.085	11	11.912
	AUSTRALIA	13.235	2.658	17	13.261
CULPABLE	(MALE)				
ACCIDENTS	BRITAIN	16.840	4.249	25	16.764
	AUSTRALIA	15.333	3.346	30	15.349
	(FEMALE)				
	BRITAIN	15.952	3.369	21	15.971
	AUSTRALIA	14.565	4.032	23	14.597

VARIABLE: SAFE

FACTOR					
NO ACCIDENTS	(MALE)				
	BRITAIN	22.143	3.066	56	22.213
	AUSTRALIA	21.468	3.042	47	21.486
	(FEMALE)				
	BRITAIN	22.831	3.130	65	22.734
	AUSTRALIA	23.573	2.889	82	23.495
NON-CULPABLE	(MALE)				
ACCIDENTS	BRITAIN	21.300	3.466	10	21.275
	AUSTRALIA	23.167	2.771	18	23.116
	(FEMALE)				
	BRITAIN	24.273	2.195	11	24.167
	AUSTRALIA	24.471	2.478	17	24.459
CULPABLE	(MALE)				
ACCIDENTS	BRITAIN	20.040	4.392	25	20.389
	AUSTRALIA	21.267	3.667	30	21.288
	(FEMALE)				
	BRITAIN	20.190	3.124	21	20.185
	AUSTRALIA	21.739	4.361	23	21.653

VARIABLE: CONFIDENT

FACTOR		MEAN	STD. DEV.	N	ADJ. MEAN
NO ACCIDENTS	(MALE)				
	BRITAIN	11.964	2.537	56	11.892
	AUSTRALIA	12.362	1.775	47	12.382
	(FEMALE)				
	BRITAIN	11.277	1.654	65	11.535
	AUSTRALIA	11.183	2.445	82	11.316
NON-CULPABLE	(MALE)				
ACCIDENTS	BRITAIN	11.800	1.619	10	11.597
	AUSTRALIA	12.611	1.944	18	12.689
	(FEMALE)				
	BRITAIN	11.000	2.191	11	11.161
	AUSTRALIA	12.118	1.799	17	12.168
CULPABLE	(MALE)				
ACCIDENTS	BRITAIN	11.360	2.515	25	10.743
	AUSTRALIA	11.933	2.258	30	11.923
	(FEMALE)				
	BRITAIN	11.238	1.670	21	11.270
	AUSTRALIA	10.261	1.839	23	10.430

VARIABLE: AWARE

FACTOR					
NO ACCIDENTS	(MALE)				
	BRITAIN	12.714	2.130	56	12.683
	AUSTRALIA	12.106	1.710	47	12.095
	(FEMALE)				
	BRITAIN	11.738	2.138	65	11.767
	AUSTRALIA	11.915	1.664	82	11.945
NON-CULPABLE	(MALE)				
ACCIDENTS	BRITAIN	12.400	1.578	10	12.432
	AUSTRALIA	12.722	1.873	18	12.742
	(FEMALE)				
	BRITAIN	12.273	1.954	11	12.316
	AUSTRALIA	12.647	1.801	17	12.649
CULPABLE	(MALE)				
ACCIDENTS	BRITAIN	10.800	2.309	25	10.667
	AUSTRALIA	11.900	1.768	30	11.890
	(FEMALE)				
	BRITAIN	11.238	1.480	21	11.238
	AUSTRALIA	11.565	1.754	23	11.597

VARIABLE: YEARS DRIVING

FACTOR				
NO ACCIDENTS	(MALE)			
	BRITAIN	3.982	3.503	56
	AUSTRALIA	3.872	0.900	47
	(FEMALE)			
	BRITAIN	3.415	2.338	65
	AUSTRALIA	4.024	1.196	82

VARIABLE: YEARS DRIVING (contd.)

FACTOR		MEAN	STD. DEV.	N
NON-CULPABLE	(MALE)			
ACCIDENTS	BRITAIN	5.600	1.506	10
	AUSTRALIA	4.111	0.832	18
	(FEMALE)			
	BRITAIN	4.091	1.446	11
	AUSTRALIA	3.941	1.197	17
CULPABLE	(MALE)			
ACCIDENTS	BRITAIN	4.880	2.261	25
	AUSTRALIA	4.033	0.999	30
	(FEMALE)			
	BRITAIN	4.000	2.049	21
	AUSTRALIA	3.870	0.869	23

