A Study of the Automobile Driver and Traffic Accidents in Relation to Biographic, Attitudinal and Personality Factors.

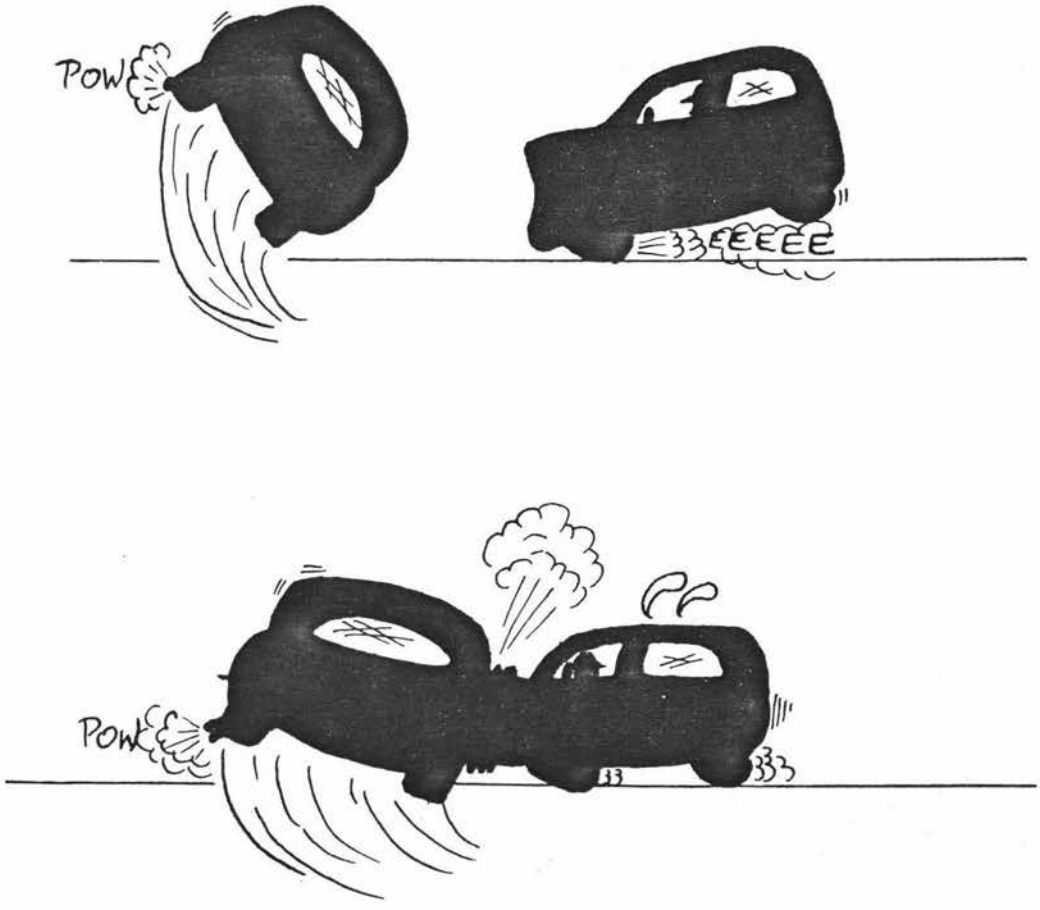
by

Marianne G. Wheatley,
Dip.Soc.St.,B.A.

Submitted in Partial Fulfillment of the
Requirements for the Degree of M.A.

Psychology Department,
Massey Univeristy,
Palmerston North,
New Zealand.

1977


POW
EEEEE
POW

'Whatever can happen to one man can happen to every man.' (Cuivas potest accidere quod cuiquam potest)

Seneca

'Some of the best lessons we learn, we learn from our mistakes and failures. The error of the past is the wisdom and success of the future.'

Tyron Edwards

'It is one thing to show a man that he is in error and another to put him in possession of truth.'

John Locke

'If accidents happen and you are to blame
Take steps to avoid repitition of same.'

Dorothy L. Sayers

PREFACE

'When you rise from your book, probe into what you have learned, to discover whether there is in it anything you can translate into reality.'

Nahmanides

'These, gentlemen, are the opinions on which I base my facts.' The origin of this statement is uncertain but, without doubt, it should be repeated again and again in respect of any work which professes to be objective (Smith, 1968).

Facts speak through an interpreter and are subject to his wishes. The facts of this research have been presented and interpretations made which are, of course, subject to further differing interpretations depending on the light and particular angle from which the facts have been viewed. Thus, any interpretations made of the facts are debatable and open to dispute.

In this study an attempt has been made to blend science and art with a flourish of ingenious subtlety to create a unified and compatible entity in an effort to render this work in a form palatable and digestible not only for the esoteric already initiated into this area of traffic accident research but also that it may whet the appetite and have interest for those desiring to commence such an acquaintance.

The general aim has been to captivate the reader's interest and enthusiasm not by detracting from the facts but rather by enhancing them with the infusion of lighter touches into the weighty, life and death issue of road traffic accidents being dealt with.

ACKNOWLEDGEMENTS

Creating and producing a study such as the present one is rather like being at the hub of a wheel from which numerous spokes radiate. Both spokes and hub are necessary for there to be a wheel.

This investigation is the result and sum of many parts and I feel like the hub of the wheel who could not have achieved this work without the helpful support of the many spokes or radiations out from the hub.

I am deeply indebted to a vast network of people who in their own different and special way helped me in what was often a far from smooth or easy passage when the easy way would have been to give in. Without the help, support and encouragement of this network of people the present work would have fallen by the wayside long ago before it finally emerged and became a reality rather than a dream.

To name but a few of those involved in particular from which my many sources of help emanated and was most gratefully received -

Professor G.A. Shouksmith for his patience, guidance and encouragement

My surgeons and physicians - my helmsmen through many peaks and troughs and all others for their part in the care and concern of sustaining body, mind and soul

All those concerned with the initial organisation of this study to get it launched and those involved in the final compilation of the completed work

My sample of drivers who participated in this study without whose co-operation and interest there would have been no study

My typist, Allison Dentice, for her painstaking and praiseworthy effort in tapping her way through this rather lengthy and complex manuscript

My illustrator, Audrey Turner, for the apt illustrations capturing and portraying in a nutshell what has been stated in a sheaf of paper

The many varied sources from which I gained continual stimulation and impetus regarding the material and information for this study

University Administration - in particular those concerned with Library Services, Health Service, Accommodation and General Welfare and Fees and Bursaries

My family for their support even though absent overseas

Lastly, but far from least, many long suffering friends and colleagues who supported, helped, encouraged and bore with me in very many ways especially during my frequent dark times often acting unwittingly as well as wittingly as invaluable sounding boards for my proliferation of ideas as I stepped and worked in, through and out of this study towards the surface light of day when it was at last completed and an actuality standing in its own right.

To each one of this whole host of people and many more not mentioned but nevertheless remembered, I am most grateful and extend most sincere thanks that I was able to keep physically, mentally and spiritually intact at the same time as being able to strive on charged with the ebb and flow of a dynamic motivating force towards the prized completion of this work, no mean feat for something that very frequently became an overwhelming challenge that was not met and overcome.

But, once having put my hand to the plough I could not look or turn back until the task was completed in spite of the cost of endurance, when I could at last take a restful pause to gaze at the furrow I had ploughed, albeit battle worn and scarred by the encountered effort but, without doubt, immensely enriched and hopefully wiser for the experience of having travelled that way, and then with joy thankfully sigh 'It is done.'

TABLE OF CONTENTS

Table of Contents

(Cont)

TABLE OF CONTENTS

(Cont)

TABLE OF CONTENTS

(Cont)

TABLE OF CONTENTS

(Cont)

TABLE OF CONTENTS

(Cont)

LIST OF TABLES

List of Tables

LIST OF GRAPHS

List of Graphs

(Cont)

LIST OF PROFILES

ABSTRACT

The art of driving is a skilled activity undertaken by very many individuals during their everyday lives and is, perhaps, one of the most complex.

In this investigation a sample of 206 licenced university automobile drivers was studied. Following a widespread publicity campaign on the university campus the automobile drivers coming forward participated on what might be termed a 'random volunteer' basis by completing 3 questionnaires covering biographical, attitudinal and personality factors. Both university staff and students were eligible to take part as long as they fulfilled the two basic criteria for entry into this study, namely:-

1) Being a licenced automobile driver

2) Being a member of the selected university either as staff or student

On analysis of data 4 driver groups were formed on the basis of sex and accident category as follows:-

MA -	Male Accident Driver Group	n = 67
MAF -	Male Accident Free Driver Group	n = 58
FAF -	Female Accident Free Driver Group	n = 59
FA -	Female Accident Driver Group	n = 22
	Total	N = 206

These 4 driver groups above were further combined to form 4 driver group combinations using the same two criteria of classification according to sex and accident category as follows:-

M(A+AF) -	Male (Accident + Accident Free) Driver Group	n = 125
F(A+AF) -	Female (Accident + Accident Free) Driver Group	n = 81
	Total	N = 206

A(M+F) -	Accident (Male + Female) Driver Group	n = 89
AF(M+F) -	Accident Free (Male + Female) Driver Group	n = 117
	Total	N = 206

This formed a complex situation of 8 driver groups for the purposes of study and comparison. By adopting this method it was possible to study, for example, male versus female driver characteristics or MA (male accident) versus FA (female accident) driver characteristics.

Three areas of biographical, attitudinal and personality factors were covered in this study and the measuring instruments (3 questionnaires) used provided a 3 dimensional view of each driver group on a two tier basis at the general or free-floating and specific or situational level for certain variables such as aggression and anxiety.

Thus, the measuring instruments used, namely the Biographic Questionnaire including a Semantic Differential Scale, the NSQ (Neuroticism Scale Questionnaire) and Parry's AG (Aggression) / AN (Anxiety) Scale formed a complementary, composite unit with confirmation of consistency being found across measures for certain variables. For example, significant correlations were found between the NSQ E (Submission-Dominance) and Parry's AG Scale variables and also between the NSQ An (Anxious-Not Anxious) and Parry's AN Scale variables.

It emerged that there were two rather than one typical accident driver personality types, namely the MA and FA driver, as well as differences being noted between the typical MAF and FAF driver. Differences were also found between M(A+AF) and F(A+AF) driver groups as well as similar personality trends noted to occur between the male/accident and female/accident free driver groups.

In effect, this means that there are 3 (possibly 4) rather than just two, the A and AF, driver personality types to consider as was previously conceived at the outset of this research.

The typical male driver, especially the MA driver, was found to be aggressive, tough, relatively cheerful and free from anxiety, self-assured and self-confident to the point of over-confidence particularly as regards driving ability, competitive, belligerent and even pugnacious.

On the other hand, the typical female driver, especially the FA, was found to be submissive, sensitive, tender-minded, lacking in self-assurance and self-confidence particularly in respect of driving ability, fairly high in anxiety and non-aggressive.

In this investigation of the automobile driver and traffic accidents in relation to biographical, attitudinal and personality factors, the focus was mainly upon the two personality variables of aggression and anxiety although not to the exclusion of other personality variables such as sensitivity and depression.

It is significant that two distinct accident related personalities emerged one for each sex, that is MA and FA.

INTRODUCTION

Traffic accidents constitute 'a pandemic of destruction' in contemporary society. Their contributing enormous toll represents both a national and international plague. They rate as the third leading cause of death in all age groups preceded only by cancer and heart disease (Clark and McMahon, 1967), and the first leading cause of death among adults within their third and fifth decades (Roberts, 1971).

It has been estimated that only about 10 per cent of traffic accidents are caused by mechanical and technical faults, whereas something like 90 per cent are due to human factors. Thus, the human factor is vitally important in road accidents and it seems reasonable that psychology would be able to help in this area (McFarland, 1952; Eysenck, 1960; Delner, 1969).

Accidents in general and motor accidents in particular constitute a major health problem in most Western countries. According to statistics from the World Health Organisation (WHO) motor vehicle accidents accounted for 169,000 fatalities in 48 countries in 1966 (Nagel et al., 1973). The number of persons injured in motor vehicle accidents in 25 countries where this information was recorded was 2,669,266 (Severy et al., 1968).

In a recent analysis of accidental deaths in 19 industrial countries representing 553 million people, 36 per cent were caused by motor vehicles (McFarland, 1969). The second category of accident death, that of falls, accounted for 22.1 per cent (Roberts, 1971).

Table of Mortality From Motor Vehicle Accidents

In Selected Countries 1966-1967

Country	Motor Vehicles per 1,000 Population	Average Annual Death Rate	
		Per 100,000 Population	Per 100,000 Registered Motor Vehicles
United States	495	26.9	54.4
France	369	25.1	67.9
New Zealand	369	20.7	56.1
Denmark	359	22.0	61.2
Canada	356	27.1	76.0
Australia	351	27.6	78.7
Netherlands	306	21.9	71.5
Finland	244	22.6	92.5
Great Britain *	237	14.0	59.1
Norway	230	12.3	53.4
West Germany +	226	28.4	126.0
Italy	215	17.2	80.2
Japan	184	15.6	85.4

Note: Ranked according to motor vehicles per 1,000 population

*Includes England and Wales, Northern Ireland and Scotland

+Includes West Berlin

The sources of basic data for the above Table of Mortality From Motor Vehicle Accidents In Selected Countries 1966-1967 were compiled from the following:-

a) World Road Statistics, 1967

b) Demographic Yearbook, 1967

c) Various publications of the National Centre for Health Statistics

d) Annual reports of other countries

e) Statistical Bulletin, April 1969

(Roberts, 1971, P. 36)

Appendix A gives statistics of those killed and injured between 1970 and 1974 for New Zealand, Australia, Great Britain and the United States. For New Zealand, statistics of those killed and injured for the years 1940, 1950 and 1960 are also given in Appendix A.

It is a matter of vital public health concern to understand the nature of 'accident proneness' and to detect 'the accident repeater' (Roberts, 1971). As early as 1926 Karl Marbe, a German psychologist, presented statistical proof that a person involved in one accident is more likely to have another when compared to individuals having no accident at all.

Bearing all these facts in mind that road accidents are a continuing problem of modern times, this piece of research was set up to investigate what was considered to be an important aspect of accident research, that of the relationship between personality factors and road accidents. Measures yielding biographic, attitudinal and personality data were used with the aim of compiling a profile for each of the driver groups taking part in this study, divided according to sex of driver and accident category.

The focus in this study has been on 'the man behind the wheel' or to use a far more vivid impromptu reference to that 'nut behind the wheel', connoting the threat of accidents from erratic driver behaviour, to see what further light may be shed upon personality factors in relation to the automobile driver and road accidents.

SECTION 1

LITERATURE REVIEW

LITERATURE REVIEW

A review of the accident literature leaves little doubt as to the importance placed on human factors by those working in the field of accident research. The Automotive Safety Foundation (1963) offered this commentary in an analysis of the relationship between highway safety and traffic control or roadway elements:-

> 'Ultimately, everything goes back to the driver - his abilities, his habits, his expectations and natural and learned reactions in different driving situations. It is for this reason that any theory of where accidents occur must be phrased in terms of the driver.'

In order to find references and literature for this research the Psychological Abstracts and Index Medicus for the past 7 years, the University Library catalogue system, the Public Library and cross references from source reference books, were all searched. A good deal of the material for this research was procured through the University Library Interloan Service.

CHAPTER 1

Discussion of Terms

Clarification and discussion of terms used in this study especially (e.g. accident, attitude, aggression etc.) and also in other studies was considered to be an appropriate way to begin this Review of Literature in the field of accident research.

Accident

The very use of the term 'accident' as a convenient wastepaper basket, faute de mieux, has been a deterrent to the development of newer concepts (Roberts, 1971).

The term 'accident' has several undesirable connotations. One is the pessimistic inference of predestination such as 'accidents will happen' and ' you cannot change human nature.' Also, there is the fatalistic view that most accidents are the result of pure chance beyond human control. In one study it was found that -

a) 82 per cent of drivers involved in accidents blamed the other driver and

b) 53 per cent felt that they could do nothing to avoid future accidents.

(MD Magazine, March 1968)

The definition of 'accident' is surrounded by controversy and conflicting views. In fact, one writer, Gibson (1961), suggested that the word 'accident' be discarded in scientific discussion because of two of its incompatible meanings. Defined as a harmful encounter with the environment, a danger not averted, an accident is a psychological phenomenon subject to prediction and control. But, defined as an unpredictable event, it is by definition, uncontrollable. These two meanings are hopelessly entangled in common usage and for this reason Gibson makes the suggestion that in scientific discussion the term 'accident' should be discarded.

Indeed, some sociologists regard the term 'accident' as misleading as 'demon'. Waller and Goo (1969) preferred the term 'crash' to accident inasmuch as it is simply descriptive and avoids etiologic implications. Others favour the term 'crash accident'. Gibson (1961) suggests that the problem of accident prevention be renamed 'the problem of safety'.

The Lancet (1966) in an editorial stated -

> 'The idea that accidents can be prevented is just filtering through and if there is one outstanding fact about accidents, it is that they are not accidental. Each accident is preceded by a set of events, most of which can now be measured.'

Other researchers have expressed their ideas concerning the definition of the term 'accident'. For example, Tillmann (1948) states that the accepted definition of the word 'accident' is that it is something that is presented by chance and, therefore, a non-essential occurrence. Tillmann and Hobbs (1949) state that by definition an 'accident' is a happening that is determined by chance. Thus, the frequency of accidents is determined by the basic risk inherent in any situation. The accident distribution should form a bell shaped or normal curve, but frequently the curve is skew in distribution owing to the high frequency of accidents at the upper level of the curve often referred to as the 'accident prone'.

The World Health Organisation (WHO) altered its 1957 definition of an accident from 'an unpremeditated event resulting in a recognizable injury' to the later version of 'an event independent of the will of man, caused by a quickly acting extraneous force and manifesting itself by injury to body or mind'.

Haddon et al., (1964) state that accidents are almost invariably defined in tabulation, in control programmes and research as the occurrence of unexpected physical or chemical chance to living or non-living structures.

Henderson (1971) states that the term 'accident' implies a course of events which is neither foreseeable nor foreseen, thus lessening the chance of identifying and, if possible, modifying, causal factors which are concerned in the initiation of the event.

Selzer and Vinokur (1974) define a traffic accident as a vehicular mishap that involved the subject as a driver and resulted in property damage or personal injury whilst Shaw (1966) defines such an event as being any collision, however trivial, with another object whether the collision resulted in any damage or not.

Finally, Arbous and Kerrich (1951) suggested the following definition of an accident: -

> 'In a chain of events each of which is planned or controlled, there occurs an unplanned event which being the result of some non-adjustive act on the part of the individual (variously caused) may or may not result in injury'

In the present research, an automobile accident has been taken to be any unexpected and, possibly, non-essential confrontation or traffic incident reported as having occurred during the last 5 years of the driver subject's driving experience whilst driving whether this resulted in damage to property or person. This is in line with the last two definitions given of an accident by Arbous and Kerrich (1951) and Shaw (1966) outlined above.

In 'All's Well That Ends Well' Shakespeare perceptively observed -

> 'Our remedies oft in ourselves do lie,
> Which we do ascribe to Heaven.'

Accident Proneness

As early as 1926 Karl Marbe presented statistical evidence that an individual involved in one accident is more likely to be involved in another compared with individuals who have not incurred any accidents.

The term 'accident prone' refers to certain individuals who seem predisposed to have accidents by their psychological make-up. This might help to explain why a small group of individuals encounter more accidents, traffic or other, than their fellows.

Aware of the subjective limitations of his research on accident prone drivers, Tillmann (1948) stated that a conscious attempt had been made to be as objective as possible and he found that -

i) Some individuals are more prone whereas others are less prone to traffic accidents than chance alone calls for

ii) The accident prone group consists of -

   a) The youthful driver
   b) The driver under the influence of alcohol and
   c) A driver with a history of repeated accidents

McFarland and Moseley (1954) state that the word 'proneness' has been used to imply a series of personality traits which have not been precisely identified thus far although attempts have been made (e.g. Dunbar, 1944; Husband et al., 1951; Thorndike, 1951; Alexander, 1949). Two lines of evidence show this to be so as follows:-

1) There are more people having no accidents at all and more people having multiple accidents than would be expected by chance alone and

2) There is a tendency for those individuals who have multiple accidents in one period of time to continue to have multiple accidents in later periods of observation.

But, before the importance of only personal factors can be assessed in accident liability such factors as exposure to the driving situation, as, for example, where driving is mainly done, number of miles driven annually etc., need to be controlled, or at least, taken into consideration.

However, it would seem that there is a certain group of individuals who experience more accidents than would be expected by chance alone, although the individuals within this group may change so that a group of what may be termed as 'accident prone' persons still remains, with the composition of this group changing as people move in and out of it.

The actual characteristic make-up of an 'accident prone' individual with certain predispositional traits towards sustaining more accidents than his fellows has yet to be discovered and, in any case, this characteristic make-up of personality will still be subject to individual variation and environmental influences and factors operating at the time.

However, it does seem that a combination of certain factors operating in a particular individual, at a particular time and in a particular situation may be sufficient to trigger off potential accident proneness of an individual, resulting in greater liability to the experience of an actual accident, traffic or otherwise.

When it comes to tracing the development of the thinking on accident proneness, road accident research has become hopelessly interwoven with research on other types of accidents such as those due to horse kicks, shunting by railway men , poisoning etc., (Shaw and Sichel, 1971).

In fact, accident proneness or the concept of unequal propensity for accidents, is a subject that is enshrouded by a great deal of argument, controversy and disbelief. Every aspect of the concept is still being debated and argued to such a degree that it would probably be difficult to find a comparable subject on which so much has been written to so little effect.

Attitude

The Oxford Dictionary (1957) gives the definition of an attitude as being settled behaviour as showing opinion, or as a way of thinking.

According to Lauer (1960) an attitude can be broadly defined as a bent or tendency to act in a certain way under given stimulation.

Most psychologists seem to regard an attitude as a tendency to act in a certain way toward some object or situation in the environment (McNemar, 1946). In this study of the automobile driver and accidents in relation to biographical, attitudinal and personality factors, attitudes of aggression and anxiety, in particular, were matched against accident record.

Attitudes have been defined in a number of different ways. G.W. Allport (1935) proposed that -

> 'An attitude is a mental and neural state of readiness, organised through experience, exerting a directive or dynamic influence upon the individual's response to all objects and situations with which it is related.'

Allport (1935) saw an attitude primarily as a set to respond in a particular way and his emphasis was clearly upon its behavioural implications.

In contrast, Doob (1947) defined an attitude as -

> 'An implicit drive producing response considered socially significant in the individual's society.'

This definition of Doob's (1947) of an attitude emphasized what an attitude is rather than its implications.

A third definition of an attitude which to some extent incorporates the other two definitions above of Allport (1935) and Doob (1947) holds that -

> 'An attitude is an enduring system that includes a cognitive component, a feeling component and an action tendency.'

The cognitive component consists of beliefs or opinions about an object or idea. The feeling component is equivalent to Doob's affective component which is to say that there is some emotional feeling connected with the beliefs. The action tendency is what Allport referred to as the readiness to respond in a particular way. For example, in the driving situation, the driver's attitude toward driving may include the knowledge that his/her driving skill is high, feelings that he/she likes and enjoys driving and the behavioural tendency to continue driving.

Case and Stewart (1958) carried out some research on the development of a driving attitude scale. Driving attitudes often become influential factors leading to the occurrence of traffic violations and accidents. Two scales which purport to measure driving attitudes are the Siebrecht Attitude Scale (1941) and the Conover Driver Attitude Inventory (1947). However, research has subsequently revealed these scales to be unsatisfactory as attitude measures (e.g. Agan, 1950; Siebrecht, 1954; Case and Stewart, 1956).

For this study of the automobile driver and accidents in relation to biographical, attitudinal and personality factors an attitude scale developed by Parry (1968) has been used to measure attitudes of aggression and anxiety towards driving and other drivers. The scores obtained on this attitude scale of Parry's have been matched against accident record for the purposes of comparison amongst driver groups divided according to sex of driver and accident category.

Aggression and Anxiety

The terms of aggression and anxiety are discussed at some length for two main reasons:-

1) The difficulty of defining aggression and anxiety or stating that it is this or that, that is the problem of definition.

2) Parry's AG/AN Scale (1968) measuring attitudes of aggression (AG) and anxiety (AN) in the motoring situation is used in this study. However, Parry in his research on aggression on the road did not actually define these two terms of aggression and anxiety, except in rather broad behavioural terms and even that was in the form of what other motorists considered to be aggressive and anxious behaviour in the driving situation.

Parry's AG (Aggression) / AN (Anxiety) Scale was compiled from a list of items submitted by motorists themselves. Parry considered that for the purposes of his survey the only way to arrive at a representative list that classified items or attitudes under Aggression or Anxiety would be to enlist the help of motorists themselves. In other words, Parry got motorists to say what they considered to be aggressive and anxious behaviour in the motoring situation. The definitions of aggression and anxiety were, thus, not dealt with except in a rather broad behavioural sense and, even then, in terms of what other motorists considered to be aggressive and anxious behaviour in the driving situation although Parry argues that he felt that motorists were the source to tap for this information.

In view of this, this study has gone further than Parry's broad behavioural concept of aggression and anxiety in the motoring situation considering it necessary to explore these two concepts in more depth and from different perspectives.

The concepts of aggression and anxiety are complex. Hence, the following discussion concerning these two concepts of aggression and anxiety is dealt with in some length as this study of the automobile driver focuses on these two personality factors in particular, both from a specific or situational and general or free floating angle.

Constructs are employed to deal with many of the complex phenomena of behavioural science. They are inventions of the scientist used to explain observable behaviour, but have no clear physical existence themselves (Levitt, 1968). A human body can be dissected to display a heart or brain or liver, but it is not possible to locate anxiety, aggression, intelligence, introversion etc. Hence, constructs are used to explain behaviour and infer the existence of emotion itself from its observable manifestations. Thus, for example, an incorrect inference could be made between anxiety and fear because for all practical and experimental purposes the two are indistinguishable.

To be scientifically useful, a construct must be defined in terms of acts not in words alone. These acts are what Ruebush (1963) called operational criteria whereby each experimenter selects his own operational definition. The important consideration is whether the definition will eventually predict human behaviour and whether it is found to be related to other partial definitions.

Aggression

Aggression is difficult to analyse and to isolate from other forms of motivated behaviour although it may be convenient to conceive of it as a behavioural process. It is a concept loaded with meaning (e.g. emotional) and often receives almost indiscriminate use in everyday language. For example, it may be used to refer to a specific response such as a killing; or, to a host of attitudinal and emotional states; or, it may be conceived of as a personality trait; or, as an underlying biological process. It may refer to intention or motivation without regard to consequences or to the consequences without regard to motivation. All these possibilities are in addition to any moral justification or legitimization of an act.

Thus, it is hard, if not impossible, to isolate necessary and sufficient conditions to produce a satisfactory definition of aggression (Johnson, 1972). However, some authors continue to offer hard and fast definitions. For example, Buss (1971) states that aggression is the attempt of one individual to deliver noxious stimuli to another, taking a behavioural stance in the definition of aggression. This may apply to humans but is seldom adequate for animal aggression as most killing is unrelated to aggression.

Further definitions are that aggression is an attack or hostile action that may take any form from physical assault at one extreme to gentle verbal criticism at the other extreme. This type of behaviour may be directed at any thing or person including the self (Wolman, 1973).

Wilkening (1973) defines aggression as the act (- ion) of going (- gress) toward (- ag); a series of hostile acts directed at some thing or person including oneself. Aggression may be overt or internalized, slow to progress or immediate and it may be a need. Another definition is that aggression is behaviour intended to be injurious.

What emerges from these definitions is that aggression may be directed towards other objects or persons including oneself, that there may be intention or motivation behind the act and that it may be hostile or attacking behaviour. Aggression may be viewed on a continuum from gentle verbal criticism to the most extreme form of physically destructive and violent behaviour.

But, the very difficulty in agreeing on a precise and accurate definition of aggression may reveal something about its nature. The inability to settle on a unitary definition indicates that aggression is not a unitary process or a single set of antecedents or consequences. Feshbach (1964, 1970, 1971) has pointed out that distinctions should be made between descriptive definitions of aggression and those based on some underlying process or theoretical construct. For example, an individual may be said to be aggressive, thus hypothesizing an underlying personality trait or motivational state, but his aggressive behaviour may be expressed in many different ways all reflecting the same process.

Aggressive individuals are not always aggressive nor are non-aggressive individuals always peaceful; and, not all members of an aggressive species will behave aggressively.

Another difficulty in the definition of aggression is that certain injurious acts such as a parent punishing a child, or a doctor administering some painful treatment such as an injection or a judge meting out punishment, may not be considered aggressive if they occur within the context of a socially acceptable and legitimate role.

Any narrow and precise definition of aggression may be easily embarrassed and more comprehensive concepts may be so general that they are almost useless. In fact, the term aggression has so many meanings and connotations that, in effect, it has lost its meaning.

Aggression cannot be defined in a pithy way simply because it is not a unitary concept and cannot be defined as such. Rather, it is a multi-dimensional concept. Aggression must be understood and defined at many different levels.

Johnson (1972) suggests that we do not avoid using the term aggression but simply recognize that it is a casual not a technical term. In strict laboratory conditions precise operational definitions are required where aggression must be carefully measured and controlled as a dependent or independent variable. But, where only modest levels of precision are necessary, it may be useful to adopt the term 'agonistic' behaviour as an alternative to aggressive behaviour. The term 'agonistic' behaviour is widely used by

scientists but not laymen and, therefore, carries with it considerably less surplus meaning (e.g. emotional). Agonistic behaviour refers to fighting and competitive behaviour usually in animals and includes threats and offensive attacks as well as defensive fighting.

It seems that there are many different kinds of aggressive behaviour with the result that no single satisfactory definition can be made. The important thing is to sort out the different behavioural processes involved and the many interacting factors which influence them.

The difficulties associated with the definition of aggression have been viewed and under the blanket of aggression many shades, nuances and manifestations of this exist.

The underlying intent or motivation of the behavioural act needs to be considered. Ignoring this means that some acts are mistakenly termed aggressive when, in fact, they are not and vice versa (Freedman, Carlsmith and Sears, 1970).

For the purpose of this study, aggression has been taken to be behaviour that has an underlying motive, probably of no good intent, such as trying to edge another car off the road or being in a fight with another driver. Mean scores obtained on Parry's AG (Aggression) Scale have been matched against driver groups according to sex of driver and accident category.

In this study of the automobile driver and accidents, Parry's AG (Aggression) Scale (1968) has been used to measure attitudes of aggression in the driving situation or situational aggression and correlated with the NSQ E (Submission-Dominance) Component measuring general or free-floating aggressive tendencies. The former, Parry's AG Scale (1968), is a measure of what might be termed as teleological or purposeful, goal directed aggression whilst the latter measure, the NSQ E Component is non-teleological in that aggression is a more generalized personality trait.

Parry's AG (Aggression) Scale embodies within it degrees or levels of aggressive attitude within the driving situation. The NSQ E Component was found to correlate significantly with Parry's AG Scale.

Anxiety

An emotion like anxiety is not directly manifest in that it cannot be located by dissection. We could say that anxiety is very much like fear, a universal, personal experience and thus establish a common core of meaning (Levitt, 1968); or, we could say, broadly, that it is a complex state characterised by a subjective feeling of apprehension and heightened reactivity.

Various definitions and characteristics are given for anxiety. Wilkening (1973) states that anxiety is a distressed or painful condition, a complex, intense emotional behaviour pattern with apprehension or fear as its most prominent symptom. Anxiety is an

emotional attitude or sentiment concerning the future, characterised by an unpleasant alternation or mingling of dread with hope (Warren, 1934).

English and English (1958) state several definitions for anxiety as follows:-

1) That it is an unpleasant emotional state in which a present and continuing strong desire or drive seems likely to miss its goal

2) That it is a fusion of fear with the anticipation of future evil

3) That it is marked and continuous fear

4) That it is a fear of low intensity

5) That it is a feeling of threat especially of a fear-some threat without the person being able to say what he thinks threatens.

Anxiety can be free-floating or generalised. This is a chronic anxiety state which attaches to almost any situation or activity of the individual. This form of anxiety can be contrasted with anxiety that may be of a specific or situational nature, that is attached to a particular situation such as taking an examination, going to the dentist or driving at night.

Anxiety like aggression is not a unitary phenomenon and many contend that fear ought to be distinguished from anxiety. However, it would seem that fear and anxiety are interwoven emotions and not easy to unravel from each other. In fact, some of the above definitions of anxiety define it in terms of fear (e.g. English and English, 1958).

There are various phenomena that are correlates of the anxiety construct such as feelings of apprehension, nervousness, tension, fear, stress and terror (Beck in Spielberger, 1972). This accounts for the psychological aspects of anxiety but there are also the physiological and biochemical aspects of this emotion (e.g. rapid heart beat, sweating, general preparation for 'fight or flight').

Anxiety is frequently characterised as being objectless and this implies that the individual is not certain or aware of the source of threat and, therefore, what might be done about it. In this way, it is non-teleological or objectless and without a goal. The anxious individual is troubled not so much by immediate and concrete dangers as by future possibilities which may never eventuate.

Lazarus and Averill (in Spielberger, 1972) offer a definition of anxiety following philosophical traditions. They state that anxiety is an emotion based on the appraisal of threat, an appraisal which entails symbolic, anticipatory and uncertain elements. What these characteristics mean is that anxiety results when cognitive systems no longer enable a person to relate meaningfully to the world about him. As regards response, anxiety

may be accompanied by behavioural and physiological manifestations although often cognitive modes of response predominate.

It can be seen that defining anxiety, as was the case with aggression, is not a question of saying that it is this or that, as it is a complex and multidimensional concept.

In this study of the automobile driver and accidents, anxiety has been measured both generally (NSQ) and specifically (Parry AN Scale). It is taken to be a complex emotional behaviour pattern with apprehension or fear being its most prominent symptom . Anxiety may manifest itself as nervousness, stress, tension, fear or terror according to degree and to the situation and may be chronic or acute.

To formulate the basic concepts of Aggression and Anxiety with respect to motoring, Parry (1968) in his study felt that the only way to arrive at a representative list of such behaviour or attitudes was to ask the motorists themselves. From this survey a list of items considered to be aggressive and anxious was drawn up. Those vetting the final list of such items were deemed to be those most qualified to do so, namely police officers (Parry's research was undertaken in England where the police carry out traffic duties unlike New Zealand with the division between Police and Traffic Departments), driving instructors and psychologists. The final list was passed for scrutiny to some police drivers on the assumption that they were the most qualified observers of driver behaviour in all kinds of situations.

Hence, Parry's study was based on what other people considered to be aggressive and anxious behaviour and attitudes in the driving situation. Therefore, the actual defining of the terms of aggression and anxiety was not embarked upon except very broadly in behavioural terms and in terms of what other motorists specified and considered to be aggressive and anxious behaviour and attitudes in the driving situation.

This being so, it was felt that the terms 'aggression' and 'anxiety' needed to be explored and looked at in a closer way as shown by the foregoing discussion concerning these two terms, going beyond the behavioural level of definition to include other aspects (e.g. cognitive, philosophical). Usually more than one level and perspective is involved when considering complex phenomena such as aggression and anxiety, in order to ferret out underlying conceptual implications, and meanings.

Otherwise, without this kind of exploration of terms, there is the danger of misinterpretation, misunderstanding and the making of something to be other than what it was meant to be. Hence, the necessity for clarification and discussion of terms, aggression and anxiety in this instance but also others treated likewise in this section, in order to gain some idea of the underlying meaning of the term in question.

Parry's AG (Aggression)/AN (Anxiety) Scale (1968) has been used in this study as a basis for measuring attitudes of aggression and anxiety towards driving and other drivers. The mean scores obtained from Parry's AG/AN Scale have been matched against each driver group divided according to sex of driver and accident category in a similar way to the procedure followed by Parry in his research. But, this study of the automobile driver and accidents in relation to biographic, attitudinal and personality factors has been extended.

Parry's AG/AN Scale rating attitudes of aggression and anxiety in the motoring situation has been correlated with the NSQ E (Submission-Dominance) and the NSQ An (Anxious-Not Anxious) Components, indicating general personality trends. In effect, this means that both specific and general measures of personality have been brought together and correlated, significantly it was found, giving a two dimensional view of the driver as regards these two personality factors of aggression and anxiety. This means that Parry's (1968) research has been extended and his hope brought to fruition that his 'study might provide both the stimulus and the indications for further research in this field'. For, Parry's study has resulted in just that, a stimulus and indication for further research as shown by this study on the automobile drive and accidents in relation to biographic, attitudinal and personality factors.

As a concluding comment regarding these two terms of aggression and anxiety, aggression may trigger off anxiety or be triggered off by it. However, aggression is not necessarily accompanied by feelings of anxiety nor is anxiety necessarily experienced with aggressive feelings.

Parry (1968) found in his study that there was a tendency for high aggression whether or not in combination with high anxiety to make for greater liability to accidents when driving. Thus, certain combinations of aggression and anxiety may be particularly and potentially dangerous in the motoring situation.

CHAPTER II

Concepts Found in Accident Research

A concept found frequently in accident research related to driving is that 'a man drives as he lives'. Accident prone drivers can be detected by their living habits (Tillmann, 1948; Tillmann and Hobb, 1949). To say that 'a man drives as he lives' is to say that the same degree of care, courtesy, caution, intelligence and responsibility will be involved whilst operating a vehicle as that person exhibits in his characteristic way of life. Therefore, it is necessary to know how a driver conducts his life and from this predictions may be made about how he will drive (McFarland and Moseley, 1954).

McFarland (1957) in relation to this concept states that, in general, those persons having repeated accidents may be characterised as having a disrespect for organised authority, poor social adjustment and evidence of permanent transitory emotional instability. Tillmann (1948) and Tillmann and Hobbs (1949) have as a basic concept to their study that people involved in repeated accidents are those who have evidenced maladjustments in meeting other personal and social demands in life. McFarland (1952) also believes that if a man is maladjusted in his personal life his chances of becoming involved in an accident are much greater than if he were well adjusted.

Shaw (1966) in South Africa using the Thematic Apperception Test (TAT) and the Social Relations Test (SRT) found that drivers classified as bad accident risks showed emotional and mental immaturity, little control of aggression, high anxiety, insecurity and tension and a high incidence of antisocial attitudes. Shaw (1966) concluded from her study that people do not just 'drive as they live' but that they 'drive as they would like to live'. Mrs Shaw from her findings has modified the concept of 'a man drives as he lives' with the following qualification:

> '.....as driving offers opportunities for delusions of grandeur and antisocial behaviour which are not usually tolerated in every day life, the cause of many a bad accident is the fact that people also drive as they would like to life.'
>
> (Shaw, 1966,P.36)

This provides an extension of the original concept of Tillmann and Hobbs (1949) so that, for example, individuals who may feel and be repressed or 'hen-pecked', frustrated etc., in their daily lives may become a different personality when automized gaining confidence and freedom in the power and speed of their vehicle, working out the suppressed, deprived, dreary nature of their lives through driving.

Another concept is that of man as a bio-robot (Cohen, 1968) or of the man/machine system. When an individual is in his vehicle he becomes mechanized in a part man-part machine combination like the centaur was part man-part horse. The control of this machine rests with the individual and the effectiveness of this man/machine system depends in very large part upon the integration of the operator and his equipment (McFarland, 1957). The operator needs to be fit in both body and mind when in charge of his automobile which also needs to be mechanically sound, as well as being adequately trained for the skilled performance required in the operation of his vehicle.

The concept of the automobile as a status symbol is mentioned by Whitlock (1971) who writes that the simple transport function of the vehicle has been replaced, in many instances, by the image of the status symbol, the piece of real estate whose value must not on any account be diminished or its position ahead of all other vehicles on the road be challenged. McFarland and Moore (1960) also comment on this stating that the car is no longer a means of transport, but

has become a symbol of power and prestige, a part of one's territory to be defended by aggressive displays whenever its integrity is threatened or breached.

This follows on to Whitlock's (1971) concept of territorial aggression. He feels that it is justifiable to argue that aggressive drive, possibly representing innate feelings for territorial rights, underlies a good deal of dangerous and inconsiderate behaviour on the roads. The ethological concept of territorial behaviour applies equally to man as it does to other animals and such a theory might help to make some sense of seemingly irrational behaviour on the roads.

The concept of territorial aggression although difficult to prove is of note and might help to explain the manifestation of at least some of the display of aggressive behaviour in the driving situation.

These are some of the major concepts to be found in this area of accident research and driving. Of special importance is the concept of 'a man drives as he lives' or rather that 'a man drives as he would like to live.' By studying a driver's customary life style some indication might be ascertained of how he will drive although, of course, the real test of this is to observe actual driving performance on the road, preferably without the driver's knowledge that he is being observed.

It has been suggested that cars or automobiles provide modern urban man with a major attribute that he lacks, that of power (Sciences, 1970). As a result, many drivers, especially young men, turn into aggressive tyrants and hostile brooders behind the wheel. As Dr. Chanoit commented -

> 'The neurotic structure of certain individuals, normally well compensated, may come out in special circumstances (e.g. emotional shock, physical fatigue, mild inebriety or misuse of drugs) and lead to driving errors or accidents.'
>
> (Chanoit, 1969)

CHAPTER III

Accident Causes and Causation

Folklore of accidents is perhaps the last folklore subscribed to by rational men including well-educated professionals such as lawyers, physicians and economists. Even with analytical thinking and a continuous search for cause there are still those who believe that accidents are 'Acts of God', that they 'just happen' and that they are as uncontrollable as the weather. In short, that accidents somehow, mysteriously defy any kind of systematic study beyond mere tabulation (Haddon et al., 1964).

Some comments made concerning accidents and accident causation are now cited. Conger et al., (1959) asserted:-

> 'It has long been recognized that motor vehicle accidents are not, as the term implies, simply a function of what "erring men call chance"'.

MacIver (1961) referring to the frequent, uncritical use of the phrase 'accident prevention' stated -

> 'Although little is known about accident causation there is much blithe talk about accident prevention programmes.'

The Automotive Safety Foundation (1963) has this to say as stated at the outset of this Review of the Literature -

> 'Ultimately everything goes back to the driver - his abilities, his habits, his expectations and natural and learned reactions in different driving situations. It is for this reason that any theory of where accidents occur must be phrased in terms of the driver.'

One method of classifying accident causes, broadly, is to group them into two categories of 'personal' and 'environmental' factors. Some researchers (e.g. Haddon et al., 1964; Clark and McMahon, 1967; Tillmann, 1948) follow the classic three-fold orientation in medical epidemiology as follows:-

1) The Host (Driver)

2) The Vector (Vehicle)

3) The Environment (Highway and Street)

This model can be transposed legitimately to the problem of traffic accidents. Such allocation of accident cause in many cases must be, in any particular case, largely arbitrary although it is generally claimed that the majority of road accidents are due to human factors. This category includes such factors as poor driving skill, error, stimulus overload, inattention and inability to cope with such a complex task as driving, psychopathology and emotional disturbance. As regards the latter factor Franzmeier (1969) states that driving under the influence of emotion may be as dangerous as driving under the influence of alcohol. Franzmeier cited an estimate by Los Angeles researchers that the emotional condition of the driver could contribute to as many as 80 per cent of traffic accidents. Examples of such emotional factors are severe anxiety, hostility, anger, depression, emotional upsets at work, in the family and at school etc., all conditions known to inhibit judgement, cause inattention, mar perception and invite reckless driving.

An in-depth study of 35 accidents was carried out by Nagel et al. (1973) in California into motor vehicle accident causation and the conclusion from this was that in most cases accidents were found to result from a combination of causes. Some of these causal factors were associated with the vehicle itself (e.g. tyre blow-out) or the environment (e.g. bad weather conditions, wet road surface) but in almost every instance a human error was involved as well.

Arbous and Kerrich (1951) comment on accident causation as follows:-

> 'Accidents are no longer regarded as entirely fortuitous events and the inevitable price to be paid for technological advancement. Events which were previously considered to be chance determined are now regarded as preventable and causes which were hitherto regarded as beyond the control of the individual are now seen, in many cases, as intimately related to his psycho-physical make-up. It is not a question of the blame being shifted from the environment to the individual, but, rather, an appreciation that what really matters is the degree of adjustment which exists between the two. Our appreciation of the wide range of individual differences which exists in man has led to the natural conclusion that considerable improvement can be effected in human adjustment by a more careful consideration of those aspects of the environment which are man-made, and also, the varying degrees of skill, mental ability, physical constitution, temperamental and personal qualities with which individuals are equipped. As a result, accidents today are more often regarded as problems of human adjustment or of manifestations of maladjustment.'
>
> (Arbous and Kerrich, 1951)

The concept of maladjustment and accidents fits in with the findings of, for example, Tillmann (1948) and Tillmann and Hobbs (1949) in Canada that those individuals found to be maladjusted in their life style were more likely to have accidents and to be known to social agencies (e.g. welfare organisations, the police) on account of their personal difficulties.

Bohnert (1969) found that 80 per cent of persons involved in driving fatalities demonstrated mental and emotional impairment of sufficient severity to warrant psychiatric diagnosis. A quarter of this group exhibited antisocial personalities, one out of 5 demonstrated an unexpected pattern of extreme submissiveness culminating in a final murderous explosion and 60 per cent were alcoholic.

It would seem that various threats to one's emotional stability such as depression, hostility, psychopathic or schizoid behaviour and a host of interpersonal, economic and other problems can summate their influence upon the multiplicity of factors which are contributory to traffic mishaps or accidents (Roberts, 1971).

Thus, there is general agreement that traffic accidents are, in large part, due to personal factors, hence the necessity of studying 'the man behind the wheel' to see what further light can be thrown upon accident causation in relation to psychological factors.

It is not a question of pointing to a single cause as there are multiple causes of traffic accidents, human and other. Any estimation of a driver's susceptibility to accident must take into account his exposure to the driving situation, speed, skill and safety-mindedness or attitude towards driving (DeSilva, 1942). There is an interplay of all these factors besides the inter-relationship of the individual and his automobile in the man/machine combination.

(Little research has been carried out in New Zealand. Factors identified as being contributory to road accidents in New Zealand are given in Appendix A, P. 277).

CHAPTER IV

Biographical/Background Factors

Henderson (1971) is of the opinion that there should be less worry about trying to identify the accident-prone driver on the basis of personality traits which may be difficult or impossible to measure and, in any case, are often irrelevant. Rather, an analysis of an individual's risk of involvement should include an appreciation of his whole life style, as for example Tillmann (1948) and Tillmann and Hobbs (1949) also indicate.

McFarland and Moseley (1954) found that the use of items in public records as objective indicators of a driver's 'style of life' afforded considerable discrimination between accident free and accident repeater groups of truck drivers. Closely related to the life style concept of the accident repeater and the evaluation of drivers is the finding in this study of truck drivers that speeding violations in private drivers were characteristic of accident repeaters.

Tillmann (1948) carried out research in Canada and as part of his study 37 truck drivers were investigated, apart from high and low accident taxi drivers. From Tillmann's research, the conclusion was that accident prone drivers could be detected by their living habits and that the habits deemed necessary for good living were of the utmost importance in safe driving.

In their study of bus and tram drivers in Northern Ireland, Cresswell and Froggatt (1963) during the first part of their interviews ascertained certain data relating to social and educational background of each driver and his opinion of the hazards of the job. However, they state that such information was not suitable for rigorous statistical treatment but, in conjunction with additional information, helped in the selection process of public transport drivers.

Those drivers with a record of traffic offences were found to be more likely subsequently to have accidents than those who were accident free. Heath (1959) carried out a study of personality characteristics and biographical data of traffic offenders and non-offenders using as subjects 763 traffic offenders and 195 accident free drivers as the control group. It was found from this study that certain items of biographical information appeared to be of value for the purposes of distinguishing between traffic offenders and non-offenders. These items included age, marital status, education, occupation, number of positions held during the five year period prece ding examination, reasons for terminating previous employment and annual salary. Types of biographical information that did not appear to be useful for distinguishing between the two groups were number of children, languages written, hospitalization, types of vehicle driven and nature of driving experience.

DeSilva (1942) discussing the concept of safety-mindedness states that although some of our basic traits are inborn the ability and willingness to adjust to society depends to a large extent upon our environment and training or what is commonly referred to as our background. In general, favourable environmental influences help to make better drivers.

In the social adjustment of a group of high accident taxi drivers Tillmann and Hobbs (1949) found that this group was rarely interested in hobbies. Their main interests were found to be in the field of sports, drinking, gambling and occasional dancing. On the other hand, the taxi driver group of low accident frequency expressed an interest in such hobbies as gardening, sports, church organisations etc. If this group of low accident taxi drivers drank at all it was in moderation and they seldom gambled. This differentiation of hobbies was found to be one of the most outstanding differences between those with low and high accident records.

CHAPTER V

Accident/Violation Record

Thus far, no single characteristic of drivers has been isolated that appears to be outstanding in accounting for a large proportion of road accidents. However, the most significant biographical predictor seems to be a history of previous accidents which suggests the presence of an accident syndrome or habit and the general

instability of relationships with institutions and society as a whole (e.g. Tillmann, 1948; Tillmann and Hobbs, 1949). A further conclusion from McFarland (1957) and others is that the personality structure of the accident repeater might be described as eccentric, impulsive or mildly psychopathic.

It is the person rather than the violation per se which it is important not to lose sight of in the study of motoring offence records. McFarland and Moseley (1954) studied 10 accident repeater truck drivers against an accident free group of 10 drivers. They found that there was a marked tendency for more accident repeater than accident free drivers to have committed minor violations and it may be said that the presence of such violations (e.g. speeding, violation of traffic rules, following too closely etc.) may be weighed as being predictive of the tendency to have accidents. Knowing if a driver has committed a serious offence did not help to distinguish between accident free and accident repeater drivers in this study of truck drivers. Almost significant is the fact of any motor vehicle record. No matter what the classification, a record may be an accident predictor.

From this study by McFarland and Moseley (1954) the psychological principle involved in the application of these data is that what the individual has done in the past is what he is likely to do in the future. McFarland and Moseley (1954) state that these various violations are errors and that the correlation between errors and accidents is a positive one. On the other hand, those whose driving is error free tend also to be accident free.

The conclusion reached is similar for group data of a study carried out in Connecticut (United States Congress from Tillmann and Hobbs, 1949), in that once an accident record of a group is established as being predominantly accident liable or accident free its future history can be predicted with an astonishing degree of reliability.

CHAPTER VI

Some Major Accident Research Studies

Some major studies, acting as landmarks, relevant to this study of the automobile driver and accidents in relation to biographic, attitudinal and personality factors, carried out in the area of traffic accidents and human factors include the following with the country given where the research was done -

1)	Canada	-	Tillmann and Hobbs, 1949
2)	Finland	-	Hakkinen, 1958
3)	U.S.A.	-	Greenshields, 1959
4)	U.S.A.	-	Conger et al., 1957, 1959
5)	U.S.A.	-	Rainey et al., 1959

6) Northern Ireland - Cresswell and Froggatt, 1963

7) South Africa - Shaw, 1966, Shaw and Sichel, 1971

8) England - Parry, 1968

1) Canada - Tillmann and Hobbs, 1949

Tillmann and Hobbs (1949) studied a group of Canadian taxi drivers with high and low accident rates in terms of a number of social and psychological characteristics. They considered differences in personality structure as being indicative of accident proneness. On this basis, they claimed that the accident prone individual is characterised by marked intolerance and aggression towards authority dating back to early childhood.

In comparison with a group of 100 accident free individuals a group of 96 drivers with a record of 4 or more accidents was found to contain many individuals, in fact 66 per cent, known to social and law enforcement agencies whilst only 9 per cent of the accident free group were found on the books of such organisations. From these results Tillmann and Hobbs concluded with their well-known phrase that 'a man drives as he lives.'

The whole approach of Tillmann and Hobbs was a more rational one than many studies which preceded it and it also came up with ideas that could be of immediate practical value.

This study has probably created a greater impact than any before or since and it is certainly one of the most quoted. But, it does have its critics from people usually with a strong statistical bias and those who appear to be very antipathetic to the whole concept of accident proneness (Shaw and Sichel, 1971). The main criticism of this study is levelled at the accident criteria on the grounds that these were calculated without regard to differences in exposure to driving. However, Tillmann (1948) on whose study the one by Tillmann and Hobbs (1949) was based, was well aware of this and mentioned the fact more than once which was why he selected only the two extremes of high and low accident driver groups for his study. An important fact to remember is that Tillmann did find significant differences between the two accident groups.

Haddon et al. (1964) were highly critical of this study, commenting that ' it demonstrates that people who have accidents differ from those who do not, but one can conclude very little from this about the nature of the accident causation process.' However, to have found a means of differentiating between 'people who have accidents and people who do not' is, in itself, a most significant step and especially helpful to practical officials whose daily job it is to do just this. The fact that one can conclude very little about the nature of the accident causation process is rather besides the point and, anyway, this was not the primary aim of the investigation of Tillmann and Hobbs (1949) which was a psychological study of the accident prone automobile driver and the drawing up of a profile of the sort of individuals to be found in the high, medium and low accident driver groups studied.

What is interesting to note about this study by Tillmann and Hobbs (1949) is that different aspects of its findings have been corroborated again and again by subsequent studies, some using a similar approach and others a different one but all coming up with results which confirm the relationship between road accidents and personal and social maladjustment (Shaw and Sichel, 1971).

2) Finland - Hakkinen, 1958

Hakkinen's study in 1958 on 'Traffic Accidents and Driver Characteristics' was the first European study to embody the American statistical approach. The study involved a most detailed investigation of the value of certain psychological tests for detecting various levels of accident proneness.