VARIABLE: KILOMETRES WEEKLY

FACTOR				
NO ACCIDENTS	(MALE)			
	BRITAIN	359.629	372.748	56
	AUSTRALIA	295.872	235.808	47
	(FEMALE)			
	BRITAIN	156.185	191.601	65
	AUSTRALIA	178.098	158.818	82
NON-CULPABLE	(MALE)			
ACCIDENTS	BRITAIN	243.200	121.103	10
	AUSTRALIA	212.500	96.471	18
	(FEMALE)			
	BRITAIN	144.436	148.678	11
	AUSTRALIA	260.294	217.525	17
CULPABLE	(MALE)			
ACCIDENTS	BRITAIN	700.544	853.952	25
	AUSTRALIA	299.667	257.059	30
	(FEMALE)			
	BRITAIN	267.810	227.130	21
	AUSTRALIA	168.739	119.447	23

<u>SIGNIFICANT COVARIATE RESULTS (DRIVING DURATION & INTENSITY)</u>
<u>MULTIVARIATE RESULTS</u>

Multivariate tests of significance (S=2 M=1/2 N=193)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.91187	4.58	8.00	776.00	.000

<u>UNIVARIATE RESULTS</u>

Univariate F-tests with (2,1282) DF

Variable	SqMulR	MulR	AdjRsq	HpthMS	ErrorMS	F	Sig of F
CONFIDENT	.06	.25	.057	54.73	4.26	12.84	.000

INDIVIDUAL UNIVARIATE EFFECTS ATTRIBUTABLE TO COVARIATES (YEARS DRIVING AND WEEKLY KILOMETREAGE)

Dependent Variable	Covariate	t-value	Sig of t
CONFIDENT	YRSDRIV	3.027	.003
CONFIDENT	KMSWKLY	3.341	.001

APPENDIX H(3): YOUNG DRIVER CROSS-CULTURAL ACCIDENT INVOLVEMENT/LIABILITY - DRIVER ATTITUDINAL/BEHAVIOURAL TENDENCIES (MANCOVA)

CELL MEANS AND STANDARD DEVIATIONS

VARIABLE: SPEED

FACTOR		MEAN	STD. DEV.	N	ADJ. MEAN
NO ACCIDENTS	(MALE)				
	BRITAIN	15.596	3.023	57	15.454
	AUSTRALIA	16.213	3.071	47	16.183
	(FEMALE)				
	BRITAIN	14.875	2.420	64	15.187
	AUSTRALIA	14.564	2.572	78	14.768
NON-CULPABLE	(MALE)				
ACCIDENTS	BRITAIN	15.545	2.162	11	15.525
	AUSTRALIA	16.579	2.219	19	16.635
	(FEMALE)				
	BRITAIN	13.818	3.459	11	14.080
	AUSTRALIA	14.389	2.615	18	14.437
CULPABLE	(MALE)				
ACCIDENTS	BRITAIN	16.160	3.236	25	15.280
	AUSTRALIA	15.677	2.880	31	15.597
	(FEMALE)				
	BRITAIN	16.667	2.556	21	16.701
	AUSTRALIA	15.174	3.256	23	15.411

VARIABLE: FRUSTRATION

FACTOR					
NO ACCIDENTS	(MALE)				
	BRITAIN	17.404	3.212	57	17.408
	AUSTRALIA	16.979	3.145	47	16.971
	(FEMALE)				
	BRITAIN	16.469	3.122	64	16.401
	AUSTRALIA	16.013	3.269	78	15.988
NON-CULPABLE	(MALE)				
ACCIDENTS	BRITAIN	16.000	4.858	11	16.066
	AUSTRALIA	16.737	2.884	19	16.729
	(FEMALE)				
	BRITAIN	17.455	3.698	11	17.427
	AUSTRALIA	16.222	2.579	18	16.210
CULPABLE	(MALE)				
ACCIDENTS	BRITAIN	17.800	3.122	25	17.923
	AUSTRALIA	16.387	3.603	31	16.390
	(FEMALE)				
	BRITAIN	18.429	3.187	21	18.417
	AUSTRALIA	15.391	3.615	23	15.354

VARIABLE: DRIVER SKILLS

FACTOR		MEAN	STD. DEV.	N	ADJ. MEAN
NO ACCIDENTS	(MALE)				
	BRITAIN	14.333	1.480	57	14.312
	AUSTRALIA	14.830	1.822	47	14.825
	(FEMALE)				
	BRITAIN	13.391	1.549	64	13.436
	AUSTRALIA	13.282	1.865	78	13.312
NON-CULPABLE	(MALE)				
ACCIDENTS	BRITAIN	13.818	1.601	11	13.817
	AUSTRALIA	14.526	1.124	19	14.535
	(FEMALE)				
	BRITAIN	13.455	1.368	11	13.494
	AUSTRALIA	12.889	1.278	18	12.896
CULPABLE	(MALE)				
ACCIDENTS	BRITAIN	13.960	1.670	25	13.829
	AUSTRALIA	14.065	1.914	31	14.052
	(FEMALE)				
	BRITAIN	13.905	1.640	21	13.910
	AUSTRALIA	13.043	1.492	23	13.079

VARIABLE: DRINK DRIVING

FACTOR					
NO ACCIDENTS	(MALE)				
	BRITAIN	2.474	1.167	57	2.454
	AUSTRALIA	3.745	1.713	47	3.739
	(FEMALE)				
	BRITAIN	2.531	1.140	64	2.561
	AUSTRALIA	2.897	1.364	78	2.921
NON-CULPABLE	(MALE)				
ACCIDENTS	BRITAIN	3.091	1.700	11	3.103
	AUSTRALIA	3.368	1.422	19	3.375
	(FEMALE)				
	BRITAIN	2.545	1.214	11	2.577
	AUSTRALIA	2.833	1.654	18	2.837
CULPABLE	(MALE)				
ACCIDENTS	BRITAIN	3.200	2.041	25	3.102
	AUSTRALIA	3.097	1.423	31	3.086
	(FEMALE)				
	BRITAIN	2.619	1.244	21	2.621
	AUSTRALIA	2.565	0.788	23	2.591

VARIABLE: SOLO SPEEDING

FACTOR					
NO ACCIDENTS	(MALE)				
	BRITAIN	6.614	1.698	57	6.599
	AUSTRALIA	5.936	1.647	47	5.930
	(FEMALE)				
	BRITAIN	5.859	2.196	64	5.875
	AUSTRALIA	5.718	1.815	78	5.734

VARIABLE: SOLO SPEEDING (contd.)

FACTOR		MEAN	STD. DEV.	N	ADJ. MEAN
NON-CULPABLE	(MALE)				
ACCIDENTS	BRITAIN	7.000	2.280	11	7.019
	AUSTRALIA	5.579	0.838	19	5.583
	(FEMALE)				
	BRITAIN	6.455	1.635	11	6.477
	AUSTRALIA	5.500	1.618	18	5.502
CULPABLE	(MALE)				
ACCIDENTS	BRITAIN	6.640	1.846	25	6.575
	AUSTRALIA	5.742	1.843	31	5.733
	(FEMALE)				
	BRITAIN	6.714	1.454	21	6.715
	AUSTRALIA	5.522	1.702	23	5.538

VARIABLE: ANTICIPATION

FACTOR					
NO ACCIDENTS	(MALE)				
	BRITAIN	7.895	0.880	57	7.892
	AUSTRALIA	7.596	1.097	47	7.597
	(FEMALE)				
	BRITAIN	7.516	0.959	64	7.533
	AUSTRALIA	6.821	1.346	78	6.828
NON-CULPABLE	(MALE)				
ACCIDENTS	BRITAIN	8.273	0.905	11	8.260
	AUSTRALIA	7.632	0.761	19	7.634
	(FEMALE)				
	BRITAIN	7.545	1.036	11	7.555
	AUSTRALIA	7.278	1.179	18	7.281
CULPABLE	(MALE)				
ACCIDENTS	BRITAIN	7.400	1.607	25	7.363
	AUSTRALIA	7.613	0.667	31	7.611
	(FEMALE)				
	BRITAIN	7.381	0.805	21	7.384
	AUSTRALIA	7.261	1.010	23	7.272

VARIABLE: NEGATIVE ATTITUDE TO OTHER DRIVERS

FACTOR					
NO ACCIDENTS	(MALE)				
	BRITAIN	5.842	1.236	57	5.871
	AUSTRALIA	6.085	1.299	47	6.094
	(FEMALE)				
	BRITAIN	6.125	1.091	64	6.080
	AUSTRALIA	5.936	1.436	78	5.900
NON-CULPABLE	(MALE)				
ACCIDENTS	BRITAIN	5.636	1.286	11	5.619
	AUSTRALIA	5.947	0.848	19	5.938
	(FEMALE)				
	BRITAIN	6.182	1.079	11	6.134
	AUSTRALIA	6.278	0.958	18	6.272

VARIABLE: NEGATIVE ATTITUDE TO OTHER DRIVERS (contd.)