The subjects used in this study were a group of Finnish bus and tram drivers. Accident research of drivers formed the material used in this study. The material consisted of traffic accidents incurred by both bus and tram drivers between 1947 and 1954. This formed a total number of approximately 4,200 accidents incurred by about 1,000 drivers. To arrive at experimental groups for testing Hakkinen took samples from each of the good/fair/poor/bad levels on the accident criterion trying to ensure that these samples were approximately equated on age and experience. Hakkinen also eliminated those who were too old for psychological testing and those drivers with bad medical histories or defective vision. 140 subjects were left and assembled by calling for volunteers to take part in the study and the final sample consisted of 44 tram drivers and 52 bus drivers.

Hakkinen not only applied a wide range of tests but also established a reliable criterion against which he validated these tests. He used characterological questionnaires and interview variables as part of his study together with other tests such as psychomotor, personality, intelligence and aptitude tests. The Personality Inventory he used was compiled by Takala et al. (1957) having 93 questions combined into primary variables such as -

i) Aggression (8 questions)

ii) Neuroticism I (15 questions)

iii) Neuroticism II (8 questions)

iv) Dependence and Submission (7 questions)

v) Emotionality (5 questions) etc.

A Traffic Questionnaire composed of two parts was also used in order to find out the subject's attitude towards traffic rules and regulations as well as towards accidents, included as part of the present study in the Biographic Questionnaire, Part II, Items 14 and 18.

Hakkinen concluded that the variables resulting from the Personality Inventory yielded no significant differences between

the driver groups in this study. Judging from the answers of this Inventory safe drivers in this study of Hakkinen's were found, for example, to be more neurotic than accident drivers. From the Traffic Questionnaire the only significant difference obtained was that the accident groups more frequently considered that the driver's fatigue, the strictness of timetables and length of driving shifts were the causes of accidents than the safe drivers of this sample did.

Hakkinen (1958) drew up a profile of a safe and unsafe driver. These profiles are interesting when compared with those given earlier by Tillmann (1948), Tillmann and Hobbs (1949) and later by such researchers as Conger et al. (1957, 1959), Malfetti and Fine (1962) and Shaw (1966).

Tillmann's approach was sociological, Conger's, Malfetti's and Shaw's approach was characterological and behavioural whilst in Hakkinen's study the emphasis was on psychomotor functioning in relation to driving. In spite of Hakkinen's very different approach Shaw and Sichel (1971) state that his conclusions concerning the safe and unsafe driver are remarkably compatible with those of other researchers mentioned.

Briefly, some characteristics of the safe driver as found by Hakkinen are that he possesses good ability of attention which forms together with well controlled motor behaviour an integral whole. In general, the safe driver is stable and calm. He is not an outstanding individual nor necessarily remarkably intelligent or fast in his reactions. His inward control enables him to master himself as well as his vehicle in order to adjust his driving operations to his driving skill, his abilities and the external conditions in every situation.

In most respects, those drivers who incur accidents form the opposite of the safe driver type. Frequently, an adequate performance is impeded by hastiness of 'motor oversensitivity' as well as inherent lack of control of motor behaviour. Perception and performance may be narrowed down because of excessive tension which is not always controllable. Such a driver may show a decline in activity or even a complete withdrawal as the difficulty of the situation increases.

These features just highlight some of the differences between safe and unsafe drivers as found by Hakkinen. Hakkinen's study provided the revelation of valuable information on the connection between psychomotor functioning and accident involvement as well as providing very strong confirmation of the whole concept of accident proneness.

3) U.S.A. - Greenshields, 1959

Greenshields (1959) in Michigan, U.S.A., carried out a study to learn more about accidents and their prevention with the basic assumption that an accident is not the result of one event but a series of happenings.

3090 questionnaires were mailed to those who according to police reports had been involved in traffic accidents. 990 replies or 32 per cent of the total number of questionnaires sent out were returned. Apparently, the attitudes of drivers not only affected the way they drove but also how they answered questions, manifested in the number of questionnaires completed and returned.

A standard statistical method, chi square, was used to determine the extent to which the group of individuals replying to the questionnaire significantly differed from the entire group of individuals to whom the questionnaires were mailed. The speed, age, vehicle condition and length of driving experience showed no significant variation. But, there was an indication that the drivers replying were not representative of the entire group. Traffic violating drivers were reluctant to reply with 29.5 per cent doing so compared with 37.8 per cent for non-violators. The emotions and attitudes as determined from the questionnaire replies were broken down into 4 categories as follows:-

1) Inner tensions as a possible cause of highway accidents

2) Driver attitudes towards themselves and other drivers

3) Evaluation of safety programmes and refresher courses as possible ways of improvement.

4) Driver's opinion of the highway environment as a cause of traffic accidents and his reaction to driving on certain kinds of roads.

For example, when asked 'When do you think you are more likely to have an accident?' 26 per cent stated when pre-occupied, 37 per cent stated when in a hurry, 5 per cent stated when angry and 2 per cent stated when worried. 55 per cent of the drivers responding to Greenshields' questionnaire replied that an attribute of a safe driver was one who kept his mind on his driving and 2.2 per cent thought that extreme caution was an attribute of a safe driver.

76 per cent of the drivers in this survey carried out by Greenshields (1959) thought that the other driver rather than themselves was to blame for accidents, showing lack of personal responsibility for safety. Only about 1 per cent or one driver in a 100 drivers admitted that he was a poor driver and the following distribution of responses to this self-judgement question about driving was that 15 per cent considered themselves to be excellent drivers, 59 per cent good, 25 percent average and 1 per cent poor.

Greenshields (1959) in his study entitled 'Attitudes, Emotions, Accidents' states that it is generally recognised that 'safety is largely a matter of attitude' and that emotions and attitudes are not among the reported causes of accidents. In fact, to produce and assess such information would be problematical, if not impossible, in most cases.

4) U.S.A. - Conger et al., 1957, 1959

Conger et al. (1957) faced the problem of determining what, if any, relationships existed between accident records and personal characteristics (psychological, psychophysical and psychophysiological) of individual drivers, in this case members of the armed forces.

The subjects studied by Conger et al. (1957) were 264 airmen stationed at an air force base in the U.S.A. The subjects were divided into two samples — the initial sample, having a number of 110 subjects, and the cross validation sample, having a number of 154 subjects. Each sample, in turn, was composed of three groups of drivers according to accident record, of high, moderate and no accident.

Among the measures used in this study were structured psychiatric interviews, objective tests of values and attitudes (Allport-Vernon Study of Values), objective personality test (MMPI or Minnesota Multiphasic Personality Inventory) and projective personality tests including the TAT (Thematic Apperception Test) and the Rorschach. Also, a wide variety of psychophysical measures such as simple and complex reaction time and motor coordination were used.

Conger et al. (1957) demonstrated that accident and non-accident subjects in their sample population of drivers differed significantly from one another. For example, the accident free subjects were consistently more oriented toward aesthetic and theoretical values than were high accident subjects. From other tests such as the Rorschach and the TAT, interviews and the few isolated items that consistently proved discriminating in other paper and pencil tests such as the MMPI, it appeared that the accident subjects may well be psychologically more complex than accident free subjects, less in harmony with their environment and less conventional.

In 1959 Conger et al. continued with a more intensive investigation of the personal factors that might make some drivers more susceptible than others to automobile accidents. The subjects studied were 10 high accident and 10 non-accident rate airmen selected to be representative of the overall accident and accident free populations.

As in the previous study of 1957 by Conger et al., high accident subjects were defined as having had 2 or more accidents for which they were officially held responsible in the past 4½ years, at least one of which occurred in the year immediately preceding the study. Accident free subjects were defined as individuals who had no record of accidents according to either official records or to the individual's subjective report during the 4½ years prior to the study.

Data obtained from the measures used fell into two general categories of clinical studies and objective testing. Psychiatric interviews were conducted and the following battery of tests was administered at one sitting:-

a) TAT (Thematic Apperception Test) - 10 cards

b) Rorschach

c) Wechsler- Bellevue Intelligence Scale - 4 sub-tests

d) Sach's Sentence Completion Test

In each case, the psychologist was requested to prepare a general evaluation of the subject, noting such things as overall assets and liabilities, basic character traits and defence mechanisms employed.

The results from this study indicated that accident in comparison with accident free subjects showed a statistically significant tendency -

1) To have less capacity for managing or controlling hostility

2) To be either excessively self-centred and indifferent to the rights of others or excessively sociocentric, that is characterised by an 'over-determined' awareness of interest in and respect for the rights and feelings of others

3) To be excessively pre-occupied with phantasy satisfactions or be extremely stimulus bound

4) To be more fearful of loss of love and support and, by inference, more angry and resentful toward persons viewed as depriving, and

5) To be generally less able to tolerate tension without discharging it immediately

6 of the 13 variables used in this study by Conger et al. (1959) discriminated between high and low accident driver groups at the 0.10 level of significance with aggression and behaviour being at the 0.05 level of significance. The authors of this study felt that the positive findings of their study, particularly in the clinical area, contribute 'materially to a clearer understanding of the relation of psychological factors to accident susceptibility, at least in the population of airmen from which driver samples were drawn.'

Conger et al., (1959) were aware that their findings were based only on 20 subjects with no cross validation carried out. All the same, it was felt that it would be unlikely for so many significant differences to be obtained by chance alone. According to Shaw and Sichel (1971) the part of the study by Conger et al. criticised as being the weakest link was the criterion as there was no way of checking differences in exposure or even to be absolutely sure of the accuracy of the accident recording.

However, Conger et al. made it clear that their material was unsuitable for trying to prove anything or for reaching definite conclusions. The aim of Conger et al. was stated to be 'to obtain a broader knowledge of the characteristics of accident and non-accident subjects'. In this aim they were, apparently, successful and the final results of the clinical study agreed closely with the composite pen-picture of the hypothetical accident and non-accident driver personality types drawn up before their study was carried out as, for example, by Tillmann (1948), Tillmann and Hobbs (1949) and Hakkinen (1958).

The research carried out by Conger et al. (1957, 1959) showed that personality testing could possibly be a successful way of identifying bad accident risks but that the difficulty of using such an approach was going to be in finding a less elaborate way of doing this.

5) U.S.A - Rainey et al., 1959

Rainey et al. (1959), on similar lines to the research carried out by Conger et al. (1957, 1959), as the objective of their study set out to determine whether there were specific personal characteristics and/or patterns of such characteristics which clearly and consistently distinguished accident repeaters from accident free drivers. 110 airmen driver subjects who had had accidents were used in this study as a sample. A comprehensive battery of psychological tests and measurements was used in this study including:-

i) Tests of psychomotor functions

ii) Objective personality tests, e.g. the Minnesota Multiphasic Personality Inventory or MMPI and the Thurstone Temperament Scale

iii) Clinical personality measures, e.g. Rorschach, Sach's Sentence Completion Test

iv) Specific tests of personal characteristics, e.g. Allport Vernon and Lindzey Scale of Values, Taylor Anxiety Scale and Level of Aspiration Test

v) Biographical questionnaires elaborating social background and personal history

Besides this battery of psychological tests, each subject was individually seen for a structured interview, part of which was designed to ascertain the subject's life-time driving history and accident experience.

Statistical analyses of the various scales and measures used in this study by Rainey et al. (1959) failed to reveal any significant difference between these groups of airmen drivers with regard to physiological reactions under either resting or stress conditions.

There were no differences with regard to psychomotor functions such as coordination, discrimination and simple or complex reaction times. Also, most objective personality inventories and tests of specific characteristics such as manifest anxiety, aspiration level and I.Q. (Intelligence Quotient) failed to discriminate between these two groups of drivers, that is accident repeater from accident free drivers.

However, rating scales were developed. The psychiatric interview transcripts, test protocols and individual psychological reports were rated 'blind' and independently for the variables of conventionality and impulse control as well as for 12 other variables hypothesized to be significantly related to accident frequency.

It was found that accident repeater and accident free subjects differed significantly ($p = 0.10$) on 6 of these variables with the accident repeater group being rated high on tension (anxiety) and unconventional behaviour and low on hostility/control ratio and tension tolerance.

The suggestion from these clinical and psychometric findings for these airmen drivers is that acceptance or rejection of conformity standards and conventional modes of behaviour and the degree of effectiveness of impulse control are major personal characteristics related to accident frequency.

6) Northern Ireland - Cresswell and Froggatt, 1963

Over a period of 4 years Cresswell and Froggatt (1963) carried out an investigation into road accidents incurred by trolley bus drivers employed by the Belfast City Transport (B.C.T.) and bus drivers employed by the Ulster Transport Authority (U.T.A.) in Northern Ireland.

In the model of accident causation presented by Cresswell and Froggatt every driver was assumed to be subject to 'spells' during which time he was more liable to accident. Such a 'spell' theory seems rather bizarre but what these researchers might be trying to say is that each driver is more liable or prone to incur accidents whilst driving during a certain time span during which he may be subject to such factors as emotional upset, illness, financial worries, fatigue etc. In that case, Cresswell and Froggatt are just saying what others had and have previously said but expressing it with a rather mystical charm.

In this study Public Transport drivers were chosen to form the population for study by Cresswell and Froggatt (1963) to ensure both an adequate ascertainment of accidents and an accurate assessment of exposure to risk in the driving situation. However, such drivers do not comprise a representative sample of the general driving population as indicated by Cresswell and Froggatt because, for example, the bus or trolley bus driver is usually of lower social class, drives full-time or professionally, drives a special type of vehicle, must retire at a certain age etc.

Accident records for the bus and tram drivers employed by these two public transport companies between 1952 and 1955 were studied and the conclusion was that the data did not support the contention that there were comparatively many, if indeed any, bus or trolley bus drivers in the population studied who were 'accident prone'. Thus, Cresswell and Froggatt felt doubtful of the validity of the concept of accident proneness in view of their findings.

This piece of research by Cresswell and Froggatt (1963) is not without criticism as, for example, the theory concerning 'spells'. Irwin (1964) shows that the statistics evidence in the study by Cresswell and Froggatt is as much, if not more, in favour of the concept of proneness than against it although these two researchers came to the reverse conclusion. Shaw and Sichel (1971) state that this study is a classic example of what happens when in the words of Arbous 'people let their statistics do their thinking for them.'

But, in spite of the numerous criticisms lodged against this study by Cresswell and Froggatt (1963), it is a piece of original work and at least in the area of accident proneness Shaw and Sichel (1971) feel that its appearance in the early 1960's was a landmark.

7) South Africa - Shaw, 1966, Shaw and Sichel, 1971

Research carried out by Shaw (1966) is given in her article on 'The Practical Use of Personality Tests as Accident Predictors' and also discussed at more length in the book by Shaw and Sichel (1971) entitled 'Accident Proneness - Research in the Occurrence, Causation and Prevention of Road Accidents.'

This investigation was carried out between 1951 and 1960 in South Africa in the Public Utility Transport Company (PUTCO) and the drivers studied were all non-whites, being mainly Bantu which is the generic name for Negro tribes according to the South African Information Service (Shaw and Sichel, 1971), with a small mixture of Coloreds and Indians. The investigation covered the analysis of the accident records of 898 bus drivers involved in 7,452 accidents during that time.

The investigation followed two main lines:-

1) The analysis of the total accident statistics of the bus company

2) The analysis of the accident records of each individual driver

Basically, the investigation boiled down to a practical research project on the much debated question of 'accident proneness' with the approach to this problem being by means of the study of individual accident records being somewhat unusual according to Shaw and Sichel. The wealth of material contained in these records made it possible to carry out a very comprehensive investigation of road accident occurrence before any further study as, for example, was done later using projective personality tests.

The PUTCO selection procedures for bus drivers endeavoured to assess each man as an individual by a 4 stage process of elimination as follows:-

1) Short pre-screening interview checking for basic requirements such as literacy and physical build

2) Psychomotor testing programme, e.g. for two hand coordination, reaction time etc.

3) Personality tests consisting of a 6 card TAT (Thematic Apperception Test) and the PUTCO comic strip or Social Relations Test (SRT) both of which are written tests.

4) Assessment of each of the 'possibles' in terms of the individual's combination of test findings, that is his abilities in relation to his total personality pattern

If an individual successfully passed through these 4 selection stages he then had to go through a full driver training course. With such thorough selection, training and driver management, it should be possible, in theory at least, to produce first class drivers or so Shaw and Sichel (1971) believed. But, the interesting thing is that the end product was anything but uniform in standard and tended to follow very closely the 5 point grading given to each new driver on the basis of his initial psychological test results.

Adopting the accident criterion of 'an accident being any collision, however trivial, with another object whether the collision resulted in any damage or not' (Shaw, 1966), bus drivers were classified in a study undertaken to investigate the personality patterns as revealed by the TAT and SRT tests according to 4 groups with two new categories (5 and 6 below) being added as follows:-

1) Good

2) Fair

3) Poor

4) Bad

5) Started as fair and gradually improved to good

6) Started as poor or bad and gradually improved to fair or better

The research carried out by Shaw (1966) and Shaw and Sichel (1971) in South Africa shows the value of using projective personality tests for predicting accident liability. However, in view of financial and manpower cost it would probably be difficult and not practical, at least at present, to implement such procedures on a wide scale although such methods should prove valuable in the selection of professional drivers.

In defense of projective personality tests Mrs Shaw states that they are sensitive and can be used to predict various levels of accident liability, not simply to distinguish between the good and bad driver. It would seem that future research in this direction should be towards developing tests sensitive enough to make fine distinctions between individuals and comprehensive enough to enable decisions to be made about action to be taken in each case.

8) England - Parry, 1968

According to Shaw and Sichel (1971) Parry in his research contained in his book entitled 'Aggression on the Road' has achieved the near impossible by producing a book which is of equal interest to the layman and scientist alike. One of Parry's most revealing and frightening factors shown in this study is that so many drivers do not know that there is anything wrong with the way they drive and, even if they do know, they do not care, on the whole. The frequently illogical and 'bloody-minded' attitudes and actions of some drivers is captured in this piece of research by Parry (1968).

Parry's study was carried out as a pilot investigation of behaviour in the driving situation. He devised an attitude scale to measure the level of a driver's aggression and anxiety towards driving and other drivers. From this attitude scale set out in a forced-choice format, Parry used the sentence stems of items enabling the driver subject to enlarge and elaborate upon the responses given in the AG (Aggression)/AN(Anxiety) Questionnaire.

In Parry's study 382 motorists formed the sample, with 279 male drivers and 103 female drivers. Parry grouped his subjects according to such factors as age, sex of driver, socio-economic classification, marital status and accident category. He matched scores obtained on the AG/AN Scale rating aggression and anxiety in the motoring situation with these classification factors.

From the data of his study, Parry found that both high aggression and high anxiety make for a greater degree of accident liability in the motoring situation. High aggression whether or not combined with high anxiety is still effective enough to make people more prone to accidents. High anxiety when combined even with low aggression was found to be not far behind in its influence on accident liability. Therefore, it follows that a combination of low aggression and low anxiety is the safest combination in the motoring situation (Parry, 1968).

It was also found in Parry's study that younger drivers aged between 17 to 34 years of age were the most aggressive in attitude towards driving and other drivers and the most liable to experience accidents and that aggression has a greater influence on higher accident liability than has anxiety.

Shaw and Sichel (1971) state that Parry's findings seem to bear out the hypothesis that people who demonstrate aggressive behaviour whilst driving or drivers in a state of anxiety are more liable to have accidents and that certain combinations of aggression and anxiety are

dangerous in the motoring situation presumably because, to some extent, anxiety precipitates aggressive behaviour and vice versa.

Concluding Comment

The foregoing studies carried out in various countries during the last 30 years give an indication of some of the research done in this area of accident research in relation to driving and the type of findings these researchers were able to unearth such as profiles for accident and accident free driver personality types, the use of projective personality tests as a means of accident prediction, the significance of aggression and anxiety in the driving situation, the importance of clinical approaches in accident research etc.

All such findings are a step along the way towards further understanding of accidents and their causation in the driving situation, differing factors between accident free and accident driver personality types and, hopefully, accident prevention, or, at the very least, a reduction in their all too frequent 'non-essential' occurrence.

Perhaps, an apt conclusion would be with the following quotation -

'So little done, so much to do.'

Cecil John Rhodes (1853-1902)

CHAPTER VII

Age/Experience/Sex of Driver

It has been shown that age trends are partly due to experience in relation to accident rates of drivers. Therefore, some of the steep drop in accident rate from youth to middle age should be attributed to gained experience (Wilde, 1970). Drivers under 24 years of age and those over 60 years of age have higher accident rates than those in the intermediate age range. The high accident rate among youth at the peak of vitality and potential skill may be interpreted in terms of inexperience, emotional and social immaturity and temperamental qualities associated with this age group. At the other end of the age scale, decline in skill and general bodily deterioration may account for the elevated accident rate among drivers.

Munden (1966) carried out a study in Great Britain on the accident rates of car drivers by age. 1851 licensed drivers formed the sample considered to be representative of drivers in England and Wales based on estimates of mileage distribution. The sample was divided into 8 age groups ranging from 19 years of age to over 70 years of age. Conclusions drawn from this study were as follows:-

1) Broadly speaking, the 'U' shaped pattern of driver accident rate by age was similar to that found in previous analyses

2) The older age groups seemed to be safer drivers than previously thought

3) Young drivers had a high involvement rate particularly in serious accidents.

Leeming (1969) and Lauer (1960) both mention a 'U' shaped relationship between age and accidents in relation to driving. Cresswell and Froggatt (1963) in a discussion of age and experience in their study of the causation of bus driver accidents mention such a 'U' shaped curve as well. They felt that this curve was the result of the factors of age and experience each acting independently, other things being equal.

In some research by McFarland and Moseley (1954) on age in relation to problems in highway transportation using a sample of 742 truck drivers, it was found that the safest age group for drivers in this sample was 45 years of age and older followed closely by the age range of 35 to 45 years of age. The age range of under 35 years and especially up to the age of 24 was found to have far in excess of their expected number of accidents. McFarland and Moseley state that in their study of truck drivers, the accident data do not support the conclusion that older drivers are more liable to accident than younger drivers.

Writing about the psychological and psychiatric aspects of highway safety, McFarland (1957) states that age is an important variable in the causation of accidents with the clear tendency for higher accident frequency to occur among younger drivers with the interpretation of this being due to factors such as youthfulness and inexperience rather than age per se. However, there is agreement in several studies that accident rates for younger drivers are higher than would be expected if age were of no influence. In a study carried out in 1955 of drivers in Connecticut, McFarland reports that youthful drivers showed an excessive number of accidents whilst drivers over 30 years of age had fewer accidents than would have been expected (Facts, 1955).

A comparative study of the characteristics of drivers involved in single car accidents was carried out by Schmidt et al. (1972) in Baltimore, Maryland. This consisted of study cases of 22 driver fatalities associated with single car accidents compared with 11 driver fatalities associated with multiple vehicle accidents during a 12 month period. One of the findings from this study was that the single car accident fatalities were significantly younger than the multiple car group. However, analysis of the Katz Adjustment Scale (KAS) scores by age did not reveal any significant differences between youthful and older drivers. This is important as it suggests the possibility that older drivers who have accidents share certain personality traits (e.g. hyperactivity, belligerence etc.) with younger accident drivers.

Lauer (1952) carried out a study of age and sex of driver in relation to accidents. 7692 Iowa drivers formed the sample for this study obtained from drivers' licence files. The object of this study was to answer two questions:-

1) Are reported accidents equally distributed among the population, age and number of licencees, and

2) Are accidents distributed equally among licenced drivers when mileage is held constant.

Two conclusions from this study were that male drivers of 30 years of age and under contributed very heavily to the accident total with the differences from 18 to 23 years of age being highly significant and that women drivers differ from men at various age levels with respect to driving accidents reported against them.

It would seem that there is general agreement about the 'U' shaped curve of age in relation to driving accidents and that age, experience and ability to learn are probably inseparable from the more general problems of personality and their relationship to safe and unsafe driving. As the vast majority of people gain their driving licences at an early age, youth is thereby linked with inexperience, hence with a higher number of driving errors and accidents. Tillmann (1948) commented concerning age and accidents that youth rather than inexperience is the determining factor, findings also corroborated by DeSilva (1938) and Johnson (1937).

Whatever the age, there seems to be a higher risk of being involved in a traffic accident during the first few years of the experience of driving which is reputed to be one of the most complex tasks undertaken by individuals in their daily life (Comments, 1971). (Appendix A presents statistics for New Zealand of age and road accidents, P 284).

CHAPTER VIII

Improvement of Driving Record

It has been demonstrated among groups of professional drivers (e.g. Farmer and Chambers, 1940; Hakkinen, 1958; Norman, 1960; Cornwall, 1962), that in different age groups the least experienced drivers had the worst accident record and that this was especially so for drivers with less than about 2 years experience of the job of driving.

For a private motorist, it is said that some of those drivers who have had repeated accidents or have regularly violated traffic rules profit from this experience in that their subsequent driving record improves. Lack of experience is one reason for the high accident rates in youth since it appears to take some years to become a moderately safe driver and this may count as a contributory factor in the decline of road deaths after the age of 25 to 30 years of age.

An article (Comments, 1971) discussing the younger driver and role of experience in driving states that there is a higher risk of accident involvement during the first few years of driving experience whatever the age.

In a study of the characteristics of the driving population for the Iowa Academy of Science, Lauer (1954,1960) states that the male driver learns slowly and after getting a driving licence tends to become progressively worse in his driving habits for about 6 years compared with his female counterpart.

In an earlier study, Lauer (1952) after noting the high accident rates of male drivers of less than 30 years of age found that they required some 5 years before improvement in their accident records occurred whereas female drivers seemed to improve right from the start of their driving experience.

CHAPTER IX

Personality as Related to Driving

Psychologists describe personality as 'the sum total of all one's characteristics' (Lauer, 1960) although they tend to emphasize personality traits or behaviour patterns more so than appearance.

Psychological aspects of road accidents include such factors as age, sex of driver, socio-economic factors as well as personality and no facet of accident causation has received such close attention. Vehicle driving is more than a separate learned skill. A vehicle frequently becomes an extension of one's personality (Nagel et al., 1973). It may even bolster up one's inadequacy or even be used as a weapon.

Burner (1973) discussing the psychosocial aspects of traffic accidents also emphasized the way that the automobile is an extension of the self as observed, for example, by different styles and ornamentation and that the idea of speed is often related to sexual identity. Burner (1973) states that drivers can be characterised as follows:-

1) Those who travel fast and see no danger

2) Those who are vain and use it to dominate others

3) Those who are aggressive and injurious

The etiology of these characteristics may be in person-situation interactions or related to situational (e.g. fatigue, illness, alcohol etc.) or personality variables (e.g. immaturity, emotional instability). Burner following his study recommended that there was a need for a study of the sociology of the automobile and driving.

Signori and Bowman (1974) considered that the involvement of personality factors in traffic accidents is supported by findings from psychiatric studies which focus on psychopathology, psychopathy, stress, alcoholism and accident proneness and from other studies which make use of psychological testing devices to measure components of personality. These two researchers felt that further progress in clarifying the relationship between personality and traffic accidents may be achieved through the use of more appropriate validation criteria and more inclusive stylistic conceptions of personality.

Tillmann and Hobbs (1949) in their Canadian study of taxi drivers state that there is a characteristic personality pattern that is associated with a high and low accident record. The personality with a high accident record is characterised by aggressiveness and inability to tolerate authority either at the parental or community level dating from the individual's home background. On the other hand, the low accident group of drivers was found to be made up of serious, stable, well-adjusted individuals with well-integrated home backgrounds.

Conger et al. (1959) produced a hypothetical composite of the accident personality type. The variables felt to be significantly related to accident frequency were:-

1) Underlying hostility

2) Lack of reality orientation

3) Conventionality

4) Extent of phantasy pre-occupation

5) Inability to tolerate various tensions

Buttigliere and Guennette (1967) note that these are the personality characteristics frequently identified with the emotionally disturbed individual.

A brief description of features common to groups of accident repeaters may be drawn from the conclusions of a number of experts (Department of Scientific Research, 1963). Accident repeaters show conflicts in their reactions to authority (McFarland and Moseley, 1954; Dunbar, 1942); they have aggressive tendencies, are irresponsible and are likely to be socially maladjusted (Tillmann, 1948; Tillmann and Hobbs, 1949). They have a history of aggressive truancy and disiplinary problems during childhood, at school and in the armed forces (Tillmann and Hobbs, 1949; Clark, 1949; Brody, 1957; McFarland, 1957). They tend to be active, energetic and quick minded, free from tension and worry and do at least their share of work (Davis, 1958).

Fine (1963) tested the hypothesis derived from Eysenck's personality theory that extraverts would be more likely to have traffic accidents and violations than introverts. He used a male college population of 937 subjects for whom driving records were available. This sample was divided into three approximately equal groups of extravert, intermediate and introvert drivers. A comparison of the numbers of accident violations incurred by the three groups resulted in statistical confirmation of the hypothesis that extraverts were more liable to accidents than introverts.

In many studies and reviews emotional instability is mentioned as being one of the most important causes of accident with the measurement methods used to detect this varying. Drivers are more likely to have an accident when emotionally disturbed or below par physically. Several studies have attempted to re-construct the personalities of drivers involved in fatal automotive accidents

(Selzer et al., 1968; Brown et al., 1968). These accident drivers were found to have significantly more symptoms of mental illness including depression, paranoid thinking and excessive use of alcohol than did control drivers.

Sachs (1964) points to the importance of the personality factor in accident causation and the accident repeater. She feels that the accident proneness of the accident repeater is a deep seated personality maladjustment which cuts across all fields of the individual involved and this would be in agreement with the findings of, for example, Tillmann (1948) and Tillmann and Hobbs (1949) and their concept that 'a man drives as he lives'. In a further study by Sachs (1962) using United States air force men as experimental subjects divided into accident repeater and accident free driver groups, a hypothetical personality composite of the accident type was compiled as in the study by Conger et al. (1959). In general, the accident type was found to be egocentric, exhibitionistic, resentful of authority, impulsive and lacking in social responsibility. As a group, they could be classified as being borderline psychopathic personalities.

Including intelligence as an aspect of personality, no one has yet established what the minimal level of intelligence for driving is. Certainly, it does not appear to be a factor in the general problem of high accident rates according to Tillmann and Hobbs (1949). Farmer in 1945 from his study of a large group of commercial drivers in Great Britain found that the results of intelligence tests completed were not satisfactory in differentiating accident prone drivers from accident repeaters. Farmer (1945) stated that the intelligence tests, at least at that time, indicated that to measure adult intelligence was of little value in selecting good from bad drivers.

Eysenck (1960) used various measures of intelligence and mechanical ability. The findings showed that over large groups of drivers the relationship between ability and accident proneness was quite small. They also show that ability makes no difference to driving safety once an I.Q.(Intelligence Quotient) level of about 80 is reached, with average I.Q. being 100. However, below 80 I.Q. there was found to be a steep rise in the number of accidents encountered and it did not seem to be important which test was used to establish mental ability level.

Following on from this, Davis and Corley (1959) found that better educated drivers had fewer accidents but that personality qualities estimated by psychometric tests did not differentiate accident repeaters from the single accident group.

Patterns of thinking or cognitive style may also reflect liability to accident as displayed by Plummer and Das (1973) in their study of dichotomous thought processes in accident prone drivers. In this study, Plummer and Das used Osgood's Semantic Differential technique as their measurement scale (Osgood et al., 1957; Snider and Osgood, 1969). To think dichotomously is to polarize personally relevant events and think in absolute or extreme terms. The accident driver group in this study was found to have a 'W' shaped graph showing dichotomous thinking whilst the non-accident driver group was

found to have an 'M' shaped graph indicating moderate thinking. Dichotomous thinking was found among those with frequent accidents. The conclusion from this study was that those who dichotomize their thinking seem to become involved more frequently in accidents than others who tend not to think in this way.

Hirschfeld and Behan (1966) studying chronic disability following accidental injury made the following interesting observation that -

> 'Accidents do not "just occur". Rather they are events which are captured by the personality for the purpose of solving the individual's life problems.'

In the United States some research carried out by Shaffer et al (1974) using fatally injured drivers as the study sample yielded some interesting results regarding driver personality.

50 cases of men who had died in car accidents were studied over a period of 4 years and compared with a sample of other men who had not been involved in car accidents. This research team headed by Shaffer inspected medical-examiner reports, police records and Department of Motor Vehicles records and interviewed close relatives and friends of the deceased in order to build up a profile of each of the male drivers fatally injured in road accidents.

The interviews used included a scale of 205 behavioural items on which the friend or relative rated the victim. These items produced a personality profile of 18 social adjustment characteristics such as anxiety, stability and verbal expansiveness.

The comparison of scores of those who had died in car accidents or the victims with those not so involved showed that the victims were significantly more belligerent, verbally expansive, negative and hyperactive than the control group of drivers.

The driving records of those fatally injured drivers also confirmed this aggressive picture. More than one third of the victims had two or more speeding convictions and half had at least one. Other interesting findings were that more than 20 per cent had been convicted for reckless or drunken driving and 28 per cent had had their driving licences suspended or revoked. Only two of those drivers fatally injured were using seat belts when they died.

Nearly 80 per cent had a measurable amount of alcohol in their blood and 52 per cent of the victims had a level of more than 0.10 which definitely impairs driving ability. A certain amount of alcohol can be taken with very little, if any, measurable effect and this is known as the 'threshold amount' with a blood alcohol reading below the level of 0.04 or 0.05 per cent being apparently insignificant and non-causal (Borkenstein, 1967).

This forms a bleak picture. Nevertheless, the researchers of this study conclude that it is the constellation of personality traits that make up 'the socially obstreperous driver' that most increases

the risk of becoming a fatality in a road accident rather than age or alcohol alone. This is, indeed, a most interesting and potentially useful finding from the research by Shaffer et al, (1974) of a sample of fatally injured male drivers studied in order to compile a personality profile of these men, that it is certain factorial forces interacting with a particular constellation of personality traits that heightens liability to accident in the driving situation and finally tipples the balance of the scale towards actuality.

Shaw (1966) in summing up the findings of her study of bus drivers in South Africa commented on distinguishing between good and bad accident driver risks as follows:-

> 'It is the total personality pattern that matters and particularly the balance and integration of that pattern. This whole study has emphasized that if this is sound and the person functions on a fairly even keel, is well adjusted to his circumstances and has learned to live with himself and his environment, then the prognosis is good. If there is a pronounced imbalance of any kind, if the person is poorly integrated, if his adjustments are inadequate or unrealistic, then the prognosis is bad.'
>
> (Shaw, 1966, P.35)

As a final observation of this section on driver personality in relation to traffic accidents, it may be cited that McLean and De Reamer (1961) commented that -

> 'The majority of accidents encountered are, indeed, the result of an individual personality interacting with the total life style.'

CHAPTER X

Attitudes as Related to Driving

Personality manifests itself through an individual's attitudes or one's attitudes are indicators of personality type. An attitude can broadly be defined as a bent or tendency to act in a certain way under given stimulation (Lauer, 1960).

It is commonly believed that besides personal characteristics of drivers that their attitudes are also one of the most important factors in accident causation. Attitudes are subject to change which may be rapid whilst habit patterns are not subject to rapid modification usually and it may take years to bring about changes in their structure.

Two types of attitude might be mentioned. Firstly, a temporary attitude is the type found in an individual when, for example, he

drives to work having had insufficient sleep or after an argument whilst permanent attitudes are classified as being active or passive. Passive attitudes are less likely to be troublesome in traffic than active attitudes, but the former cannot be ignored. No individual driver's behaviour is characterised by a single attitude. There is a dominant trait in the attitude such as submission, anxiety, aggression etc., and this is also associated with a number of other traits differentiating that individual driver from every other driver.

Case and Stewart (1956) discuss driving attitudes and mention two scales used to measure them. First, there is the Conover Driver Attitude Inventory of 1947. This scale assumes that attitudes are generalised and carry deep seated emotional connotations. In this inventory an attempt is made to measure driver attitude by ascertaining the individual driver's reaction to a word or phrase such as alcohol, parties, accident etc., on a 5 point scale.

The other attitude measure developed in 1941 in relation to driving was the Siebrecht Attitude Scale. This scale uses the technique of presenting to the individual a series of complete sentence statements about factors involved in driving and the individual indicates his reaction on a 5 point scale.

However, research has subsequently revealed these two scales to be unsatisfactory as attitude measures (e.g. Agan, 1950; Siebrecht, 1954; Case and Stewart, 1956).

A scale developed by Parry (1968) is designed to measure the level of aggression and anxiety that drivers have in relation towards driving and other drivers. This questionnaire uses the one alternative choice method. For example -

I like fast driving I do not like fast driving

This technique does not allow the driver subject to choose a midpoint for his answer and he/she has to decide which of the two items is nearer the truth for him. Also, in this study sentence completion items were compiled from the sentence stems of Parry's AG (Aggression) / AN (Anxiety) Scale allowing the driver subject the opportunity to elaborate on his responses given in the questionnaire. For example, from the above item:-

For me, to drive fast is.....

DeSilva (1942) introduces the concept of safety-mindedness which refers to the attitudes which lead a driver to try and keep out of accidents. The definition DeSilva gives of safety-mindedness is as follows:-

> 'Safety-mindedness is a complex state of mind involving a recognition of the inherent hazards of driving and their relation to the lives of those who use the roads. Among its basic constituents are caution and consideration for the lives, property and comfort of others.

> Other traits that contribute to safety-mindedness are foresight, emotional stability, mental balance and a desire to understand one's limitations as a driver with a view to surmounting them.'
>
> (DeSilva, 1942, P.88)

Safety is largely a matter of attitude. Worries and emotional disturbances act as a distraction and are often the cause of accidents. The individual driver could be rated on a continuum from safe to unsafe (Skillman, 1965) with fluctuations according to his varying circumstances such as illness (sudden or chronic), emotional upsets, anxiety, fatigue etc. However, emotion and attitudes are not usually among the reported causes of accidents whatever their contribution may be (Greenshields, 1959).

CHAPTER XI

Aggression and Anxiety as Related to Driving

Attitudes usually have a dominant trait such as anger, anxiety, depression or aggression which are all part of the human lot. If an individual drives whilst strongly affected by such emotions he is more likely to veer towards the unsafe end of the driving continuum.

Aggression appears to be an essential ingredient of human behaviour (Whitlock, 1971). There appear to be two main theories about human aggressive behaviour:-

1) That it is an innate drive capable of being released by a wide variety of signals and situations, or

2) That it is a learned pattern of behaviour in response to frustration or counter-aggression

According to Berkowitz (1962) frustration is conducive to the manifestation of aggressive behaviour and frustration is one of a driver's principal experiences on the road. Lorenz (1966) commented that 'I believe that present day civilized man suffers from insufficient discharge of his aggressive drive.' Hence, motorized aggression seems to form a more or less socially acceptable outlet for this.

A study carried out by Goldstein and Mosel (1958) investigated drivers' attitudes with a further study on driver aggression. An attitude inventory of 186 items was developed to measure 14 aspects of drivers' attitudes and this was administered to 323 subjects. The finding from this research was that greater aggression is associated with more violations and accidents with younger men being the most aggressive. For women this finding was not significant and there seemed to be no relationship between age and aggression for them.

This theme of aggression of those who have repeated accidents runs through numerous papers written in this area of driving and accidents. For example, Tillmann and Hobbs (1949) found that accident drivers drove aggressively showing little concern for the safety and rights of others. Conger et al. (1957) found that accident repeaters showed poor control of hostility and were more overtly aggressive than accident free drivers. In 1959 Conger et al., showed that persons involved in repeated road accidents were more likely than accident free individuals to demonstrate impulsive hostility, poor reality testing, emotional lability, impaired intellectual function, a highly personalized phantasy life and withdrawal from interpersonal relationships. Lastly, Parry (1968) found that younger motorists, especially male drivers, were the most aggressive and suffered a greater frequency of accidents than other age groups within his study.

Perchonok (1972) examined some human characteristics to determine their effect upon accident causation. He found that male drivers, while apparently more aggressive than female drivers, were less likely to be culpable in generating accidents. This suggests that aggressiveness in driving may not necessarily imply unsafe driving.

Selzer and Vinokur (1974) following a study on 'Life Events, Subjective Stress and Traffic Accidents' stated that :-

> 'Aggression was the only personality variable to correlate significantly with accidents although several significant correlations between traffic accidents and life and subjective stress were found.'

As regards anxiety, Hakkinen (1958) in his research on bus and tram drivers in Finland stated that judging from the responses given to his Traffic Questionnaire and from interview variables, safe drivers in both groups appeared to be more neurotic than accident drivers. Similar results have also been shown by Whitlock and Gannell (1949) and Moffie et al. (1952). Parry (1968) found that anxiety feelings tend with advancing age to increase among female motorists and to decrease among male motorists. Also, Parry found that high anxiety when combined with even low aggression is not far behind high aggression level in its influence on accident liability with the natural deduction following that a combination of low aggression with low anxiety is the safest in its consequences for contribution towards accidents in the driving situation.

Eysenck (1960) writing about psychology and the prevention of road accidents states that the work done in this area of personality traits and accident proneness tends to show that the more emotional and neurotic person tends to over-react to stress, to decline in performance and to take longer to recover to his previous level of performance. Eysenck concludes that there is good reason to suspect that emotional people contribute more than their fair share to the accident prone group of drivers.

Literature Review - Concluding Comment

Various aspects, mainly psychological, of accident research carried out during about the last 40 years in several countries have been looked at in this Literature Review, deemed to be pertinent to this particular study and forming a backdrop to the stage before the presentation of this research commences.

The main focus has been on psychological factors involved in relation to 'the man behind the wheel' and traffic accidents. The aim was to look fairly comprehensively at the work done by other researchers in this field of traffic accidents as well as to clarify some of the terms frequently used and involved in this area.

Having concentrated on this aim and painted a background the stage is now clear and ready to present this study which was set up to investigate the automobile driver and accidents in relation to biographical, attitudinal and personality factors with the ultimate objective of being able to shed more light on the individual as a driver and his role in the process of traffic accidents.

SECTION 2

STATEMENT OF THE PROBLEM

STATEMENT OF THE PROBLEM

The primary aim of this research is to be heuristic and to obtain a broader knowledge of the characteristics of an A (accident) and an AF (accident free) driver personality type.

A sample drawn from a university population of licenced automobile drivers including both staff and students participated in this research involving the completion of three questionnaires which provided a background of biographical, attitudinal and personality data.

The sample is divided into 4 driver sub-groups for the purpose of classification in this study with the following abbreviations for each driver group being used throughout the study:-

MAF	- Male Accident Free Driver Group	n = 58
MA	- Male Accident Driver Group	n = 67
FAF	- Female Accident Free Driver Group	n = 59
FA	- Female Accident Driver Group	n = 22
	Total	N =206

These four driver groups above were further divided and combined on the basis of sex and accident category to form the following four driver group combinations:-

M(A+AF)-	Male (Accident + Accident Free) Driver Group	n =125
F(A+AF)-	Female (Accident + Accident Free) Driver Group	n = 81
	Total	N =206

A(M+F) -	Accident (Male + Female) Driver Group	n = 89
AF(M+F)-	Accident Free (Male + Female) Driver Group	n =117
	Total	N =206

By a process of analysis and evaluation of data a primary objective was to develop and compile profiles of typical driver personality characteristics in order to determine whether any differentiation occurs between the A and AF driver personality types.

In particular the results provide data on:-

a) The incidence of accidents by age and sex

b) The frequency of accidents categorised as very serious, serious and minor

c) The frequency of accidents according to whether considered to be preventable or non-preventable

d) The incidence and type of traffic offence

CHAPTER XII

Hypotheses

Within this context certain specific hypotheses are posed to investigate:-

I Whether there is a typical driver personality profile that emerges from the data to differentiate an A (accident) from an AF (accident free) type according to the driver group classification used in this study

II Whether there is a relationship between a driver's self-concept and the incidence of accidents

III Within this hypothesis the following relationships will be investigated:-

i) The relationship between age and the incidence of accidents being an exploratory investigation with no specific hypothesis being postulated

ii) The relationship between level of aggression and accident frequency testing the null hypothesis (H_0) that there is no relationship against the alternative hypothesis (H_1) that the relationship between level of aggression and accident frequency will be non-linear

iii) The relationship between level of anxiety and accident frequency testing the null hypothesis (H_0) that there is no relationship against the alternative hypothesis (H_1) that the relationship between level of anxiety and accident frequency will be non-linear

iv) An exploratory investigation into the nature of the relationship between Parry's AG(Aggression) and Parry's AN (Anxiety) variables.

v) Two other relationships will be explored with no specific hypotheses being postulated:-

a) The relationship between the NSQ E (Submission-Dominance) and Parry's AG (Aggression) variables

b) The relationship between the NSQ An (Anxious-Not Anxious) and Parry's AN (Anxiety) variables

SECTION 3

METHOD

METHOD

CHAPTER XIII

Sample

The original proposal for this study of the automobile driver in relation to traffic accidents was that a sample of automobile drivers would be obtained from the general driving population, for example, through the help of an insurance company or motoring organisation. However, this proposal did not prove possible to effect.

Two insurance companies and a motoring organisation were approached but were unable to help with setting into operation the kind of work that this research on automobile drivers and road accidents involved. Owing to this turn of events nearly towards the end of the university academic year, it was decided to take a sample of automobile drivers from a university population including both staff and students, with the realization that such a sample would be somewhat different from one drawn from the general population of licensed automobile drivers.

The project was advertised on the selected university campus by various means including notices in the campus weekly newsletter, posters, circulars and by word of mouth. This publicity campaign aimed to be widespread in order to reach as many of the campus population as possible. As a further means of publicising this research, with the permission of several Heads of Department, both Arts and Sciences, several university classes were addressed concerning this research with the invitation to come forward and participate.

In response to the publicity methods used and due to interest aroused, a sample of over 200 licensed automobile drivers presented themselves and volunteered to take part in this research on driving and driving attitudes. This number included both university staff and students.

Considering that this was a busy and somewhat difficult time of the academic year with examinations, end of year assessment and other activities associated with the end of the academic year, this was a most encouraging number.

Although it was indicated in the advertising of this research that it concerned only licensed automobile drivers several motor cyclists took part unwittingly and later their questionnaire forms had to be discounted.

The final sample number was 206 licensed automobile drivers divided into the following 4 driver groups on the basis of sex and accident category:-

MA	- Male Accident Driver Group	n = 67
MAF	- Male Accident Free Driver Group	n = 58
FAF	- Female Accident Free Driver Group	n = 59
FA	- Female Accident Driver Group	n = 22
	Total	N = 206

The 4 driver groups above were combined on the basis of sex and accident category to form 4 further driver group combinations as follows:-

M(A+AF)	- Male (Accident + Accident Free)	n = 125
F(A+AF)	- Female (Accident + Accident Free)	n = 81
	Total	N = 206

A(M+F)	- Accident (Male + Female)	n = 89
AF(M+F)	- Accident Free (Male + Female)	n = 117
	Total	N = 206

The above abbreviations for each driver group classification are used throughout this study.

Driver subjects taking part in this research on licensed automobile drivers and road accidents in relation to biographic, attitudinal and personality factors, were doing so on what might be termed 'a random volunteer' basis, to coin a phrase. That is, driver subjects were invited to participate in this study through the publicity methods used and could opt in or out of it.

Of course, there is the point that 'volunteers' as opposed to 'non-volunteers' form a special group and form an area of research in itself as to why some individuals volunteer to participate and others do not. There may well be an individual with a particular kind of personality make-up that makes him more likely to 'volunteer'. For example, it may fulfil some need of his. Such an issue concerning 'volunteers' is borne in mind.

The drivers presenting themselves to take part in this study did so on an optional basis and, in this sense, could be termed 'random volunteers.' The criteria of qualification necessary to be eligible to participate in this study were that the driver volunteer subject be -

1) A licensed automobile driver

2) A member of the selected university, either as staff or student

Assumptions were made that educational and socio-economic background factors would not be markedly dissimilar among the sample of drivers, acting as an additional underlying basis of criteria stipulated.

This meant that those subjects coming forward were not barred or found to be ineligible because of such factors as age, sex, accident record etc., provided that they fulfilled the above two entry qualifications of being a licensed automobile driver and a university member, either as staff or student.

As regards exposure to driving, Carlson (1973) presented the use of relative exposure as being a useful device for determining this in his study of over-involvement in crashes of 16 to 25 year old drivers. Carlson (1973) found that the high occurrence of young drivers in night, single vehicle crashes was related to exposure with two exceptions:-

i) 16 to 18 year old drivers were over-involved in non-alcoholic crashes

ii) 18 to 21 year old drivers were over-involved in alcoholic related crashes

In this study of licensed automobile drivers with the sample being drawn from a university population, exposure to driving is on a relative basis. With the 'random volunteer' composition of the sample of drivers, it was not known what type of driving exposure might be operating and what type of driving exposure the sample had experienced. However, as Carlson (1973) states this is a useful device for measuring exposure to the driving situation. Using this relative technique driving exposure has been partialled out over the sample and, subsequently, the sub-groups of drivers in order to gain an idea of how much mileage might be driven annually, for example, what type of roads are mainly driven on etc., by each driver group. This means, for example, that driving over 10,000 miles per annum on all kinds of roads would represent greater exposure to driving and, thus, accident liability than driving only 500 miles per annum on mainly rural roads.

In the subsequent analysis of driver questionnaire forms, they were divided into 4 driver groups on the basis of sex and accident category. These 4 driver groups were combined into 4 further driver groups as explained above (P. 49). The criterion used for the division of drivers into A or accident and AF or accident free categories is now discussed.

Driver Groups -

Accident and Accident-Free Criteria

The criterion for placing a driver subject within an accident or an accident free category was based on his reported driving record during the last 5 years. Responsibility for an accident or accidents sustained whilst driving during this span of time was not considered although from the brief 'stated' cause of any accident recorded in Item 29, Part II of the Biographic Questionnaire, an arbitrary decision was made as to whether the incident was deemed to have been preventable or non-preventable.

A preventable accident is taken to be any occurrence, confrontation or incident incurred whilst driving whether it resulted in damage to person or property that could have been prevented had reasonable and due care been taken. A non-preventable accident, on the other hand, is taken to be one in which the driver was judged to have reasonably done everything he or she could have done in order to have prevented the occurrence (Brandaleone et al., 1972).

In this study the Accident Free group of drivers includes those drivers who did not record the incidence of any accident whilst they were driving during the last 5 years of their driving experience.

The Accident group of drivers includes those drivers who recorded that they had experienced one or more accidents whilst driving during the last 5 years of their driving experience.

The period of 5 years for accident record was selected as it is likely to indicate consistency of the trend of usual pattern of driving behaviour over this time span, although not all driver subjects in this sample had held a driving licence for that long.

The incidence of accident or accidents may have occurred prior to this stipulated period of the past 5 years without any such occurrence during the past 5 years. Alternatively, those incurring accidents whilst driving might only have experienced one accident or might show trends of being an accident repeater. For this reason, the 5 year time span regarding accident record was felt to be a useful indicator and of potential, if not actual, significance in the attempt to shed further light on the characteristic tendencies differentiating accident (A) and accident free (AF) personality types as well as male and female driver characteristics.

Thus, according to the driver group classification system adopted in this study the following apply:-

MA Driver Group - Includes male drivers having experienced one or more accidents whilst driving during the past 5 years.

MAF Driver Group - Includes male drivers free of accidents whilst driving during the past 5 years.

FA Driver Group - Includes female drivers having experienced one or more accidents whilst driving during the past 5 years.

FAF Driver Group - Includes female drivers free of accidents whilst driving during the past 5 years.

The above 4 driver groups make it possible to look at the characteristics of a particular driver group such as the FAF or MA group of drivers. However, a step further than this can be taken by combining driver groups on a basis of sex and accident category. Such grouping of drivers permits any characteristic trends to become apparent. For this reason the following driver group combinations were formed from the above 4 driver groups -

M(A+AF) - Male (Accident + Accident Free) Driver Group

F(A+AF) - Female (Accident + Accident Free) Driver Group

A(M+F) - Accident (Male + Female) Driver Group

AF(M+F) - Accident Free (Male + Female) Driver Group

Throughout this study, the number of driver subjects actually responding to an item measure has been stated as in some instances not all of the driver subjects of a particular driver group responded. The actual number of driver subjects responding to an item has been used as the base figure for the purposes of calculation.

A presentation of Part I of the Biographic Questionnaire follows (P. 53) and this provides descriptive statistical data for this sample of drivers concerning factors such as age, marital status, educational qualifications, occupation, hobbies, details of automobile normally driven etc., according to the driver group classification system adopted in this study.

The objective is to provide a frame of biographical reference against which to place this sample of drivers before proceeding to present the findings of the investigation of various attitudes and personality factors obtained through the use of the measuring instruments used in this study, namely Part II of the Biographic Questionnaire including a Semantic Differential Scale rating self-concept as a driver, the NSQ and Parry's AG(Aggression) / AN(Anxiety) Scale.

The general aim has been to construct a comprehensive picture of drivers within this sample from a biographical, attitudinal and personality angle, using measures that, at least to some extent, dovetail and complement each other.

Driver Sample Statistics

Biographic Questionnaire - Part I

Part I of the Biographic Questionnaire deals with biographic details of the driver sample taking part in this study such as age, marital status, education, occupation, details of car normally driven etc. The data for this biographic information is presented mainly in the form of descriptive statistics except for one instance where chi square has been applied to test for the significance of difference between observed and theoretically expected values in respect of male and female drivers. Apart from this, data is given in tabular form showing actual frequencies for each driver group with one distribution graph for the driver age groups.