FACTOR		MEAN	STD. DEV.	N	ADJ. MEAN
CULPABLE	(MALE)				
ACCIDENTS	BRITAIN	6.400	1.225	25	6.549
	AUSTRALIA	5.935	1.124	31	5.952
	(FEMALE)				
	BRITAIN	6.143	1.108	21	6.139
	AUSTRALIA	5.826	0.937	23	5.787

VARIABLE: AWARENESS OF OTHER ROAD USERS

FACTOR					
NO ACCIDENTS	(MALE)				
	BRITAIN	5.561	1.524	57	5.541
	AUSTRALIA	5.660	1.372	47	5.643
	(FEMALE)				
	BRITAIN	5.641	1.187	64	5.606
	AUSTRALIA	6.205	1.380	78	6.209
NON-CULPABLE	(MALE)				
ACCIDENTS	BRITAIN	5.182	1.601	11	5.269
	AUSTRALIA	5.842	1.214	19	5.842
	(FEMALE)				
	BRITAIN	6.091	1.758	11	6.102
	AUSTRALIA	5.944	1.349	18	5.936
CULPABLE	(MALE)				
ACCIDENTS	BRITAIN	5.320	1.282	25	5.325
	AUSTRALIA	5.677	1.351	31	5.666
	(FEMALE)				
	BRITAIN	5.619	0.973	21	5.610
	AUSTRALIA	5.826	1.696	23	5.818

VARIABLE: PERCEIVED CONTROL

FACTOR					
NO ACCIDENTS	(MALE)				
	BRITAIN	5.228	1.783	57	5.242
	AUSTRALIA	4.957	1.503	47	4.962
	(FEMALE)				
	BRITAIN	5.422	1.753	64	5.400
	AUSTRALIA	5.833	1.304	78	5.816
NON-CULPABLE	(MALE)				
ACCIDENTS	BRITAIN	4.545	2.067	11	4.538
	AUSTRALIA	5.368	1.606	19	5.364
	(FEMALE)				
	BRITAIN	5.636	1.362	11	5.614
	AUSTRALIA	4.889	1.875	18	4.886
CULPABLE	(MALE)				
ACCIDENTS	BRITAIN	5.040	1.837	25	5.112
	AUSTRALIA	5.419	1.544	31	5.427
	(FEMALE)				
	BRITAIN	6.095	1.480	21	6.093
	AUSTRALIA	5.652	1.695	23	5.634

VARIABLE: YEARS DRIVING

FACTOR				
NO ACCIDENTS	(MALE)			
	BRITAIN	4.000	3.474	57
	AUSTRALIA	3.957	0.859	47
	(FEMALE)			
	BRITAIN	3.469	2.330	64
	AUSTRALIA	4.038	1.167	78
NON-CULPABLE	(MALE)			
ACCIDENTS	BRITAIN	5.273	1.794	11
	AUSTRALIA	4.105	0.809	19
	(FEMALE)			
	BRITAIN	4.091	1.446	11
	AUSTRALIA	4.000	1.188	18
CULPABLE	(MALE)			
ACCIDENTS	BRITAIN	4.880	2.261	25
	AUSTRALIA	4.065	0.964	31
	(FEMALE)			
	BRITAIN	4.000	2.049	21
	AUSTRALIA	3.870	0.869	23

VARIABLE: KILOMETRES WEEKLY

FACTOR				
NO ACCIDENTS	(MALE)			
	BRITAIN	360.337	369.444	57
	AUSTRALIA	303.426	237.495	47
	(FEMALE)			
	BRITAIN	149.725	189.483	64
	AUSTRALIA	177.615	157.607	78
NON-CULPABLE	(MALE)			
ACCIDENTS	BRITAIN	232.000	120.744	11
	AUSTRALIA	251.316	193.433	19
	(FEMALE)			
	BRITAIN	144.436	148.678	11
	AUSTRALIA	260.833	210.652	18
CULPABLE	(MALE)			
ACCIDENTS	BRITAIN	700.544	853.952	25
	AUSTRALIA	324.516	262.981	31
	(FEMALE)			
	BRITAIN	267.810	227.130	21
	AUSTRALIA	168.739	119.447	23

SIGNIFICANT COVARIATE RESULTS (DRIVING DURATION & INTENSITY)
MULTIVARIATE RESULTS

Multivariate tests of significance (S=2 M=3 N=190 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.91724	1.88	18.00	766.00	.015