Age Distribution of Driver Sample

	Age Groups							
Driver Group	20 and Under	21-25	26-30	31-40	41-50	51-60	61+	Driver Group Totals
MAF	26	15	6	7	2		2	58
MA	28	31	1	5	1		1	67
FAF	22	12	6	11	5	3		59
FA	11	5	2	1	3			22
Number of Subjects	87	63	15	24	11	3	3	206

AGE:

This sample of drivers participating in this research was composed mainly of students aged up to 25 years of age although the age range was not entirely restricted to the younger age bracket as university staff as well as students were invited to take part. This meant that a wider age distribution was possible than if the study had been limited to only students, even with the fact that more mature students might have participated.

Inevitably, there was some bias towards the under 25 year age range although driver subjects were distributed throughout all the age categories, decreasing fairly sharply in number as the age range increased. In spite of this and bearing it in mind, the data table above signifies that young male drivers up to the age of 25 years in this sample incurred the greatest number of accidents whilst driving in the last 5 years of their driving history. Further details concerning accident record are given in Item 29 of Part II of the Biographic Questionnaire in the section on Results (P. 104).

Wilde and Grant (1970) state that it has been shown that age trends as regards accidents in the driving situation are partly due to age and partly due to experience. Therefore, some of the steep drop in accident rate from youth to middle age should be attributed to gained experience whilst driving.

It has been found that drivers under 24 years of age and those drivers over 60 years of age have higher accident rates than those in the intermediate age range. Among youth at the peak of their potential strength and skill high accident rates may be explained in terms of inexperience, emotional and social immaturity and termperamental qualities associated with this age group. As regards those drivers at the other end of the age scale a decline in skill and general bodily deterioration (e.g. slower reaction times, faulty coordination, failing eyesight etc.) may account for the elevated accident rate of older drivers, for example, 61+.

The previous section on Review of Literature in the field of driving and accident research contains a section on Age/Experience/Sex of Driver (P. 32) as well as a further section on general Biographical/Background Factors of the driver (P. 18).

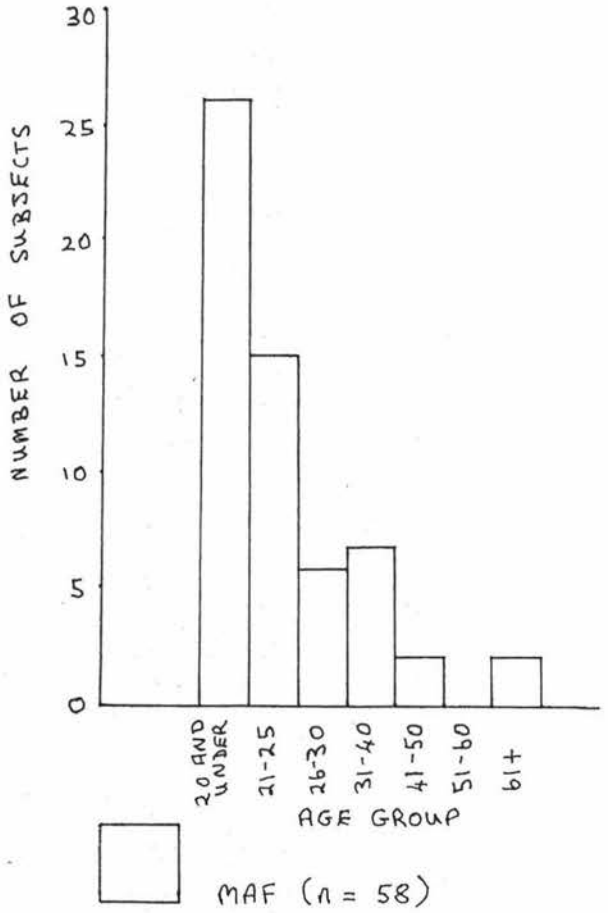
Frequency Distribution of Sample of Drivers by Age Group:

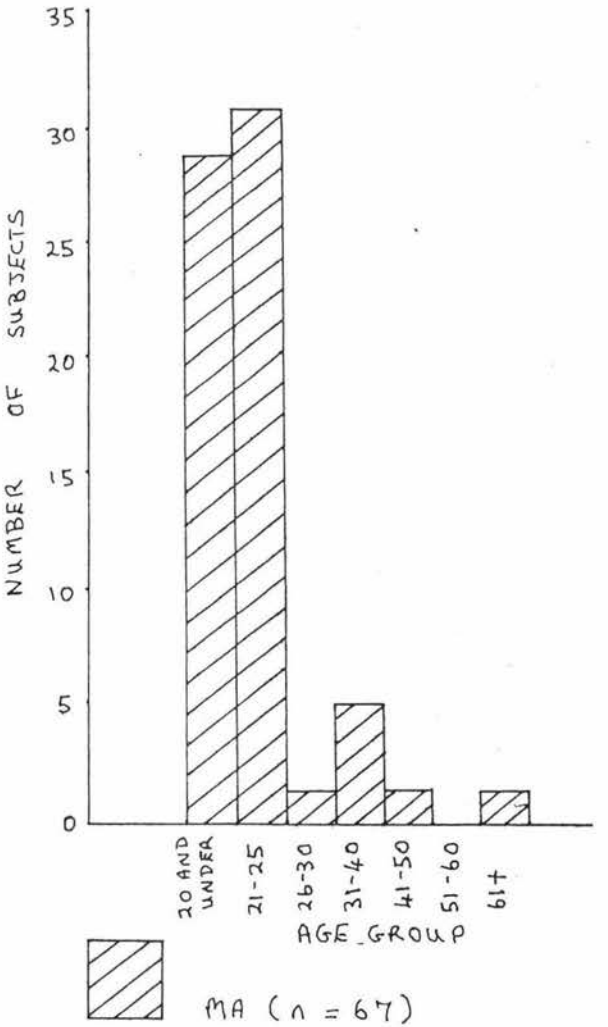
The above table (P. 53) and on which the following bar graphs are based, show the frequency distribution of the 4 driver sub-groups of this sample according to age group.

Driver subjects were mainly in the younger age group of up to 25 years of age. In the FAF group there were 11 subjects in the 31-40 age range and in the sample as a whole 6 subjects were over 50 years of age.

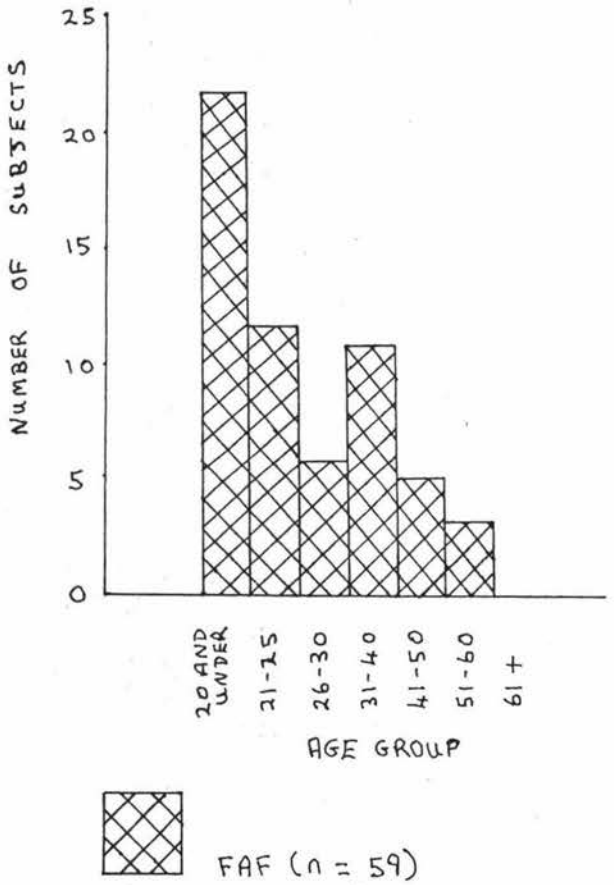
By including university staff as well as students in this sample a wider age range of drivers was obtained.

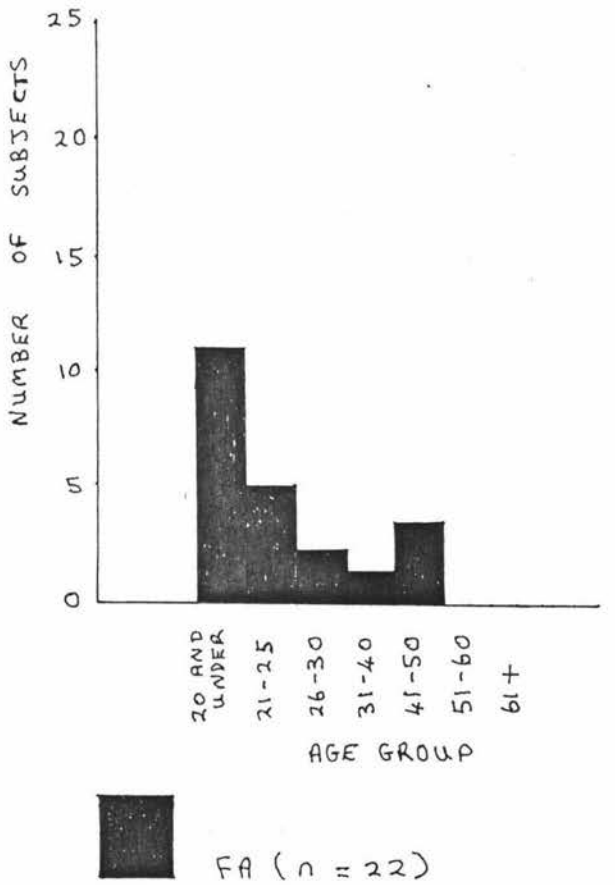
Frequency Distribution of Driver Sample According to Age Group





Frequency Distribution of Driver Sample According to Age Group





SEX

	MAF	MA	FAF	FA
NUMBER OF SUBJECTS	58	67	59	22
TOTAL NUMBER	MALE SUBJECTS n = 125		FEMALE SUBJECTS n = 81	

The total number of male drivers in this sample including both accident and accident free categories was 125 and the number of female driver subjects for the same two categories was 81. This gives a ratio of 1.5:1, male to female drivers. This was not significant using chi square where $\chi_c^2 = 3.041$ at $p = > .05$ level

There were 58 subjects in the MAF group and 59 in the FAF group giving a ratio of 1:1 male to female driver subjects, respectively.

In the MA group there were 67 subjects and 22 driver subjects in the FA group giving a ratio of 3:1, male to female drivers, respectively. Using chi square to test the significance of difference between observed and expected values $\chi_c^2 = 21.71$, $p = < .001$. This shows that there is a significant difference between the number of male and female driver subjects in the two accident categories of this sample of drivers.

Chi Square Results From Above:

Male:Female	$\chi_c^2 = 3.041$	$p = > .05$	ns
MA:FA	$\chi_c^2 = 21.75$	$p = < .001$	s

Where

χ_c^2 = Chi square corrected for continuity
p = Probability
ns = Not Significant
s = Significant
$<$ = Less Than
$>$ = Greater Than
• = Direction of significant difference

MARITAL STATUS:

MARITAL STATUS	MAF	MA	FAF	FA
SINGLE	42	58	37	17
MARRIED	16	8	19	2
DIVORCED		1	2	3
WIDOWED			1	
NUMBER OF SUBJECTS	58	67	59	22

The sample studied was mainly of students. The number of subjects married in the MAF and FAF groups of 16 and 19, respectively, may be partly accounted for by the fact that, besides students, university staff members took part in this survey. Of course, there would also be a few married students.

In a study on the prediction of accident liability through biographical and psychometric tests, Harano et al. (1975) found that using cross validation of analysis, marital status together with other variables such as socioeconomic factors, traffic conviction record, rating of one's driving ability etc., was a significant variable.

As the sample being studied in this investigation was mainly comprised of young university students, there was found to be a bias towards being single. However, the findings of Harano et al. (1975) might well be borne out, for example, with a sample drawn from the general population of automobile drivers.

NUMBER OF CHILDREN:

	MAF n = 16	MA n = 9	FAF n = 22	FA n = 5
NUMBER OF CHILDREN	28	26	33	6
RANGE OF NUMBER OF CHILDREN	1-5	1-6	1-6	1-3
AVERAGE NUMBER OF CHILDREN	1.75	2.88	1.65	1.5

The figures shown in the above data table are not necessarily accurate as in order to obtain the average number of children it was presumed that those driver subjects who were married, divorced or widowed would be the ones to have children. In view of today's trend towards solo parenthood the assumption made may be false, at least in some cases. However, this was realized and acting on this assumption a guideline as regard the average number of children per driver group has been calculated.

UNIVERSITY COURSE:

UNIVERSITY COURSE	MAF n = 58	MA n = 67	FAF n = 56	FA n = 21
NO COURSE	13	6	11	4
DIPLOMA E.G. HORTICULTURE	1		2	2
BACHELOR'S DEGREE SCIENCE	32	41	11	4
BACHELOR's DEGREE ARTS	6	9	27	9
BACHELOR's DEGREE BUSINESS	2	7	2	
HONOURS DEGREE ARTS AND SCIENCE		1	1	
MASTERATE ARTS AND SCIENCE	2	1	2	2
DOCTOR OF PHILOSOPY (Ph. D.)	2	2		

Driver subjects taking part in this research were not necessarily taking a university course as indicated by the data table for university course as both university staff and students took part in this study.

Male driver subjects tended to be taking a bachelor's degree course in science including agriculture, horticulture, food technology, veterinary science etc., whilst female driver subjects who were students tended to be taking a bachelor's degree in arts including humanities and social sciences.

The number of driver subjects taking higher degrees or post-graduate courses for Masterate and Ph.d courses decreased sharply as might be expected with the pyramid effect of the education system using a bachelor's degree as the baseline.

YEAR OF UNIVERSITY STUDY:

YEAR OF UNIVERSITY STUDY	MAF n = 58	MA n = 67	FAF n = 56	FA n = 21
NO COURSE	13	6	11	4
YEAR 1	17	18	17	6
YEAR 2	18	20	13	5
YEAR 3	5	13	9	3
YEAR 4	4	8	3	1
YEAR 5	1	2	2	2
YEAR 6				
YEAR 7				
YEAR 8			1	

Several driver subjects in this sample of drivers were not taking a university course as both university staff and students participated in this research. As regards those who were taking a university course the majority of driver subjects were either in their first or second year of university study as full-time students. The subject stating that she was in the eighth year of university study was undertaking her course on a part-time basis as might also be the case for some of the other respondents within the driver groups. The pyramid effect is again seen as was the case for data concerning university course whereby the number of subjects decreases sharply as the year of study increases.

OCCUPATION

OCCUPATION	MAF n = 58	MA n = 67	FAF n = 59	FA n = 22
STUDENT	44	57	37	14
LECTURER	5	5	2	2
TEACHER			3	2
NURSE			5	2
ADMINISTRATIVE	2	3	9	1
TECHNICAL	4	2	1	1
MANAGERIAL	2			
OTHER	1			

The main occupation among this sample of automobile drivers, as might be expected, was that of full-time student for all driver groups although as both staff and students took part in this study there was also a range of other occupations such as lecturer, technical and administrative etc.

HIGHEST EDUCATIONAL QUALIFICATION GAINED:

HIGHEST EDUCATIONAL QUALIFICATION	MAF n = 55	MA n = 67	FAF n = 57	FA n = 22
TWO YEARS SECONDARY SCHOOL	3			
SCHOOL CERTIFICATE	1		9	1
U.E./H.S.C.	15	35	18	6
G.C.E. 'A' LEVEL(S)/ BURSARY	22	22	18	8
DIPLOMA E.G. TEACHING	4	1	4	3
BACHELOR'S DEGREE	2	5	5	2
HONOURS/ MASTERATE	5	1	2	1
Ph. D.	2	2		1
OTHER	1	1	1	

Where - U.E. = University Entrance
H.S.C. = Higher School Certificate
Bursary = 'A' and 'B' Bursary
G.C.E. 'A' Level = General Certificate of Education
Advanced Level (English Qualification)
Ph. D. = Doctor of Philosophy

For this sample of automobile drivers the highest educational qualification gained by the majority of driver subjects taking part in this study was either U.E. / H.S.C. or Bursary ('A' or 'B') / G.C.E. 'A' Level(s).

Other qualifications entered as being the highest educational ones gained were a Bachelor's degree held by 14 subjects, Honours/Masterate held by 9 subjects, 5 subjects with a Ph. d besides Diplomas (e.g. in nursing or teaching).

This means that as a group education qualifications would be well above average, if compared for example, with a sample of drivers taken from the general driving population.

HOBBIES:

HOBBY	MAF n = 51	MA n = 64	FAF n = 56	FA n = 22
SPORT	38	41	32	14
ARTISTIC	6	11	11	6
MUSICAL	15	16	20	7
LITERARY	11	5	23	11
SOCIAL	3	9	2	2
HOMECRAFT	8	6	35	16
TECHNICAL	12	16	1	
OTHER	8	12	5	7

Sport was the predominant hobby for all driver sub-groups followed by musical and literary pursuits.

Male driver subjects tended to have hobbies such as those classified under the 'technical' category including, for example, model aeroplane and railway construction, electronics, working on cars etc., differing from female driver subjects who tended to have hobbies such as cookery, sewing, gardening etc., or what might be termed generally as 'homecraft'.

It is to be noted that the MA group of drivers besides their interest in sport as a hobby also display an extravert tendency in the 'social' category including, for example, gambling, general socializing, dancing, drinking etc.

There is a difference to be noted concerning the different types of hobby pursued in general by male and female driver subjects in this sample of drivers.

Tillmann and Hobbs (1949) found that one of the most outstanding differences between high and low accident driver groups in their study carried out in Canada was the interest expressed in hobbies.

In the high accident group of drivers for example, Tillmann and Hobbs found that there was rarely an interest expressed in hobbies with their main activities being in the field of sports, drinking, gambling and occasional dancing. To some extent this trend is also to be seen with the MA group of drivers in this sample.

On the other hand, Tillmann and Hobbs (1949) found that the low accident group of drivers in their study usually expressed an interest in hobbies such as gardening, sports, church organisations etc. They seldom gambled and tended to be moderate drinkers.

Very broadly, it might be postulated that extraversion/introversion lies at the base of this difference between high and low accident driver groups and the hobbies they pursue. The high accident group, on the whole, seem to prefer energetic and social type of outlet to appease their activity and interests whilst the low accident type seem to prefer a quieter, more sober type of hobby for his leisure time pursuits.

An individual's activity level in the form of extraversion or introversion may well manifest itself in the type of hobby he undertakes and so may form a basis of the whole of his life style.

From the evidence shown by Tillmann and Hobbs (1949) and the data gathered for this sample of automobile drivers participating in this research, further investigation of the validity of this postulation could provide an avenue of exploration in the effort to identify why one individual incurs accidents whilst driving and yet another remains accident free.

OTHER INTERESTS:

	MAF	MA	FAF	FA
NUMBER OF SUBJECTS RESPONDING	38	48	36	15
NUMBER OF INTERESTS	84	88	76	40
AVERAGE NUMBER OF INTERESTS	2.21	1.83	2.11	2.66

This item concerning other interests the subject might have besides hobbies sought to gain some indication of this. Other interests included such things as Russian history, religion (e.g. Christianity), yoga, politics etc.

It can be seen from the data table that the MA group of drivers had the lowest average number of other interests besides their hobbies of 1.83 whilst the FA group of drivers had as their average for other interests 2.66.

DETAILS OF CAR/VEHICLE NORMALLY DRIVEN:

VINTAGE OF CAR/VEHICLE	MAF n = 56	MA n = 66	FAF n = 57	FA n = 22
BEFORE 1955	4	1	4	3
1956 - 1960	3	9	1	2
1961 - 1965	13	21	13	4
1966 - 1970	15	18	12	7
1971 AND LATER	21	17	27	6

This item sought to ascertain broadly the vintage of cars/vehicles normally driven by this sample of drivers.

For a sample of mainly full-time university students a rather surprising factor emerged as regards the number of cars/vehicles normally driven that were of a 1971 or later model.

C.C. POWER OF CAR/VEHICLE NORMALLY DRIVEN:

CAR/VEHICLE C.C. POWER	MAF n = 56	MA n = 66	FAF n = 57	FA n = 22
UP TO 1000 C.C.	8	12	8	5
1001 - 1500 C.C.	24	29	28	9
1501 - 2000 C.C.	13	16	17	6
2001 - 2500 C.C.	4	5	2	1
2501 - 3000 C.C.	3	2	2	1
3001 - 3500 C.C.	3	1		
OVER 3501 C.C.	1	1		

c.c. = Cubic Capacity or engine power

The data given in the above table shows that the main c.c. power of cars/vehicles normally driven by this sample of university automobile drivers was within the 1001 - 1500 c.c. range followed by the 1501 - 2000 c.c. power range.

Some cars/vehicles normally driven were up to 1000 c.c. whilst 6 driven by male drivers (A+AF) were over 3001 c.c. power.

The c.c. power of cars/vehicles normally driven by this sample of drivers is interesting and in the main automobiles were of moderate power capacity with the exception of some being fairly low powered while others notably driven by male drivers were high powered.

COLOUR OF CAR/VEHICLE NORMALLY DRIVEN:

CAR/VEHICLE COLOUR	MAF n = 55	MA n = 65	FAF n = 57	FA n = 21
RED	6 10.9%	6 9.2%	6 10.5%	6 14.3%
BLUE/AQUA	12 21.8%	15 23.1%	12 21%	7 33.3%
YELLOW/ORANGE/GOLD	11 20%	10 15.4%	10 17.5%	3 14.3%
GREEN	3 5.5%	13 20%	9 15.8%	1 4.8%
PURPLE/ORCHID		1 1.5%	1 1.8%	
WHITE/CREAM	14 25.5%	16 24.6%	13 22.8%	2 9.5%
BLACK			1 1.8%	2 9.5%
OTHER	9 16.3%	4 6.2%	5 8.8%	3 14.3%

The predominant colour of autombiles normally driven by this sample of drivers was blue/aqua followed by white/cream, then the yellow/orange/gold range of colours and green. These predominant vehicle colours were fairly evenly distributed across the 4 driver groups. The 'other' colour category included such colours as brown, beige, and grey.

Nearly everyone is more susceptible to colour than he realises and investigation has shown that certain colours are stimulating whilst others are relaxing; that one colour may arouse dissension in people and another bring harmony (Roon, 1951).

Louis Cheskin of the Colour Research Institute of America has discovered some fascinating effects of colour (Roon, 1951). Red, Cheskin points out, has a violently stimulating effect whilst blue, the coldest of all colours, is a psychological sedative.

Bearing this in mind, the writer had previously postulated a theory that the colour red for vehicles would be associated with a greater incidence of road accidents than vehicles of other colours would owing to a particular set of personality characteristics inherent and aroused in the driver of a vehicle of that colour.

This postulation was not supported by the data collected for this sample of university automobile drivers. However, there is the proviso that there may be less red coloured automobiles on the road in relation to vehicles of other colours.

The red vehicle may be associated with greater accident liability because of certain personality characteristics of its driver (e.g. making risky manoeuvres, impulsiveness, the 'always in a hurry' syndrome, very fine judgement, fast reactions but not necessarily accurate ones etc.). In view of Cheskin's finding that red has been found to have a violently stimulating effect this may well be so as regards the driver of a red automobile.

Such a driver may leave havoc in his wake as he speeds on blissfully unaware of the potential accident situation he might have created. His behavioural actions might precipitate a chain of events that could lead to a potential accident of which he may or may not be a part although he set the whole process in action initially.

However, further research in the area of colour and particularly automobile colour and its effects, in relation to personality might prove to be useful.

TYPE OF MOTOR INSURANCE HELD:

TYPE OF MOTOR INSURANCE HELD	MAF n = 55	MA n = 62	FAF n = 52	FA n = 22
NO INSURANCE	2	4	6	
3RD PARTY INSURANCE	19	19	10	7
COMPREHENSIVE INSURANCE	33	38	36	15
3RD PARTY AND COMPREHENSIVE INSURANCE	1	1		

Comprehensive motor insurance was the main type of insurance cover held by the majority of driver subjects in this sample of drivers, followed by Third Party insurance cover.

Those driver subjects who claimed that they did not hold any motor vehicle insurance may have been covered by the insurance policy of the owner of the vehicle they were driving. Alternatively, these driver subjects may have derived some thrill from the risk of not being covered by motor insurance of some kind during their driving ventures, unless, of course, no insurance company will cover them in view of their driving record or would do at a very high premium.

Driver Sample - Overview

A profile of the typical male and female driver taking part in this driver research follows in the form of a summary table outlining the characteristic tendencies indicated for male (A+AF) and female (A+AF) driver subjects in this sample:-

Category	Typical Male Driver	Typical Female Driver
Age	Up to 25 years old	Up to 25 years old
Marital Status	Single	Single
No. of Children	Average 2.3	Average 1.6
University Course	Bachelor's Degree - Science	Bachelor's Degree - Arts
Year of Study	First or Second	First or Second
Occupation	Full-Time Student	Full-Time Student
Highest Educational Qualifications	Bursary/G.C.E. 'A' Level(s), U.E./H.S.C.	Bursary/G.C.E. 'A' Level(s), U.E.'H.S.C.
Hobbies	Sport/Musical/Art/ Literary/Social	Homecraft/Sport/ Literary/Music
Other Interests	Average 2.0	Average 2.4
Car Normally Driven	Vintage 1971 - 1966 - 1970	Vintage 1971 - 1966 - 1970
Car c.c. Power	1001 - 2000 c.c.	1001 - 2000 c.c.
Car Colour	Blue/Aqua, White/ Cream, Yellow/Orange/ Gold	Blue/Aqua, White/ Cream, Yellow/Orange/ Gold
Motor Insurance	Comprehensive, Third Party	Comprehensive, Third Party

In the above summary table for the typical male and female driver taking part in this study where more than one response applies, the response has been given in order of priority. For example, three coloursof car /vehicle normally driven are given with blue/aqua, being the most predominant followed by white/cream and then the yellow/orange/ gold range of colours. The same applies to other categories where more than one entry has been made.

As indicated from the above summary table for the typical male and female driver taking part in this research many similarities are to be noted. Three exceptions are:-

1) Average number of children being 2.3 for males and 1.6 for females although it has been pointed out that these figures may not necessarily be accurate.

2) Average number of interests being 2.0 for the typical male driver and 2.4 for the typical female driver in this study.

3) Order of priority of hobbies and types of hobby differing between the typical male and female driver.

Perhaps the most significant difference as indicated by Tillmann and Hobbs (1949) in their study carried out in Canada on high and low accident taxi drivers is in the area of hobbies. In the study by Tillmann and Hobbs (1949) high accident drivers were found to rarely express an interest in hobbies with their main activities being in the field of sports, drinking, gambling and occasional dancing. Such activities in this study are classified within the category 'Social'.