UNIVARIATE RESULTS

Univariate F-tests with (2,391) DF

Variable	SqMulR	MulR	AdjRsq	HpthMS	ErrorMS	F	Sig of F
SPEED	.06	.23	.050	84.26	7.39	11.40	.000

INDIVIDUAL UNIVARIATE EFFECTS ATTRIBUTABLE TO COVARIATES (YEARS DRIVING AND WEEKLY KILOMETREAGE)

Dependent Variable	Covariate	t-value	Sig of t
SPEED	KMSWKLY	4.202	.000
AWARENESS OF OTHER ROAD USERS	YRSDRIV	-2.017	.044

APPENDIX H(4): YOUNG DRIVER CROSS-CULTURAL ACCIDENT INVOLVEMENT/LIABILITY - ATTRIBUTIONS FOR ROAD TRAFFIC ACCIDENTS IN BRITAIN/AUSTRALIA (MANCOVA)

CELL MEANS AND STANDARD DEVIATIONS

VARIABLE: ATTITUDE TO DRIVER VARIABLES

FACTOR			MEAN	STD. DEV.	N	ADJ. MEAN
NO ACCIDENTS	(MALE)					
		BRITAIN	19.804	3.060	56	19.798
		AUSTRALIA	19.460	2.808	50	19.468
	(FEMALE)					
		BRITAIN	20.109	2.631	64	20.179
		AUSTRALIA	20.086	2.383	81	20.118
NON-CULPABLE	(MALE)					
ACCIDENTS		BRITAIN	19.273	2.611	11	19.217
		AUSTRALIA	19.389	3.728	18	19.394
	(FEMALE)					
		BRITAIN	21.182	2.822	11	21.214
		AUSTRALIA	19.684	2.626	19	19.694
CULPABLE	(MALE)					
ACCIDENTS		BRITAIN	19.160	3.520	25	19.024
		AUSTRALIA	19.781	2.338	32	19.775
	(FEMALE)					
		BRITAIN	20.571	1.938	21	20.581
		AUSTRALIA	19.000	3.247	23	19.039

VARIABLE: ATTITUDE TO OTHER ROAD USERS

FACTOR						
NO ACCIDENTS	(MALE)					
		BRITAIN	7.839	1.570	56	7.815
		AUSTRALIA	7.700	2.279	50	7.673
	(FEMALE)					
		BRITAIN	8.750	2.316	64	8.666
		AUSTRALIA	8.852	2.231	81	8.834
NON-CULPABLE	(MALE)					
ACCIDENTS		BRITAIN	6.727	1.555	11	6.859
		AUSTRALIA	7.833	2.407	18	7.837
	(FEMALE)					
		BRITAIN	9.364	2.942	11	9.359
		AUSTRALIA	8.579	2.610	19	8.569
CULPABLE	(MALE)					
ACCIDENTS		BRITAIN	7.680	1.909	25	7.764
		AUSTRALIA	8.281	2.492	32	8.276
	(FEMALE)					
		BRITAIN	8.238	1.578	21	8.222
		AUSTRALIA	8.391	1.924	23	8.361

VARIABLE: SPEED AND AGGRESSION

FACTOR		MEAN	STD. DEV.	N	ADJ. MEAN
NO ACCIDENTS	(MALE)				
	BRITAIN	8.232	1.388	56	8.233
	AUSTRALIA	7.600	1.641	50	7.595
	(FEMALE)				
	BRITAIN	8.437	1.194	64	8.401
	AUSTRALIA	8.852	1.085	81	8.836
NON-CULPABLE	(MALE)				
ACCIDENTS	BRITAIN	7.545	1.036	11	7.579
	AUSTRALIA	7.667	1.085	18	7.664
	(FEMALE)				
	BRITAIN	8.727	1.618	11	8.712
	AUSTRALIA	8.737	0.991	19	8.732
CULPABLE	(MALE)				
ACCIDENTS	BRITAIN	7.680	1.842	25	7.748
	AUSTRALIA	8.531	1.646	32	8.534
	(FEMALE)				
	BRITAIN	8.333	1.461	21	8.328
	AUSTRALIA	8.783	1.313	23	8.763