On the other hand, Tillmann and Hobbs (1949) found that low accident drivers in their study usually expressed an interest in such hobbies as gardening (classified in this study under 'Homecraft'), church organisations (classified under 'Other' for hobbies) sports etc.

From the data table for hobbies undertaken by driver subjects in this study both tendencies can be seen to emerge for high and low accident drivers along the lines previously found by Tillmann and Hobbs (1949) in Canada.

Otherwise, the summary table for the typical male and female driver of this sample of drivers does not differ greatly as regards age, marital status, type of car normally driven, highest educational qualifications, motor insurance held etc.

In this 'random volunteer' selected sample of university automobile drivers there were 125 male (A+AF) to 81 female (A+AF) drivers yielding a ratio of 1.5:1 male to female drivers, respectively. Using chi square this was not found to be significant as follows:-

Male:Female $\chi_c^2 = 3.041$ $p = > .05$ ns

However, using chi square a significant difference was found between the proportion of MA to FA drivers. In the MA driver group there were 67 subjects and in the FA group there were 22 subjects rendering a ration of 3:1 male to female drivers, respectively. Using chi square the following results was found:-

$\bullet$ MA:FA $\chi_c^2 = 21.75$ $p = < .001$ s

Where - χ_c^2 = Chi square corrected for continuity
ns = Not Significant
s = Significant
$<$ = Less Than
$>$ = Greater Than
$\bullet$ = Direction of significant difference

The data presented in tabular form plus the summary table for the sample of drivers taking part in this research on automobile drivers in relation to traffic accidents enables the portrayal of the typical male and female driver subject.

Further details using personality and attitudinal measures are presented later in this study and expounded upon with a typical profile constructed for both the male and female accident driver as revealed by the measuresused in this study. Also, differences that emerge concerning male and female drivers are considered, together with the focus on the differentiation between the accident and accident-free personality type.

CHAPTER XIV

PROCEDURE

One week was set aside for the data collection process of this research. This designated week was near the end of the academic year when examinations and other end of year academic activities were being undertaken. Thus, it could be stated as being a busy and difficult time of the university year for both staff and students.

Driver subjects taking part in this survey of licensed university automobile drivers and road accidents in relation to biographic, attitudinal and personality factors did so on what might be termed as 'a random volunteer' basis, to coin a phrase. The use of random samples offers an alternative exposure measurement technique in the driving situation as stated by Carlson (1973).

Driver subjects presenting themselves to participate in this research were not barred by such factors as age, education, driving record etc., but two entry qualifications to take part in this survey were stipulated as follows:-

1) That the driver subject was a licensed automobile driver

2) That the driver subject was a university staff or student member.

A few licensed motor-cyclists mistakenly completed the questionnaires and these had to be discounted. Following the collection of data, the driver sample was broken down into 4 driver groups and 4 driver group combinations according to sex and accident category, (See Section on Method, P. 48).

To continue with the procedure followed for this study. Publicity was distributed around the university campus by the following means:-

a) Posters were displayed in 'key' points such as the Student Centre Foyer and the Foyer of the Social Science Tower Block as well as on each of the 8 floors of this building.

b) Circulars were distributed in the Student Centre and Coffee Bar. On the final day of the designated week for this research further circulars were distributed with 'Final Day' boldly printed on them

c) Announcements were made in the weekly Campus Newsletter

d) Communication about the research was made by word of mouth

e) With cooperation and permission from several Heads of Department (including Science and Social Science) announcements were made to university lecture classes during the week preceding the forthcoming research bringing the event to their notice and also inviting them to participate.

This rather widespread network of publicity sought to inform and arouse interest in as many people as possible, both university staff and students. From the ensuing response this publicity campaign was found to be most successful.

The designated week for driver subjects to present themselves for participation in this driver research by completing a set of three questionnaire forms was from Monday to Friday between the hours of 9 a.m. to 4 p.m. during the final week of the third academic term before examinations started. Other times outside those hours set aside could be made by arrangement and some driver volunteer subjects who wished to take part availed themselves of this opportunity.

One room was set aside in the Psychology Department of the university as it was envisaged that this would be sufficient accommodation. As it happened, it was necessary to spread into several other rooms owing to an overflow of volunteers coming forward to participate in this study. At one time four rooms were filled with driver subjects diligently completing their set of three questionnaires. Most of the time there was an air or tension that felt like examination conditions, as driver subjects thoughtfully considered their responsesto the questionnaire items.

Completing the three questionnaires for this research took, on average, about 30 minutes although some participants took nearly twice as long as they worked carefully through the items. The environmental conditions in which the driver subjects filled in their questionnaires were comfortable and relatively quiet. At times, it was sufficiently quiet and tense to hear 'a pin being dropped' figuratively speaking as the floor was carpeted. One group of driver volunteers were rather boisterous and amused by certain of the questionnaire items but were in a separate room and did not cause too much disturbance to others working in a more sober fashion on their set of questionnaires.

During the week set aside for this study, there was a constant flow of volunteers presenting themselves even, at times extending to overflow proportions for accommodation purposes while they were temporarily 'housed' to complete their questionnaires. In the last three hours of the designated week after 'Final Day' circulars had been liberally distributed around the Student Centre and Coffee Bar, about 50 driver subjects arrived at the 'last minute' so to speak, many intimating that they had meant to come along and take part in the survey all that week.

The general interest taken in this traffic research and the success of obtaining a sample of over 200 driver subjects, later categorised according to sex of driver and accident record, especially in view of the difficult time of the academic year in which it took place, was felt to be most encouraging and worthwhile.

The procedure followed was that as each driver subject arrived at the appointed room in the Psychology Department he or she was handed a set of the three questionnaires to be completed and also a writing implement if so required. Each subject was advised that a code number was used on each questionnaire form in lieu of his/her name for purposes of retaining anonymity. The driver volunteer subject was requested to seek advice if any points needed clarification concerning the questionnaires and their completion. Generally, the questionnaires were understood and completed without much difficulty as might be expected with a sample population of this calibre well acquainted with pen and paper exercises.

In fact, the whole procedure in respect of general publicity, being permitted to address several university classes of various academic disciplines, having a comfortable and suitable environment made available to temporarily 'house' driver volunteers whilst they completed their forms and, of course, the response of all those who participated for without them and their help there would have been no study, went very smoothly and was a most encouraging and enjoyable experience.

CHAPTER XV

MEASURING INSTRUMENTS

Four measuring instruments have been used in this study of the automobile driver and accidents in relation to biographic, attitudinal and personality factors.

In the selection of measures to be used in this study of the automobile driver and accidents that would be most effective, two questions were raised concerning -

1) The objective underlying the study

2) The measuring instruments that could best meet this objective

There was the awareness of the vast scope of the field embracing biographic, attitudinal and personality factors, in this case in relation to the automobile driver and accidents incurred whilst driving. It was decided that the objective of this investigation was to study the automobile driver in relation to factors in these three areas acting as a backdrop to the stage with the focus being aimed particularly upon the variables of aggression and anxiety and allied personality traits, both in a general and specific sense.

The next step was to find measures that would be appropriate and suitable to meet this aim. Such measuring instruments would need not only to be valuable and useful in themselves but also to be compatible, confirmatory of the other measures used, at least to some extent, but not too repetitive, comprehensive, not too long, able to obtain the maximum of relevant and useful data for the study with the minimum of tedium and finally to dovetail with each other to form a composite unit.

Of course, such requirements are demanding and hard to fulfil. But, by a process of analysis and elimination 4 measuring instruments were finally selected that were considered to fit the bill and meet these criteria reasonably adequately.

Thus, the 4 measuring instruments finally selected to be used in this study of the automobile driver and accidents in relation to biographic, attitudinal and personality factors were:-

1) Biographic Questionnaire
2) Semantic Differential Technique
3) Parry's AG (Aggression) / AN (Anxiety) Scale
4) NSQ or Neuroticism Scale Questionnaire

A discussion of these 4 measuring instruments now follows.

Measuring Instruments

1) Biographic Questionnaire

The objective behind the construction of the Biographic Questionnaire was to be able to build up a framework of biographic reference against which to set this sample of automobile drivers taking part in this study on automobile drivers and accidents in relation to biographic, attitudinal and personality factors.

By a process of reading, consideration and analysis in the area of accident research it was ascertained what kind of information might be relevant for a study of this type in order that the maximum useful data might be gathered with the minimum of tedium.

The Biographic Questionnaire is divided into two parts. Part 1 of the questionnaire involves general descriptive data about the driver sample such as age, marital status, education, occupation, hobbies, details of car/vehicle normally driven etc.

Part II of the Biographic Questionnaire deals with such matters as attitudes about driving (e.g. the enjoyment of driving), attitudes towards other drivers (e.g. where blame usually placed when driving errors occur), behaviour patterns (e.g. smoking, drinking), self-estimation of driving ability, driving experience and accident record during the last 5 years to ensure some consistency and stability in this respect etc.

Items 14 and 18 in Part II of the Biographic Questionnaire are included with acknowledgement to Hakkinen (1958) and his research in Finland on traffic accidents and driver characteristics taking a statistical and psychological approach using bus and tram drivers for his sample.

Also, included within Part II of the Biographic Questionnaire is a semantic differential scale rating self-concept as a driver.

Analytical techniques used to deal with data are discussed in the section on Treatment of Results (P. 88), such as the use of chi square to test for the difference between observed and theoretically expected values. The section on Results (P. 104) explains the grouping of drivers according to sex and accident category that has been used not only in the Biographic Questionnaire but also throughout the whole study.

The main aim and concern in the selection of items and construction of the Biographic Questionnaire was to make it dovetail with the other measures used in this study, the NSQ and Parry's AG/AN Scale, in order to form a complementary and relatively comprehensive united whole for the type of reseach effort undertaken.

2) Semantic Differential

A semantic differential rating technique was included in Part II of the Biographic Questionnaire. Driver subjects were asked to rate their self-concept as a driver by this technique which is the most general measure of affect (Triandis, 1971).

Osgood's Semantic Differential was developed for research on perception, meaning and attitudes rather than as a personality test (Osgood et al., 1957). It measures indirectly the connotation of words or phrases (Cronbach, 1970), a connotation being what implications the object or concept has for a particular person (Nunnally, 1970). The Semantic Differential measures mainly connotative aspects of meaning particularly the evaluative connotative meaning available, meaning being a very global term ultimately including all possible reactions that people have to words and things.

A collection of scales such as those used in this research referred to as a semantic differential. Although it is convenient to speak of the Semantic Differential the term is used in a generic sense to refer to any collection of rating scales anchored by bipolar adjectives (Nunnally, 1970). Rather than being a particular instrument the Semantic Differential is a very flexible approach to obtaining measures of attitudes and other sentiments. It is an objective and flexible technique allowing investigation of the meaning of words and concepts of all sorts as well as changes in these meanings as a result of special experience or procedures such as psychotherapy (Mischel, 1971).

Three main dichotomous factors have been repeatedly indicated in

factor analytic research on the Semantic Differential. A primary evaluative factor (e.g. good-bad, positive-negative) seems to be the most important and by far the strongest factor. Two other major factors are potency (e.g. strong-weak, large-small) and activity (e.g. excitable-calm, active-passive).

Mulaik (1964) and Vernon (1964) have pointed out that these three semantic factors from studies of concept meanings are similar to the factors found in trait ratings. Thus, trait factors from ratings of persons are often close to the meaning factors found in Semantic Differential studies of words and concepts.

The objectivity, reliability and validity of the Semantic Differential will now be viewed.

Semantic Differential

i) Objectivity

The measurement procedures of the Semantic Differential are explicit and can be replicated. Hence, the Semantic Differential method is objective. Two investigators given the same collection of check marks and following the rules must end up with the same meanings of concepts and patterns of conceptual structure. However, interpretation of these results is a subjective matter. The data from the Semantic Differential are subjective being the introspection of subjects about the meaning of various concepts.

Objectivity concerns the role of the observer, not the observed. The essence of objectivity is that the procedures completely eliminate the idiosyncrasies of the investigator in arriving at the final index of meaning and with the Semantic Differential technique this is possible (Osgood et al., 1964).

ii) Reliability

The conventional notion of reliability in psychological and educational measurements focuses on how consistently individuals are ranked in successive application of the measurement instrument, that is upon the size of the correlation between test and re-test scores.

In the test form from which the data for factor analysis of the Semantic Differential were collected, 40 of the 1,000 items were selected at random and repeated. None of the subjects were aware that this was being done. The reliability coefficient was +0.85 (Snider and Osgood, 1969).

iii) Validity

A measuring instrument is said to be valid when it measures what it is supposed to measure or a more refined and quantitative way of stating this is that an instrument is valid to the extent that scores on it correlate with scores on some criterion of that which is supposed to be measured.

In relation to the Semantic Differential two types of validity may be mentioned as follows:-

a) Face Validity

The Semantic Differential is an instrument for measuring meaning. As there is no commonly accepted quantitative criterion of meaning 'face validity' is used instead.

'Face validity' means that an instrument provides distinctions that correspond with those which would have been made by most subjects without the help of the instrument (Osgood et al., 1964).

Osgood et al.(1964) throughout their work with the Semantic Differential found no reasons to question the validity of the measuring instrument on the basis of its correspondence with the results to be expected from common sense.

b) Validity of Semantic Factors

The assumption is made when certain basic factors such as evaluation, potency and activity repeatedly appear in the intercorrelations of factor analysis that these factors correspond to the major dimensions which people 'naturally' and 'spontaneously' use in making meaningful judgements. The assumption is also made that the D's (differences) computed between concepts validly represent the psychological dissimilarities and similarities in meaning among these concepts.

Rowan (1954) presented 160 subjects with 10 concepts in making a direct comparison between the semantic differential and method of triads. The 10 concepts used were found to be grouped into three of the following clusters with one exclusion:-

Cluster 1 - White rose buds, gentleness, sleep

Cluster 2 - Hero, Virility, success

Cluster 3 - Death, fate, quicksand

Exclusion - Methodology

Rowan (1954) found that for this set of concepts at least two dimensions, those of evaluation and either potency or activity or a combination of both (dynamism) are used naturally by subjects in their meaningful judgements.

Perhaps the most direct test of validity is the reversibility of the measurement operations. Given profiles a subject has made for various concepts, is it possible to identify or label the concepts originally judged. When the number of concepts is small and highly varied in meaning, this can be achieved fairly successfully but not when the number of concepts is large and especially if they are of similar connotations. However, Osgood et al.(1964) conclude that the reversibility criterion is not a necessity for this type of measure. Its application would require that the concept's meaning is reproduced

from the profile, not its label.

In this study of automobile drivers a semantic differential scale was included in Part II of the Biographic Questionnaire rating each driver subject's self-concept as a driver.

Twelve bipolar adjectives were included in this semantic differential scale rating self-concept as a driver with 4 sets of bipolar adjectives for each of the 3 semantic factors of E (Evaluation), A (Activity) and P (Potency). Each pair of bipolar adjectives was rated according to a 7 point semantic scale.

Three examples follow of bipolar adjectives for each semantic factor for rating self-concept as a driver together with instructions given for completion by driver subjects in Part II of the Biographic Questionnaire:-

E (Evaluation) Factor

Good X : - : - : - : - : - : - Bad

A cross placed on this line would show that you (i.e. the driver subject) feel very good as a driver

A (Activity) Factor

Fast - : - : - : - : - : X : - Slow

A cross placed on this line would show that you (i.e. the driver subject) feel quite slow as a driver

P (Potency) Factor

Weak - : - : - : X : - : - : - Strong

A cross placed on this line would show that you (i.e. the driver subject) feel neither weak nor strong as a driver.

In this study from the data obtained from the rating of self-concept as a driver on the E, A, and P factors, a profile was compiled for the 4 driver groups (i.e. MA, MAF, FAF, and FA) as well as for the 4 driver group combinations (i.e. M(A+AF), F(A+AF), A(M+F) and AF(M+F)). See Profile II (P. 175) and IIa (P. 177) based on data seen in TableVIII (P. 174) andVIIIa (P. 176).

3) Parry's AG (Aggression) / AN (Anxiety) Scale

The abbreviations Parry's AG (Aggression) and Parry's AN (Anxiety) are used throughout this study when referring to this scale devised by Parry (1968) from the research he carried out in England concerning aggression on the road. This scale measuring attitudes of aggression and anxiety in the motoring situation in included in this study with acknowledgement to Parry and his work.

In his study Parry (1968) felt that the only way to arrive at a

representative list classifying items of behaviour or attitudes under aggression and anxiety would be to enlist the help of motorists themselves. In other words, his aim was to get other motorists to say what they considered aggressive and anxious behaviour in the driving situation to be.

A preliminary list of 65 AG and 38 AN items both pertaining to behaviour and attitudes was drawn up. In numerous 'brain storming' sessions this list was reduced to 50 AG and 25 AN items. Those vetting the list were considered to be most qualified for doing so, namely police officers as in England the police carry out traffic duties, driving instructors and psychologists with a final scrutiny being carried out by some police drivers on the assumption that they were, perhaps, the most qualified observers of driver behaviour in all kinds of situations.

The list of 75 AG/AN items was in a sense randomised as regards order for the composition of the final questionnaire. Items were numbered on bits of paper and pulled out of a tin. This was done in an endeavour to dispel the tendency towards the assumption that many people have when completing questionnaires that all items listed on the left are 'for' and that those on the right are 'against'. Also, it was virtually impossible for the subject to discover which 45 (30 AG and 15 AN) of the 75 items were pertinent for analytical purposes. The additional items of the questionnaire were included for the purpose of 'burying' the 45 relevant AG/AN items and, as a secondary consideration, to make the whole questionnaire more interesting.

The one alternative choice questionnaire such as the technique used in Parry's AG/AN Scale places the subject at a disadvantage where he must select only one of two items given, as often the desire is to respond somewhere between the two extremes given. For example:

a)	I never lose my temper when another driver does something silly	I lose my temper when another driver does something silly
b)	I like driving fast	I do not like driving fast

The subject in the two examples above has to choose one of two alternatives (Parry 1968). He may sometimes lose his temper when another driver does something silly but this is not his usual behavioural reaction, being for him the exception rather than the rule. Can he then truthfully claim to never lose his temper even though he only does so rarely when another driver does something silly. Likewise with fast driving, an individual may feel the urge and need to do this when, as far as he can judge, road, weather conditions etc., appear favourable for a burst of speed. But, as a rule, such an individual does not like fast driving although in certain rare circumstances he could like and even enjoy doing so.

In defence of this forced choice method, the subject is not permitted to use the mid-point as is possible, for example, in the

Semantic Differential. The subject has to choose which of the two items is nearer the truth for him, however slight the edge of one anwer has over the other. This is the crux of the matter, the indication in favour of one extreme or the other is the criterion not absolute accuracy in Payy's AG/AN Scale.

For this study Parry's AG/AN Scale was used in toto. Modifications for future use whether in New Zealand or elsewhere would be in order to make it more suitable. For example, Item 30 of Parry's AG Scale where the practice in England is to flash lights when others have their headlamps on full or for other purposes not necessarily written into the Road Code. In Parry's AN Scale Item 13 where police carry out traffic duties and therefore, for New Zealand purposes, at least, the wording might be changed to traffic officers and Item 4 of the same scale as L-plates are no longer used in New Zealand this could be amended to something like a driving school car with a learner at the controls.

Another possible modification is that the wording of certain items could be made less absolute. For example:

Parry's AG Scale - Item 5	'I get annoyed if the traffic lights change to red as I approach them'
Change to	'I tend to get annoyed if the traffic lights change to red as I approach them'
Parry's AN Scale - Item 2	'I worry about getting lost when driving'
Change to	'I tend to worry about getting lost when driving'

Another suggestion for amendment of Parry's AG/AN Scale would be to retain the basic items but to range the responses on a 5 point scale. For example:

Parry's AG Scale - Item 3 'I lose my temper when another driver does something silly

Always	Sometimes	Often	Seldom	Never

Parry's AN Scale - Item 2 'I worry about getting lost when driving'

Frequently	Often	Sometimes	Seldom	Never

Such an amendment as responding to items on a 5 point scale would allow the subject more freedom and also allow for a greater degree of accuracy.

Comments and suggestions made concerning the format of Parry's AG/AN Scale would not entail much more than some alterations and adjustments to the original scale and re-arrangement of format if a 5 point

scale is incorporated.

These comments are added as a guide to improvement and, in its present form, the sample of drivers taking part in this survey indicated that they found it interesting and some even quite entertaining and enjoyable.

In this study Parry's AG/AN Scale has been used in conjunction with a standard personality measure, the NSQ, measuring anxiety and allied personality components. This constitutes matching a general personality scale, the NSQ, against Parry's AG/AN Scale, a specific or situational measure, concerned with aggression and anxiety in the driving situation.

Tests of correlation were carried out between NSQ E (Submission-Dominance Component) and Parry's AG as well as between NSQ An (Anxious-Not Anxious Component) and Parry's AN variables. Results for these correlations were found to be significant in both instances (See Results (P. 104); Profile I (P. 156), and Ia (P. 158); Table I (P. 155) and Ia (P. 157); and Appendix C (P.300) and D (P. 305)).

By combining various measures with Parry's AG/AN Scale, that is the NSQ standard personality test and a semantic differential technique rating self-concept as a driver, the original work undertaken by Parry has been expanded, extended and, in certain aspects, confirmed.

4) Neuroticism Scale Questionnaire or NSQ

The NSQ or Neuroticism Scale Questionnaire is a brief, standard inventory measuring degree of neuroticism or neurotic trend. It is suitable for administration to normal and abnormal adults and adolescents.

'Anxiety is the central problem in neurosis' was Freud's classical dictum and most modern observers would add that 'neurosis is the central problem in society'. The incidence and prevalence of neurosis is estimated to be between 5 per cent to 35 per cent of the population (e.g. Brown and Menninger, 1940; Cattell and Scheier, 1961; Rose, 1955). Some degree of neurosis exists throughout the entire population affecting real life adjustment and effectiveness. Bearing this in mind, the NSQ was included in this research on the automobile and driver accidents.

Neurosis is not the exclusive province of the clinician. It needs to be considered by those dealing with people in other applied fields such as schools, personnel work, marriage guidance, accident research etc. For this reason the NSQ was included in this research on automobile drivers in relation to the incidence of traffic accidents in an endeavour to ascertain what kind of trends might appear characterologically in the driver groups of this sample of drivers. Another objective was to investigate the relationship between Parry's AG and the NSQ E (Submission-Dominance) component; and also the relationship between Parry's AN and the NSQ An (Anxious-Not Anxious) component.

Neurotics do not differ from normals on one dimension only but on many personality dimensions (Cattell and Scheier, 1961). Thus, neurotic trend is a complex form of deviation involving both innate and environmentally determined inadequacies. It has been found that about 6 personality dimensions account for the most marked differences between clinically judged neurotics and normals.

The NSQ deals only with that portion of the personality most intimately bound up and expressing neurotic trend. These 6 neurosis associated dimensions are given as follows:-

1) Factor I — Overprotection: Tender-Minded, Cultured, Protected Emotional Sensitivity (vs. Tough-Mindedness)

2) Factor F — Depressiveness: Inhibited, Sober, Seriousness (vs. Happy-go-lucky, Cheerfulness)

3) Factor E — Submissiveness: Suggestibility, Dependence (vs. Dominance)

ANXIETY

4) Factor O — Worry, Guilt Proneness (vs. Assured Self-Confidence)

5) Factor Q_4 — Ergic Tension (from Frustration) (vs. Calm Relaxation)

6) Factor C — Ego Weakness or Emotional Immaturity and Instability (vs. Ego Strength)

(Scheier and Cattell, 1961)

The last 3 dimensions of the NSQ group together to form the fourth component of the NSQ, that of anxiety. Scores for the NSQ can be given for each of the 4 components or as a composite score for the 4 dimensions forming a total NSQ score.

The total NSQ score gives an overall picture of anxiety status for quick appraisal and assessment purposes. 'Leads' suggested by the brief 10 item scales of the 4 NSQ dimensions can be followed up by further testing such as with the 16 PF test or IPAT Anxiety Scale (Cattell and Scheier, 1963; Cattell and Eiber, 1957).

The NSQ raw score data can be converted into sten or standard scores. However, for this study calculations carried out have been based on raw score data which are more likely to indicate differences that might exist. Raw scores were deemed to be appropriate to assess the significance of difference between mean scores, for example, as was carried out using t tests. It was felt that by dealing with raw scores any differences occuring would be detectable.

Mean scores and standard deviations were calculated for the total NSQ variable as well as for the 4 component variables of the NSQ. A profile was drawn for the MA, MAF, FAF and FA driver groups as well as for the 4 driver group combinations, M(A+AF), F(A+AF), A(M+F) and AF(M+F). These two profiles were compiled for the 4 NSQ components, excluding NSQ Total Variable, as well as for Parry's AG/AN variables. (See Profile I (P. 156) and Ia (P. 158) based on data in Table I (P. 155) and Ia (P. 157)).

Although anxiety does have a major role in neuroticism, as Freud said, it is by no means the whole of it. Neuroticism and anxiety are distinct phenomena. Neurotics do not always and necessarily show high anxiety, and normals can be highly anxious.

NSQ

i) Reliability

For the 4 component scales of the NSQ the coefficient in each case is a split half by random split (5 out of 10 on one side and 5 on the other) with the two parts correlated. These values are corrected to full sub-scale length by the Spearman Brown formula. For the total test the homogeneity coefficient is of the parallel split ('herring bone') type, that is one half of each sub-scale is on each side and the correlation of the two parts is corrected to full test length to be comparable with the other coefficients.

The table below showing reliability coefficients for the NSQ split half consistency coefficients, is based on 300 normal cases, 200 males and 100 females, with average age of 31 years and average education level of 12 years completed in school:-

Tender-Mindedness (I)	Depression (F)	Submissiveness (E)	Anxiety (An)	Total NSQ Score
+.55	+.57	+.47	+.70	+.67

(Scheier and Cattell, 1961)

The values in this table would have been consistently higher if neurotics had been included with normals in the sample as neurotics differ significantly and systematically from normals on all these components.

Owing to the brevity of the scale the reliability of the components is lowered. However, the reliabilities attained with these 10 item-scales are rather impressive when it is considered that usually 40 or 50 item-scales are the minimum for measuring one thing as, for example, in intelligence testing (Scheier and Cattell, 1961).

ii) Validity

Two types of validity are reported for the NSQ

a) Concept or Construct Validity

b) Concrete Validity

a) Concept or Construct Validity

Concept or construct validity is the correlation of the items in a given scale with the factor they are designed to measure. The concept validities for each of the 4 NSQ components are as follows:-

Tender-Mindedness	(I)	=	+.74
Depression	(F)	=	+.76
Submissiveness	(E)	=	+.69
Anxiety	(An)	=	+.84

Scheier and Cattell (1961) state that these correlations indicate the degree to which the items in the anxiety component scale accurately measure the anxiety dimension defined empirically and factor analytically; and likewise for each of the 3 component scales of the NSQ. The total NSQ score is a composite one of the 4 distinct components and not a single dimension or concept, therefore, values are not given for this score.

b) Concrete (Concurrent) Validity

Concrete validity is a correlation of the test with life performances and categories. The ability to discriminate significantly between clinically chosen neurotics and normals was the main concrete (external) criterion towards which NSQ test construction was orientated.

To check on this point, Scheier and Cattell (1961) state, the NSQ was administered to 102 clinically judged neurotics (53 males and 49 females) at 10 different institutional centres in order to compensate for possible biases at any one centre. The 102 neurotics total NSQ scores were found to be considerably higher than those for 1,068 normals, the difference being confirmed beyond the 0.0005 level of statistical confidence. This means that the NSQ is very definitely a test of neurosis in the concrete validity clinical criterion sense as neurotics score much higher on it than normals do.

SECTION 4

TREATMENT OF RESULTS

TREATMENT OF RESULTS

CHAPTER XVI

Significance Levels

Tests of significance are made to test the probability of observed differences between means or scatters differing from those expected being due to the usual error variations (Leeming, 1969). The difference is said to be significant if the probability of its arising from mere error variations is less than some limit, called the significance level. The usual level at which differences are said to be significant is '1 in 20' or 0.05 or 5 per cent. This means that the probability of the difference occurring by chance is once in 20 trials. A more stringent level can be set such as 0.01 or even 0.001 depending on the purpose of the investigation.

Criteria for the Rejection or Retention of the Null Hypothesis (H_o)

A null hypothesis (H_o) can never be rejected or retained with complete certainty (Smith, 1970). It can merely be shown to be highly probable, highly improbable or something in-between these two extremes. Two critical probabilities conventionally used for testing hypotheses in the behavioural sciences are $p = 0.01$ and $p = 0.05$ values of t.

If the null hypothesis is rejected only when p is equal to or less than 0.01 ($p \leq 0.01$) there is very little risk of a false rejection and in the long run one would be made no more than about 1 per cent of the time or 1 in 100 times. This is a fairly rigorous criterion and, in fact, it may be too rigorous.

If, in order to avoid a false rejection of a true hypothesis (Type I Error) this criterion or something even more rigorous like $p = 0.002$ is insisted upon, there is the risk of falling into another kind of error. In this situation, there is the risk of failure to reject a false hypothesis or a Type II Error.

The problem, however, is that if the probability of a Type I Error is reduced the probability of a Type II Error is increased (Smith, 1970). In this type of study there is the risk of a Type II Error or failure to reject a null hypothesis when it is false (Friedman, 1972).

Level of Significance in the Present Study

In this study the conventional significance level of 0.05 or less has been taken as the criterion level of statistical significance. This applies to those instances where tests of significance were appropriate to carry out on the data of the measures used in this study such as, for example, the testing of the significance of the difference between mean scores.

However, in an exploratory investigation of this kind, it is often advisable to increase the probability level prior to the rejection or acceptance of a null hypothesis (H_o). Wallach and Kogan (1965) suggest that the acceptance of the 0.10 probability level and below be considered since the composition of sub-groups is not based on extremes. In other words, there will be a substantial number of individuals in the vicinity of the median, but on either side of it, who are not anticipated to be basically different from one another. Under these circumstances, Wallach and Kogan (1965) deemed it advisable to increase somewhat the probability of a Type 1 error, that is the rejection of the null hypothesis when it is true, and to reduce somewhat the probability of a Type II error, that is the acceptance of the null hypothesis when it is false.

Thus, Wallach and Kogan suggest that factors lower than the $p = 0.10$ level in an exploratory investigation, such as the present research, are worthy of further study and exploration. This is to be born in mind when considering the results of this study where $p = 0.05$ has been taken as the critical cut-off point of statistical significance.

CHAPTER XVII

Statistical Techniques Used for the Treatment of Results of the Present Study

i) Descriptive Statistics

The data collected in this survey provides a descriptive study including biographical, attitudinal and personality factors.

The sample is divided into 4 driver groups with the following abbreviations being used throughout the study:-

MAF - Male Accident Free driver group
MA - Male Accident driver group
FAF - Female Accident Free driver group
FA - Female Accident driver group

The above 4 driver groups were further combined according to sex of driver and accident category to form the following 4 driver group combinations -

M(A+AF) - Male (Accident + Accident Free) driver group
F(A+AF) - Female (Accident + Accident Free) driver group
A(M+F) - Accident (Male + Female) driver group
AF(M+F) - Accident Free (Male + Female) driver group

Part I of the Biographic Questionnaire concerns details such as age, marital status, education, vehicle normally driven, hobbies etc. Part II of the same questionnaire relates to such things as behaviour patterns (e.g. drinking, smoking, vehicle maintenance etc.), accident record and driving experience, self-estimation of driving ability and judgement, adequacy of the driving test etc. The Semantic

Differential Scale rating self-concept as a driver is also included in this part of the questionnaire.

The NSQ allows an appraisal of anxiety status among the driver sample whilst Parry's AG/AN Scale provides a measure of attitudes towards driving and other drivers.

Each measure used in this study provides its own information and yet the three questionnaires complement each other on certain dimensions. For example, the NSQ An component was found to correlate significantly with Parry's AN variable and the NSQ E component was found to correlate significantly with Parry's AG variable. Also, Item 24 in Part II of the Biographic Questionnaire concerning self-rating as a driver links up with the E (Evaluation) Factor of the Semantic Differential. This being so, there is the possibility of confirmation and consistency across the measures used.

Descriptive statistics are mainly used to analyse the data of the Biographic Questionnaire, particularly Part I, using frequency distributions, averages, percentages and actual frequency counts, presented for the main part in tabular form. For the analysis of the other measures (e.g. Semantic Differential, Parry's AG/AN Scale, the NSQ) inferential statistics have been used such as t tests, correlations, chi square (also used in Part II of the Biographic Questionnaire) and Guilford's (1954) Scale Value technique assuming a composite standard. Inferential statistics involve significance levels, previously discussed, and hypothesis testing to be discussed later in this section on Treatment of Results.

In some instances the number of subjects is less that the total number for that particular sub-group of drivers. This is explained by the fact that all of the subjects of that particular driver sub-group did not respond to the item. Where this has occurred, the actual number of subjects in that driver group responding has been used as the base number for the purposes of computation and this applies throughout the study.

ii) Scale Values Assuming a Composite Standard

The basic assumption of this scale value assuming a composite standard (CS) is that each stimulus is judged in comparison with the group as a whole. The group as a whole then becomes a composite standard (CS) with which every stimulus is compared. It is from the proportions given to every stimulus as compared with the CS that linear scale values are derived. The resulting value is given in the form of a z score using the following formula:-

$$P_{j>cs} = \frac{\Sigma f_{ji} R_i - .5N}{Nn}$$

(Guilford, 1954, P. 186)

In this study Items 14 and 18 in Part II of the Biographic Questionnaire have been included with acknowledgement to Hakkinen (1958)

and his research in Finland with bus and tram drivers. For the analysis of these two items, Guilford's (1954) scale value assuming a CS was used. From this CS technique a table of scale values in the form of z scores was compiled from which a bar graph was charted to depict these values graphically.

iii) Content Analysis

Content analysis is a multi-purpose research method developed specifically for investigating any problem in which the content of communication serves as the basis of inference (Holsti, 1969; Carney, 1972). In general terms, content analysis is the application of scientific methods to documentary evidence and it is possible to have engaged in the process of content analysis without knowing it.

The three main characteristics of content analysis are objectivity, system and generality. However, these three requirements are not unique to content analysis as they are necessary conditions for all scientific inquiry.

The definition of this method which Carney (1972) claims keeps coming to the fore of late is that:-

> 'Content analysis is any technique for making inferences objectively and systematically identifying specified characteristics of messages.' (Stone et al., 1966)

In this study for Items 23 and 33 of Part II of the Biographic Questionnaire, the technique of content analysis has been used. Item 23 of this questionnaire asked driver subjects what behaviour of other drivers made them feel (a) angry and (b) anxious. Item 33 of the same questionnaire asked subjects to give any other comments, views, ideas etc., concerning, for example, male and female drivers, accident causation and prevention etc.

Data obtained from these two items was read through to get a general impression of the types of message being communicated. Following this general overview, the responses of the driver subjects were charted according to the group classification used throughout this study prior to further analysis for according to a chinese proverb 'the palest ink is clearer than the best memory.' (Carney, 1972).

The responses obtained were categorised for each driver sub-group for these two items and written up in a paragraph form. A summary paragraph was also compiled to cover generally what the 4 driver groups of this sample had communicated as regards these two items.

iv) Hypothesis Testing

a) Chi Square (χ^2)

The chi square (χ^2) technique for testing hypotheses was developed by Karl Pearson in 1900.

A fundamental assumption in the use of chi square is that each observation of frequency of an event or occurrence is independent of all other observations. Chi square is a method of determining whether differences between the theoretical and observed frequencies in any number of categories could reasonably be attributed to chance variations in sampling.

i) Single sample chi square tests are used to determine if a given sample could reasonably be assumed to have come from a particular population. The characteristics of the population or E (expected) values must be known in advance of the test (Friedman, 1972).

Goodness-of-fit tests are a commonly used application of single sample chi square tests. The distribution of outcomes in a sample is compared to the distribution expected for a sample from a particular population. This allows the determination of whether or not a significant difference exists between the observed number of cases appearing in each category and the expected number of cases specified under the null hypothesis (H_o).

The formula for the application of the single sample chi square test is as follows:-

$$\chi^2 = \sum \left[\frac{(O_j - E_j)^2}{E_j} \right]$$

Where - O = Observed Frequency for event j

E = Expected Frequency for event j

df = Degrees of Freedom = Number of Cells (C) - 1

N = Number of Cases = ΣO

(Friedman, 1972, P.24)

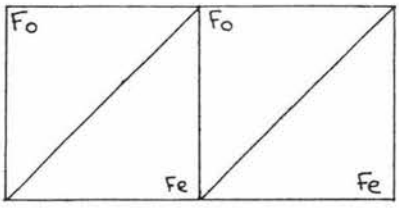
With 2 cells (df = 1) the test is equivalent to the binomial test and the χ_c^2 formula incorporating a correction for continuity should be used as follows:-

$$\chi_c^2 = \sum \left[\frac{(|O_j - E_j| - \frac{1}{2})^2}{E_j} \right]$$

Where (| O-E |) means the absolute value of (O-E)

(Friedman, 1972, P.24)

The chi square or χ^2 statistic, a numerical measure of the difference between O (observed) and E (expected) values in a situation with 2 or more possible outcomes, maybe expressed in the following way:-



Where F_o = Frequency Observed

F_e = Frequency Expected

df = Number of Cells - 1 or C - 1

The chi square single sample (and binomial) test can be applied in situations in which the obtained data are compared to some previously expected outcome.

ii) Where the problem of comparing 2 samples or more with each other is concerned in order to decide whether it can be assumed that they are essentially the same or different, a formula for multi-sample chi square testing is applied. In contrast to the single sample chi square test, with the multi-sample chi square test no prior knowledge of the characteristics of the population is needed (Friedman, 1972).

The formula for chi square multi-sample comparisons is as follows:-

$$\chi^2 = \sum \left[\frac{(O_{ij} - E_{ij})^2}{E_{ij}} \right]$$

Where $$E_{ij} = \frac{(\Sigma r_i)(\Sigma c_j)}{N}$$

$$df = (\text{rows} - 1)(\text{columns} - 1)$$

(Friedman, 1972, P.42)

or $$E = \frac{\text{Row Total X Column Total}}{\text{Grand Total}}$$

When the degrees of freedom (df) are one, for example as in 2 X 2 tables or for two cell single sample tests, or when the sample number is not small, as the correction maybe too severe when sample sizes are small making it difficult to reject H_o, the following formula corrected for continuity should be used:-

$$\chi_c^2 = \sum \frac{(|O_{ij} - E_{ij}| - \frac{1}{2})^2}{E_{ij}}$$

When df = 1 (Friedman, 1972, P.42)

The sampling distribution for chi square is based on an infinite sample size and the step-wise nature of the data. When the number is small this leads to a slight but consistent mismatch.

When degrees of freedom equal one (df = 1) this mismatch causes slightly incorrect values. The appropriate correction for this mismatch for both chi square single sample and chi square multi-sample comparisons is called 'the correction for continuity' and involves the subtraction of one half from each O - E (Observed - Expected) difference as shown in the above χ_c^2 formulae.

In practice employing categorical variables, the one variable case of chi square is not encountered too frequently. More often questions are asked concerning inter-relationships between and among variables such as in a 2 X 2 contingency table. The chi square 2 variable case maybe employed to see if the 2 variables are related or independent.

The 2 X 2 contingency table can be extended to include more variables such as would be the case in a 3 X 4 contingency table where there are 3 categories in one scale and 4 in another. The main problem in each instance is to calculate E (expected) cell frequencies. The procedure for this is the same as that employed for the 2 X 2 contingency table mentioned above:-

$$E_{ij} = \frac{(\Sigma r_i)(\Sigma c_j)}{N}$$

or $$\frac{\text{E = Row Total X Column Total}}{\text{Grand Total}}$$

iii) Garrett (1962) suggests that when the contingency table is 2 X 2 in nature, chi square maybe calculated without first computing the 2 expected (E) frequencies or the 4 independent values by using the following formula:-

A	B	A+B
C	D	C+D
A+C	B+D	N

$$\chi^2 = \frac{N(AD-BC)^2}{(A+B)(C+D)(A+C)(B+D)}$$

(Garrett, 1962, P. 265)

Friedman (1972, P. 42) expresses the same with the following formula:-

$$\chi^2 = N\left[\sum \frac{(O_{ij})^2}{(\Sigma r_i)(\Sigma c_j)} - 1\right]$$

(Friedman, 1972, P. 42)

Garrett (1962) suggests that when entries in a fourfold table are quite small, for example 5 or less, that a correction for continuity should be applied to his formula above as follows:-

$$\chi_c^2 = \frac{N(|AD-BC| - \frac{N}{2})^2}{(A+B)(C+D)(A+C)(B+D)}$$

(Garrett, 1962, P. 265)

Friedman's method outlined in (ii) above was used to find E (expected) frequency values, although Garrett's method discussed in (iii) above was employed as a test to check that the results of both methods concurred with a confirmatory outcome.

A rule which has generally been adopted in the one-degree-of freedom (df = 1) situation is that the expected frequency in all cells should be equal to or greater than 5 ($\geq$ 5) otherwise an inflated chi square result is obtained. When degrees of freedom are greater than one, the expected frequency should be equal to or greater than 5 ($\geq$ 5) in at least 80 per cent of the cells (Runyon - Haber, 1971).

Friedman (1972) in discussing the restrictions of using chi square single sample and multi-sample tests, besides the fact that all observations should be independent of each other, sets more rigid specifications than Garrett (1962), in that he states that for both single and multi-sample chi square tests all expected (E) values should be at least 5 with no cell having an E value of 0 or zero. Also, with the one-degree-of-freedom (df=1) situation, that is with 2 cells or where df = (Row - 1) (Column - 1) = 1, as for example in a 2 X 2 contingency table, the correction for continuity should be used as this leads to a more accurate p (probability) value.

In the treatment of results in this study, the correction for continuity for chi square has been used where appropriate (e.g. when df = 1). Also, no cell has had an E (expected) value of less than 5 when calculating chi square, both for single and multi-sample tests, in order to avoid inflated and misleading chi square values.

The level of significance for chi square in this study has been taken as being p = 0.05, bearing in mind Wallach and Kogan's (1965) suggestion that in an exploratory investigation such as this factors attaining a significant level of p = $\leq$ 0.10 might be worthy of further study (see Treatment of Results discussing significance levels, P. 88).

b) t Test

With data such as that which has been collected in this survey most significant results can be readily seen in distribution profiles or graphs. However, to check these observations the standard technique of t tests was used in order to test the significance of the difference between mean scores obtained by the 4 driver groups for three of the measures used, the NSQ, Parry's AG/AN Scale and Semantic Differential.

The significance level is taken as being $p = \leq .05$. However, with multiple t tests, such as carried out here with these measuring instruments, errors will still occur due to chance factors alone. Taking an extreme example, involving the collection of 1,000 t ratios, approximately 50 comparisons would be significant due to chance alone and it would be surprising if roughly this number were not obtained due to predictable sampling errors (Runyon-Haber, 1971).

Likewise, in the t tests carried out on the data in this study using multiple t tests, some significant results would appear by chance alone and settling the significance level at 0.05 means, in effect, being willing to take the risk of being wrong as often as 5 per cent of the time in the rejection of the null hypothesis.

Before any t tests could be carried out mean scores and standard deviations were calculated. The following formula was applied to calculate s (standard deviation):-

$$s = \sqrt{\frac{N\Sigma X^2 - (\Sigma X)^2}{N(N-1)}}$$

(Friedman, 1972, P.99)

The above formula is based on the use of raw score data, corrected for bias and suitable for computation with a calculator.

The formula for independent samples where the mean and standard deviation are appropriate measures was applied to the find the significance of difference between mean scores in certain of the measures used in this study (e.g. the Semantic Differential). The formula is as follows:-

$$S_{DM} = \sqrt{\frac{(\Sigma X_1^2 + \Sigma X_2^2) - (n_1\bar{X}_1^2 + n_2\bar{X}_2^2)}{n_1 + n_2 - 2}\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}$$

(Friedman, 1972, P. 150)

Where df (Degrees of Freedom) = $n_1 + n_2 - 2$

Where $n_1 \neq n_2$ (unequal sample sizes)

In this study, t tests were applied to test the significance of difference between, for example, the mean scores obtained for the NSQ and Parry's AG/AN Scale (7 variables in all) and for the three semantic factors (Evaluation, Activity and Potency) of the Semantic Differential. In both cases, the significance of the mean score of each of the 4 driver groups and 4 driver group combinations was tested against every other. The level of significance is taken as being at the level of 0.05 or less.

c) Correlation

The correlation coefficient is an index of the degree or extent of a linear relationship between two variables. This is expressed in the units of one of the variables and, therefore, is an index that will allow comparisons to be made between different sets of variables (McCall, 1970). When a relationship between two sets of variables is linear, that is can be described by a straight line, the correlation scores may be expressed by the product moment coefficient of correlation (Garrett, 1958).

No matter what correlational technique is used all have certain characteristics in common as follows:-

1) Two sets of measurement are obtained on the same individuals or events or on pairs of individuals who are matched on some basis

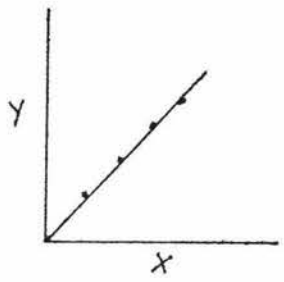
2) The values of the correlation coefficient vary between +1.00 and -1.00. Both of these extremes represent perfect relationships between variables and 0.00 represents the absence of a relationship.

3) A positive relationship means that the individuals obtaining high scores on one variable tend to obtain high scores on a second variable and vice versa.

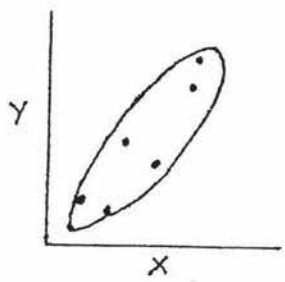
4) A negative relationship means that the individuals scoring low on one variable tend to score high on a second variable and vice versa (Runyon-Haber, 1971).

Scatter Diagrams Showing Various Degrees of Relationship Between Two Variables

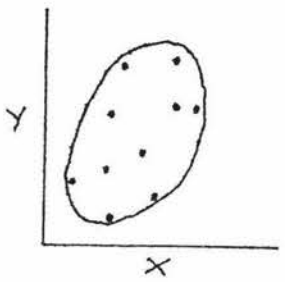
r = +1.00



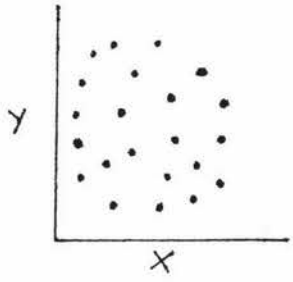
r = +0.82



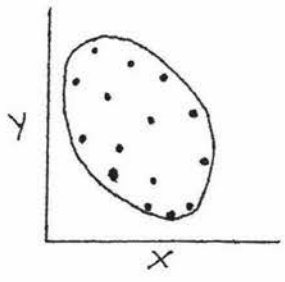
r = +0.57



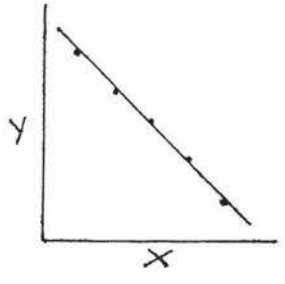
r = 0.00



r = -0.38



r = -1.00



(Runyon-Haber, 1971, P. 95)

The formula for calculating r (Pearson's correlation coefficient) used in this study, based on raw score data, is as follows:-

$$r = \frac{N\Sigma XY - (\Sigma X)(\Sigma Y)}{\sqrt{N\Sigma X^2 - (\Sigma X)^2} \times \sqrt{N\Sigma Y^2 - (\Sigma Y)^2}}$$

(Friedman, 1972, P.126)

The advantages of this formula for calculating r are that -

1) Of its ease of use with large numbers

2) It is not necessary to be concerned about selecting the positive or negative root to indicate the direction of relationship. The slope is positive for positive relationships and vice versa.

A scattergram gives a rough idea of how variables X and Y are related although the assumption cannot be made that there is a linear relationship between X and Y (Hayslett and Murphy, 1967).

Best fit or regression lines represent a scattergram of correlational data in the same sense that the mean represents a set of scores. The regression line represents the best guess or prediction of a subject's score on one variable on the basis of his score on another variable. Each scattergram has two best fit lines to minimize errors in predicting one of the variables. The formula for calculating the best fit or regression line, although not used in this study, is as follows:-

$$Y' = r\left(\frac{S_Y}{S_X}\right)(X - \bar{X}) + \bar{Y}$$

(Friedman, 1972, P.126)

Regression lines were calculated for the appropriate co-variables but none proved to be significant.

The Pearson product moment correlation coefficient is a measure of correlation between two variables based on the relative standing of the subjects within the two groups in terms of z scores. The Pearson r reflects only linear relationships between variables and there are two possibilities when no evidence of a relationship is found:-

1) That there is no relationship between the variables

2) That the variables are related in a non-linear fashion in which case the Pearson r is an inappropriate measure of relationship between the variables in question (Runyon-Haber, 1971).

However, correlation does not imply causality. The correlation coefficient represents the degree of observed association between two variables not the extent of their causal relationship (McCall, 1970). Statements of causality must be based on a knowledge of the situation in addition to the information used for calculation of the correlation coefficient.

SECTION 5

RESULTS

'The Chapter of accidents is the longest chapter in the book.'

John Wilkes

RESULTS

Data for the measuring instruments used in this study are presented in this section on Results. The section on Treatment of Results (P. 88) gives the statistical methods used in this study for the purposes of analysis of data.

Subjects are grouped according to the classification system adopted in this study, and for further details of this see the section on Method (P. 48) dealing with the sample of this study, as follows:-

MA	-	Male Accident Driver Group	n = 67
MAF	-	Male Accident Free Driver Group	n = 58
FA	-	Female Accident Driver Group	n = 22
FAF	-	Female Accident Free Driver Group	n = 59
			N = 206

The above abbreviations for the 4 driver groups participating in this research have been used throughout the presentation of this study as well as the following abbreviations for the 4 driver group combinations:-

A(M+F)	Accident (Male + Female)	n = 89
AF(M+F)	Accident Free (Male + Female)	n = 117
M(A+AF)	Male (Accident + Accident Free)	n = 125
F(A+AF)	Female (Accident + Accident Free)	n = 81

Results are presented in the following order for the measuring instruments used in this study:-

1) Biographic Questionnaire - Part I, P. 53
   Part II, P. 105
2) NSQ and Parry's AG/AN Scale Variables (7) - P. 153
3) Semantic Differential (3 Factors) - P. 173

For further details see section discussing Measuring Instruments, P. 75.

CHAPTER XVIII

Biographic Questionnaire

Part I

Data from Part I of the Biographic Questionnaire (P. 53) are included in the previous section on Method (P. 48) discussing the sample of automobile drivers taking part in this research using mainly descriptive statistics for analysis.

Part II

Data for Part II of the Biographic Questionnaire follows (P. 107) and items remain in the original sequence in which they were presented to the sample. The statistical techniquesutilized for analysis can be seen in the section on Treatment of Results (P. 88). However, a further discussion of chi square and the group combinations used when applying this statistical technique to the results of the Biographic Questionnaire, particularly Part II, ensues prior to the presentation of the data for this questionnaire.

Chi square has been used throughout the Biographic Questionnaire to test numerically the difference between observed and expected values in a situation with two or more possible outcomes. Both single variable and multi-sample chi square testing has been carried out (see section on Treatment of Results, P. 92 , discussing Hypothesis Testing - (iv) chi square).

Actual frequencies have been used to calculate chi square rather than percentages although both are given in the data tables where appropriate. Percentages can be used if a correction for size of sample is made. This follows from the fact that in dealing with probability the significance of an event depends upon its actual frequency and is not shown by its percentage occurrence. For example, for a penny to fall 8 times in 10 times is not as significant as for the penny to fall 80 times in 100 tosses although the percentage occurrence is the same in both cases. In this study it was decided that actual frequencies would be used as a basis for calculating chi square in order to obtain maximum accuracy.

In using chi square to test to significant differences between observed and theoretically expected values of the 4 driver groups in items of the Biographic Questionnaire, mainly in Part II, the following pattern of group combinations was adopted:-

1) M(A+AF) and F(A+AF)

2) MAF and FAF. If significant difference found then cannot compare with MA and FA group as the former two groups act as control. If significant difference not found then can compare with A groups (M+F) as follows:-

   a) MAF and MA
   b) FAF and FA

3) MA and FA. Can compare these two groups to see if significant difference exists between them.

4) If no significant difference found between

   a) MAF and FAF
   b) MA and FA

   Then can compare AF (M+F) and A (M+F) groups

This makes 6 possible group combinations for comparison based on sex and accident category. Following this scheme 9 items in Part II of the Biographic Questionnaire were found to show significant differences using chi square as for example Item 8 concerning the number of driving convictions and Item 24 on self-estimation of driving standard.

In cases where all subjects have not responded to an item the actual number responding has been used as the base figure for the purposes of calculating, for example, chi square or the percentage of response for each group.

In some items of the Biographic Questionnaire the use of chi square would have meant collapsing cells and thus losing too much data. In these instances this testing procedure has not been used as it would have rendered the resulting chi square statistic rather meaningless. Also, where E values were 5 or less in a cell this testing technique has not been carried out. However, in some instances it was considered that not too much data would be lost by collapsing or combining cells and chi square has been used when the required E value of 5 or more has been attained.