VARIABLE: ROAD AND WEATHER CONDITIONS

FACTOR					
NO ACCIDENTS	(MALE)				
	BRITAIN	7.125	1.538	56	7.151
	AUSTRALIA	7.300	1.619	50	7.307
	(FEMALE)				
	BRITAIN	7.625	1.409	64	7.581
	AUSTRALIA	7.543	1.597	81	7.510
NON-CULPABLE	(MALE)				
ACCIDENTS	BRITAIN	6.000	2.324	11	5.991
	AUSTRALIA	7.278	1.364	18	7.268
	(FEMALE)				
	BRITAIN	7.364	1.433	11	7.320
	AUSTRALIA	7.421	1.346	19	7.414
CULPABLE	(MALE)				
ACCIDENTS	BRITAIN	7.000	1.607	25	7.143
	AUSTRALIA	7.594	1.604	32	7.607
	(FEMALE)				
	BRITAIN	7.762	1.578	21	7.758
	AUSTRALIA	6.913	1.535	23	6.876

VARIABLE: IMPAIRMENT

FACTOR					
NO ACCIDENTS	(MALE)				
	BRITAIN	15.000	2.149	56	14.971
	AUSTRALIA	15.180	2.116	50	15.153
	(FEMALE)				
	BRITAIN	15.344	2.311	64	15.280
	AUSTRALIA	16.370	1.735	81	16.363

VARIABLE: IMPAIRMENT (contd.)					
FACTOR		MEAN	STD. DEV.	N	ADJ. MEAN
NON-CULPABLE	(MALE)				
ACCIDENTS	BRITAIN	13.818	1.662	11	13.941
	AUSTRALIA	15.000	2.301	18	15.006
	(FEMALE)				
	BRITAIN	16.273	2.970	11	16.281
	AUSTRALIA	15.842	2.115	19	15.835
CULPABLE	(MALE)				
ACCIDENTS	BRITAIN	13.640	2.752	25	13.676
	AUSTRALIA	15.813	2.162	32	15.804
	(FEMALE)				
	BRITAIN	14.000	1.643	21	13.987
	AUSTRALIA	16.304	1.550	23	16.287

VARIABLE: YEARS DRIVING				
FACTOR				
NO ACCIDENTS	(MALE)			
	BRITAIN	3.929	3.463	56
	AUSTRALIA	3.900	0.886	50
	(FEMALE)			
	BRITAIN	3.406	2.342	64
	AUSTRALIA	3.975	1.118	81
NON-CULPABLE	(MALE)			
ACCIDENTS	BRITAIN	5.273	1.794	11
	AUSTRALIA	4.167	0.786	18
	(FEMALE)			
	BRITAIN	4.091	1.446	11
	AUSTRALIA	4.053	1.177	19
CULPABLE	(MALE)			
ACCIDENTS	BRITAIN	4.880	2.261	25
	AUSTRALIA	4.094	0.963	32
	(FEMALE)			
	BRITAIN	4.000	2.049	21
	AUSTRALIA	3.870	0.869	23

VARIABLE: KILOMETRES WEEKLY				
FACTOR				
NO ACCIDENTS	(MALE)			
	BRITAIN	358.200	372.432	56
	AUSTRALIA	302.120	237.264	50
	(FEMALE)			
	BRITAIN	156.125	193.640	64
	AUSTRALIA	178.136	159.612	81
NON-CULPABLE	(MALE)			
ACCIDENTS	BRITAIN	232.000	120.744	11
	AUSTRALIA	245.833	197.516	18
	(FEMALE)			
	BRITAIN	144.436	148.678	11
	AUSTRALIA	256.579	205.555	19

VARIABLE: KILOMETRES WEEKLY

FACTOR		MEAN	STD. DEV.	N
CULPABLE	(MALE)			
ACCIDENTS	BRITAIN	700.544	853.952	25
	AUSTRALIA	316.875	262.291	32
	(FEMALE)			
	BRITAIN	267.810	227.130	21
	AUSTRALIA	168.739	119.447	23

SIGNIFICANT COVARIATE RESULTS (DRIVING DURATION & INTENSITY)
MULTIVARIATE RESULTS

Multivariate tests of significance (S=2 M=1 N=195 1/2)

Test Name	Value	Approx F	Hypoth DF	Error DF	Sig of F
Wilks	.96495	1.41	10.00	786.00	.169

UNIVARIATE RESULTS

No univariate results were significant.

INDIVIDUAL UNIVARIATE EFFECTS ATTRIBUTABLE TO COVARIATES (YEARS DRIVING AND WEEKLY KILOMETREAGE)

Dependent Variable	Covariate	t-value	Sig of t
ATTITUDE TO OTHER ROAD USERS	YRSDRIV	-2.017	.044