The ultimate aim has been to arrive at an accurate outcome when using chi square throughout the results of the Biographic Questionnaire when testing for the significance of difference between observed and expected values.

A summary table of significant chi square results found for 9 items of Part II of the Biographic Questionnaire is given following the presentation of results for this part of the questionnaire (see P. 151).

Finally, concerning the presentation of results, in the data tables for the Biographic Questionnaire, Part II, actual frequencies have been given and percentage of group response, where appropriate, for the same item with the former being used to calculated chi square where appropriate.
For example -

Group Number of Subjects	MAF n = 58
Actual Frequency	25
Percentage	43.1%

Symbols used in the Biographic Questionnaire Results:-

χ^2 = Chi Square
χ^2_c = Chi Square Corrected For Continuity
s = Significant

ρ = Probability
$<$ = Less Than
$>$ = Greater Than
• = Direction of Significant Difference

Results - Part II, Biographic Questionnaire

1) Member of Automobile Association (AA) or similar motoring organisation:

AA Member	MAF n = 58	MA n = 67	FAF n = 59	FA n = 22
YES	38 65.5%	40 59.7%	27 45.7%	14 63.6%
NO	20 34.5%	27 40.3%	32 54.3%	8 36.4%

Overall membership of the Automobile Association or similar motoring organisation was quite high for all 4 driver groups of this sample. Using chi square a significant difference was found between the observed and expected values of AA membership between the two accident free groups as follows:-

• MAF and FAF $\chi^2_c = 3.888$ $p = .05$ s

2) Attendance at a defensive driving course:

Defensive Driving Course Attendance	MAF n = 58	MA n = 67	FAF n = 59	FA n = 22
YES	14 24.1%	15 22.4%	11 18.6%	8 36.4%
NO	44 75.9%	52 77.6%	58 81.4%	14 63.6%

In this sample of drivers the number attending a defensive driving course was not high, with proportionately the highest attendance being attained by the FA group. In fact, attendance at such a course, for the two accident groups at least, may have been compulsory rather than through choice giving the figures a boost.

In a study carried out by Planek et al. (1974) an evaluation was made of the Defensive Driving Course (D.D.C.) in several states in the U.S.A. Two methods were used in this study -(a) comparison of self-reported accident rates from the year before and the year after the D.D.C. and (b) a comparison of the after the D.D.C. accident rates with those reported by drivers who did not take the D.D.C.

A finding of this research was that significant reductions in accident rates were found after the D.D.C. Reductions in accidents following the D.D.C. were found to be greater for males than females and less for drivers under 24 years of age although the accident profiles were found to be the same essentially for the type and manner of collision.

Although this is only evidence from one study concerning the D.D.C. it would seem to indicate the potential and actual benefit that a course in defensive driving might have on accident reduction particularly for male drivers.

3) Average number of years driving licence held:

YEARS DRIVING LICENCE HELD	MAF	MA	FAF	FA
RANGE IN YEARS	1-45	1-45	1-40	1-22
TOTAL YEARS	431	480	558	149
NUMBER OF SUBJECTS	58	67	59	22
AVERAGE NUMBER OF YEARS DRIVING LICENCE HELD	7.43	7.16	9.46	6.77

For MA and MAF driver groups the average number of years that a driving licence was held was 7.16 and 7.43 years respectively. The same average for the FAF group was 9.46 years and for the FA group 6.77 years. One reason for the higher average numbers of years that a driving licence was held by the FAF group was that there were more subjects in the higher age range as compared with the other 3 groups of drivers (See section on Method discussing the age distribution of the sample, P. 54).

Significant differences between observed and expected values for the average number of years that a driving licence was held were found as follows:-

MAF and FAF $\chi_c^2 = 16.3$ $p = < .001$ s

MA and FA $\chi_c^2 = 25.76$ $p = < .001$ s

4) Number of times driving test taken before passing it:

NUMBER OF TIMES DRIVING TEST TAKEN	MAF n = 58	MA n = 67	FAF n = 59	FA n = 22
0		1	1	
1	52	61	55	20
2	5	3	3	1
3	1	2		1

The table above shows that, in general, driver subjects in this sample gained their driving licence the first time they took their driving test. It can be seen that two subjects in the MA group needed to take their driving test 3 times before passing it. This also occurred for one subject in the MAF group and one in the FA group.

The two subjects who recorded that they did not take a driving test obtained their driving licence before this legal requirement was introduced.

5) Adequacy of driving test:

ADEQUACY OF DRIVING TEST	MAF n = 56	MA n = 64	FAF n = 57	FA n = 22
YES	27 48.2%	26 40.6%	33 57.9%	12 54.5%
NO	29 51.8%	38 59.4%	24 42.1%	10 45.5%

In general, male drivers of both A and AF categories, seemed to feel that the present driving test was not adequate whilst female drivers of the same two categories tended to feel the reverse that the driving test was adequate.

Dissatisfaction with the driving test was felt by male drivers particularly by those in the MA group and perhaps in view of the latter group's subsequent driving history this may have been, in part, because they felt that they ought to have been subjected to a more rigorous driving test before being permitted to obtain a driving licence.

6) Suspension of driving licence:

DRIVING LICENCE SUSPENDED	MAF n = 58	MA n = 67	FAF n = 59	FA n = 22
YES	3 5%	7 10%	1 1.6%	0 0%
NO	55 95%	60 90%	58 98.4%	100%

Male drivers of both A and AF groups had had their driving licences suspended more than their female counterparts. Chi square could not be used because there was not the required cell entry of 5 or more for 3 of the driver groups. However, according to actual frequencies or as the percentage of response for each group for driving licence suspension, it can be seen that there is a difference in this respect between

a) Male (A and AF) and Female (A and AF) drivers
b) MAF and MA and
c) MA and FA drivers.

MA drivers had had their driving licence suspended more than twice as many times as MAF drivers. One driving licence suspension occurred in the FAF group and none in the FA group of drivers.

This would seem to suggest that in respect of driving licence suspension that there is a difference between male and female drivers.

7) Conviction for driving offence:

CONVICTION FOR DRIVING OFFENCE	MAF n = 58	MA n = 67	FAF n = 59	FA n = 22
YES	13 22.4%	27 40.3%	8 13.5%	5 22.7%
NO	45 77.6%	40 59.7%	51 86.5%	17 77.3%

40.3 per cent of the MA group of drivers had been convicted for a driving offence. This fact is in line with research findings that those drivers with any kind of violation record are more likely to have an accident record. 13.5 per cent of the FAF group had received such convictions.

Chi square was used to calculate the numerical difference between values actually observed and those expected for driving offence convictions with the following 3 significant results:-

M (A + AF) and F (A + AF)	$\chi_c^2 = 5.669$	$p = < .02$	s
A (M + F) and AF (M + F)	$\chi_c^2 = 7.661$	$p = < .01$	s
MAF and MA	$\chi^2 = 3.85$	$p = .05$	s

A significant difference was found between drivers in this sample according to sex and accident category and also between MAF and MA drivers as regards conviction for driving offence.

Williams et al.(1974) compared 100 persons who were found guilty of serious traffic offences with 99 controls matched for sex, residential district and type of drivers licence held. Such measures as a demographic questionnaire, Eysenck's Personality Inventory and the 16 Personality Factor Questionnaire were used in this research. It was found that more offenders than controls had experienced recent adversity in their lives, had a greater evidence of non-psychotic psychiatric disorders, were more impulsive and lower in social conscience. This study represents an attempt to identify high risk individuals in the driving population and hence has implications for accident prevention.

As a concluding comment, the presence of a violation record might be weighed as being predictive of the tendency to have accidents (McFarland and Moseley, 1954). No matter what the classification of driving offence a record may be an accident predictor as may be seen in this study particularly with the MA group.

8) Types and number of driving offences committed:

In this sample of drivers, speeding was the main motoring offence committed by the drivers of all 4 driver sub-groups. For male drivers of both A and AF categories, besides speeding, other driving offences included those involving general carelessness e.g. no current driving licence, going through red/amber traffic lights etc. Female drivers committed less driving offences with the main one being speeding with others including, for example, no Warrant of Fitness and careless use of a vehicle.

Using chi square to test the significance of difference between observed and expected values for the number of driving offences committed, the following 3 significant results were found:-

- M (A + AF) and F (A + AF) $\chi_c^2 = 5.12$ $p = < .05$ s
- MAF and FAF $\chi_c^2 = 5.34$ $p = < .05$ s
- MA and FA $\chi_c^2 = 5.2$ $p = < .05$ s

The following table gives an analytical breakdown of the type and number of driving offences committed by each of the 4 driver groups of this sample of drivers.

8) Types and number of driving offences committed:

MA Group n = 67
Number of Accidents = 107
$\bar{X}$ (mean) = 1.6

Offences	Number
1) Speeding	21
2) Going through red/ orange light	2
3) Dangerous driving	2
4) Failure to stop after accident	1
5) Following too close	1
6) No Warrant of Fitness	1
7) No current licence	1
8) Failure to give way	1
9) No seat belt	1
10) Not stopping at stop sign	1
TOTAL	32

FA Group n = 22
Number of Accidents = 31
$\bar{X}$ (mean) = 1.4

Offences	Number
Speeding	3
Failure to stop in half clear distance	1
Careless use of vehicle	1
TOTAL	5

MAF Group n = 58

Offences	Number
1) Speeding	13
2) Excessive noise	2
3) Not Stopping at stop sign	1
4) Failure to keep left	1
5) Cutting Corner	1
6) Going through red light	1
7) Overtaking with less than clear distance ahead	1
TOTAL	20

FAF Group n = 59

Offences	Number
Speeding	4
No Warrant of Fitness	1
Failure to stop at stop sign	1
Failure to give way to traffic on right	1
TOTAL	7

Speeding, as mentioned, was found to be one of the main driving offences committed by all 4 sub-groups of this sample of drivers. For the two male groups of drivers a variety of other offences were also committed with the MA group committing the most. Various findings emerge from the accident research literature concerning driving offences, particularly speeding.

In a study by Munden (1967) on the 'Relation between a driver's speed and his accident rate' one finding was the fact that fast and slow drivers have high accident rates and this fact does not in itself necessarily mean that relatively high and low speeds are the only direct cause of danger of accidents. It may imply that driving speed is also correlated with certain other driver traits which are likely to cause accidents.

McFarland and Moseley (1954) in their study of truck drivers used items in public records as objective indications of a driver's 'style of life' and this was found to afford considerable discrimination between AF (accident free) and AR (accident repeater) groups of truck drivers. One finding from their study was that speeding violations in private driving were characteristic of accident repeaters. Likewise, a greater tendency to accept and operate defective equipment on the part of AR's (accident repeaters) suggests equipment practices as an indicator of accident liability. Revolt against authority, traffic violations in this case, is considered by some experts as a trait characteristic of the AR.

Ross (1960) after noting the popular attitudes to road offences wrote 'traffic law violations are a costly and widespread form of criminal behaviour'. In America he found that the proportion of white collar workers is higher in traffic crimes than in non-traffic crimes and that violations of traffic laws are usually condoned by public opinion. Canty (1956) compared a group of traffic violators with persons convicted of non-traffic criminal offences. It was found that both traffic and non-traffic offenders had in their ranks a large proportion of disturbed and unstable persons and that as far as traffic offenders were concerned some 90 per cent were regarded as showing some form of psychiatric disturbance.

In a study carried out by Williams and O'Neill (1974) the road records of Sports Club of America national competition licence holders were compared with control drivers matched for age and sex. It was found that race drivers had a greater number of crashes, speeding violations and moving violations. With the driving experience and advanced driver education that race drivers undergo, the expectation would be that they would incur less violations and crashes which, in fact, is not so as indicated by the findings of this study. It may be that the fast and sometimes impulsive reactions of racing drivers lead to more driving errors.

9) Maintenance or checking of car or vehicle:

FREQUENCY THAT VEHICLE CHECKED	MAF n = 56	MA n = 65	FAF n = 55	FA n = 22
REGULARLY	34 60.7%	39 60%	29 52.7%	12 54.5%
OFTEN	9 16%	19 29.2%	10 18.2%	6 27.4%
SOMETIMES	10 18%	7 10.8%	13 23.7%	3 13.6%
SELDOM	3 5.3%		1 1.8%	
NEVER			2 3.6%	1 4.5%

It can be seen from this table above that the car or vehicle driven is usually regularly maintained and checked with a greater tendency to do this by both MA and MAF drivers than by both accident and accident free female drivers. Partly for the latter two groups this may be explained by the fact that someone else (e.g. owner of the vehicle) has the responsibility of doing this. This would apply especially to those who stated that they never maintained or checked their vehicles.

On the whole, there does seem to be more interest shown in keeping their vehicles road worthy by male drivers than by female drivers.

10i) Estimation of miles driven per annum (p.a.):

ESTIMATE OF MILES DRIVEN PER ANNUM	MAF n = 57	MA n = 67	FAF n = 58	FA n = 22
UP TO 500 MILES	3		5	
501-1000 MILES	8	2	13	2
1001-2000 MILES	6	5	4	5
2001-3000 MILES	6	5	6	2
3001-4000 MILES	7	14	10	5
4001-7500 MILES	5	8	8	3
7501-10000 MILES	13	15	8	4
OVER 10000 MILES	9	18	4	1

The above data table gives an estimation by each driver subject of this sample of the average number of miles driven per annum. From this it can be seen that female drivers of both accident and accident free groups drive less miles annually than male drivers of the same two categories do. Of course, this makes a difference in exposure to the driving situation and helps to account for the greater liability to road accidents as, for example, those driving over 10,000 miles per annum in the MAF group and particularly in the MA group.

10ii) Roads where driving mainly done:

PLACE OF DRIVING	MAF n = 58	MA n = 67	FAF n = 59	FA n = 22
RURAL ROADS	4	3	4	
CITY ROADS	13	10	15	7
RURAL AND CITY ROADS	41	54	40	15

From this table it can be seen that the driving carried out by the 4 driver groups of this sample is mainly on a combination of both rural and city roads. This means that generally there is equality of exposure among the groups to road conditions and road experience.

11) Method of learning to drive:

METHOD OF LEARNING TO DRIVE	MAF n = 58	MA n = 67	FAF n = 59	FA n = 22
PROFESSIONAL INSTRUCTION	4 6.9%	10 14.9%	11 18.6%	3 13.6%
RELATIVES/ FRIENDS	34 58.6%	36 53.7%	26 44.1%	8 36.4%
PROFESSIONAL INSTRUCTION & RELATIVES/FRIENDS	17 29.3%	17 25.4%	22 37.3%	11 50%
OTHER METHOD	3 5.2%	4 6%		

The main method of learning to drive for all driver groups was by tuition from relatives and/or friends, followed by professional instruction combined with that of relatives and/or friends.

In this sample female drivers of both accident and accident free categories tended to receive more professional instruction whether learning to drive by this alone or in combination with tuition from

relatives and/or friends than their male counterparts.

A small percentage of male drivers of both categories stated that they learned to driver by 'other ' method which was self tuition.

A difference of approach between male and female drivers in the method of learning to drive is indicated with male drivers tending to be more enterprising and willing to take risks whilst female drivers opted to be less venturesome in this respect.

12) Frequency of wearing a seat belt when driving:

SEAT BELT WORN	MAF n = 59	MA n = 67	FAF n = 59	FA n = 22
ALWAYS	45 77.6%	50 74.6%	49 83.1%	15 68.2%
OFTEN	7 12.1%	7 10.4%	7 11.9%	
SOMETIMES	5 8.6%	10 15 %	1 1.7%	1 4.6%
SELDOM	1 1.7%			3 13.6%
NEVER			2 3.3%	3 13.6%

The majority of driver subjects of all 4 groups stated that they always wore seat belts when driving. Some female drivers who stated that they never wore seat belts when driving did not have them fitted in the vehicle that they were driving.

In the United States Morgan (1967) investigated the use of seat belts. It was found from his study that the higher the educational level of the motorist the more likely he was to use seat belts. The data from this study in the above table would seem to confirm this.

In a further study by Höffner (1973) in Austria he contends that statistical data prove the effectiveness of seat belts and he discusses the problem of making them accepted by the general public. In this study, Höffner found several significant variables influencing the use of seat belts as follows:-

a) Drivers having a better socio-economic background and education used them more frequently. Morgan's (1967) finding in America was in line with this.

b) They were used more frequently by the owners of newer vehicles with large displacement ratio .

c) Non-smokers used them more than smokers.

d) Private drivers accepted them much more readily than professional ones.

e) Strangers used them more than local drivers.

f) Drivers who viewed themselves as careful, considerate and responsible accepted them.

These significant variables influencing the use of seat belts found by Höffner (1973) are of interest and indicate the type of individual driver likely to use them.

Bearing in mind the findings of Morgan (1967) in America and Höffner (1973) in Austria, in the 4 driver groups of this study from the data obtained, significant variables influencing the use of seat belts would be education and possibly socio-economic factors, non-smoking and newer type vehicles driven by private drivers.

13) Frequency that normally drive:

FREQUENCY OF DRIVING	MAF n = 58	MA n = 67	FAF n = 59	FA n = 22
EVERY DAY	25 43.1%	39 58.2%	34 57.6%	13 59.1%
SEVERAL TIMES WEEKLY	24 41.4%	25 37.3%	15 25.4%	7 31.8%
RARELY	9 15.5%	3 4.5%	10 17 %	2 9.1%

From the data table above it can be seen that, on the whole, drivers of this sample drive daily or at least several times weekly. Those drivers stating that they drove rarely were approximately the same in number for both accident and accident free groups. It appears that generally the two accident groups drive more frequently than the two accident free groups thus giving greater exposure of the former to accident liability although, using chi square, no significant differences were found between observed and expected values of driving frequency.

14) Composite standard scale values of what road traffic accidents are most often caused by given in z scores:

ACCIDENT CAUSE	MAF n = 58	MA n = 67	FAF n = 59	FA n = 22
PEDESTRIANS	+.02	+.08	+.01	+.02
ROAD CONDITIONS	+.47	+.38	+.37	+.41
DRIVER FAILURE	+1.17	+1.00	+1.09	+.94
ALCOHOL	+.60	+.92	+.83	+.57
MECHANICAL FAILURE	+.04	-.02	+.43	-.32
SPEED	+.21	+.33	+.51	+.68
OTHER	+.21	+.25	+.02	+.09

This item was included in the Biographic Questionnaire with acknowledgement to Hakkinen (1958) and his research in Finland with bus and tram drivers.

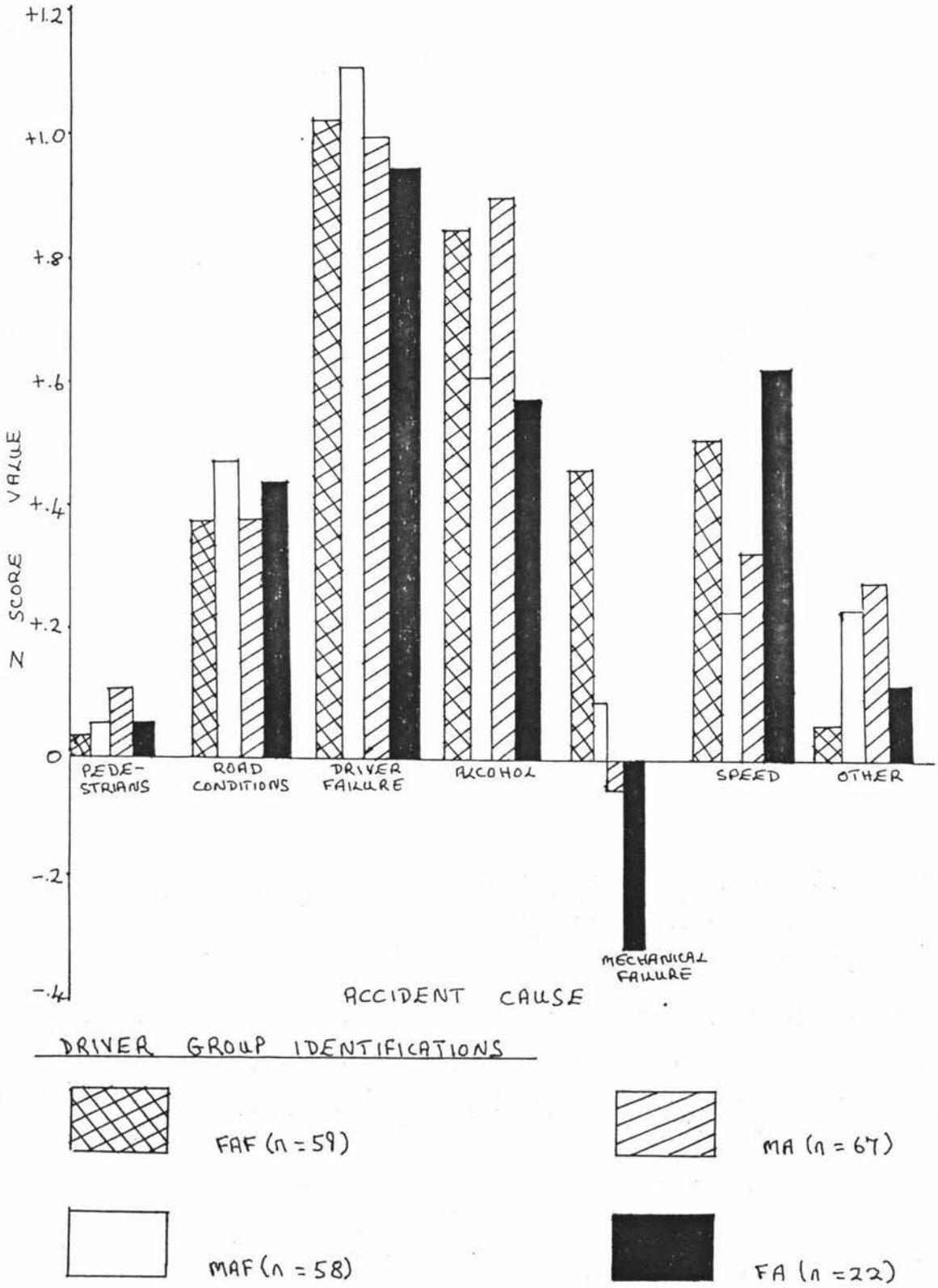
There was found to be general agreement amongst the 4 driver groups in this sample that driver failure was the most frequent cause of road accidents followed by alcohol.

Female drivers, both accident and accident free, considered speed to be the third leading cause of traffic accidentswhilst male drivers of both accident categories differed and felt that road conditions were. FAF drivers and to a lesser extent MAF drivers emphasized the importance of mechanical failure in road traffic accidents in contrast to the two accident driver groups.

Eysenck (1960) and McFarland (1952) state that about 90 per cent of road accidents are due to human causes and that only about 10 per cent can be attributed to mechanical or other causes.

The following bar graph shows the information contained in the above data table.

14) Bar Graph: What road accidents considered to be 'most often caused by' based on composite scale values given in z scores



15i) Enjoyment of driving:

ENJOYMENT OF DRIVING	MAF n = 58	MA n = 67	FAF n = 59	FA n = 22
ALWAYS	31 53.4%	37 55.2%	29 49.2%	8 36.4%
OFTEN	19 32.8%	24 35.8%	22 37.3%	7 31.8%
SOMETIMES	6 10.4%	4 6 %	8 3.5%	7 31 %
SELDOM	2 3.6%	2 3 %		
NEVER				

General agreement was reached about driving always or often being enjoyable by the 4 driver sub-groups in this sample.

In fact, from the data it would seem that women drivers of both accident and accident free categories enjoy the driving they do as much as or perhaps even more than male drivers of the same two accident categories.

Using chi square a significant difference was found in regard to the enjoyment of driving between the two accident groups of this sample as follows:-

MA and FA $\chi^2 = 7.213$ $p = < .05$ s

15ii) Enjoyment of the thrills and risks of modern driving:

ENJOYMENT OF THRILLS/ RISKS OF DRIVING	MAF n = 58	MA n = 67	FAF n = 59	FA n = 22
ALWAYS	7 12.1%	17 25.4%	3 5.1%	
OFTEN	15 25.9%	15 22.4%	8 13.5%	2 9%
SOMETIMES	17 29.3%	15 22.4%	17 28.8%	10 45.5%
SELDOM	12 20.7%	14 20.8%	21 35.6%	4 18.2%
NEVER	7 12 %	6 9 %	10 17 %	6 27.3%

A quarter of the MA group of drivers stated that they always enjoyed the thrills and risks of modern driving with less than half of such enjoyment being felt by the MAF group with even less enjoyment in this respect being experienced by female drivers of either the accident or accident free categories.

It can be seen that there is a difference between male and female drivers concerning the enjoyment of the thrills and risks of modern driving and using chi square this difference was found to be significant as follows:-

M (A+AF) and F (A + AF) $\chi^2 = 17.133$ $p = < .001$ s

16) Errors made whilst driving:

DRIVING ERRORS MADE	MAF n = 58	MA n = 67	FAF n = 59	FA n = 22
ALWAYS				
OFTEN	9 15.5%	7 10.5%	5 8.5%	4 18.2%
SOMETIMES	33 56.9%	38 56.7%	43 72.9%	15 68.2%
SELDOM	16 27.6%	21 31.3%	11 18.6%	3 13.6%
NEVER		1 1.5%		

Driver subjects of the 4 sub-groups did not feel that they always made mistakes when driving. The predominant feeling was that they were inclined to make them sometimes or seldom.

There appears to be a difference between male (A and AF) and female (A and AF) drivers as also between the MA and FA group of drivers as regards the estimation of errors made whilst driving. However, using chi square these differences were not found to be significant. In spite of this, the indication would seem to be that male drivers, particularly MA drivers, feel more confident in their ability as drivers than do female drivers in this sample.

17) Other driver blame when driving errors occur:

BLAME OTHER DRIVER FOR ERRORS	MAF n = 58	MA n = 67	FAF n = 59	FA n = 22
ALWAYS				
OFTEN	6 10.3%	14 20.9%	7 11.9%	2 9.1%
SOMETIMES	33 56.9%	35 52.2%	28 47.4%	7 31.8%
SELDOM	16 27.6%	13 19.4%	22 37.3%	13 59.1%
NEVER	3 5.2%	5 7.5%	2 3.4%	

From the data table above, it can be seen that male and female drivers of both accident and accident free categories differ as regards their blame of other drivers when driving errors occur. However, using chi square no significant differences were found.

There is the indication that male drivers, on the whole, tend to feel more confident in their driving ability than female drivers with the result that they do not tend to feel blameworthy for driving errors that occur. Instead, they tend to blame other drivers for errors that occur when driving.

Greenshields (1959) found in a study carried out by questionnaire on attitudes, emotions and accidents in relation to driving that 76 per cent of the motorists responding thought that the other driver rather than themselves was to blame showing a lack of personal responsibility for safety. 55 per cent of these drivers believed that other drivers could not be trusted to drive properly.

18) Causes of accidents for which drivers are most often thought to be responsible using a composite standard scale value given in z scores:

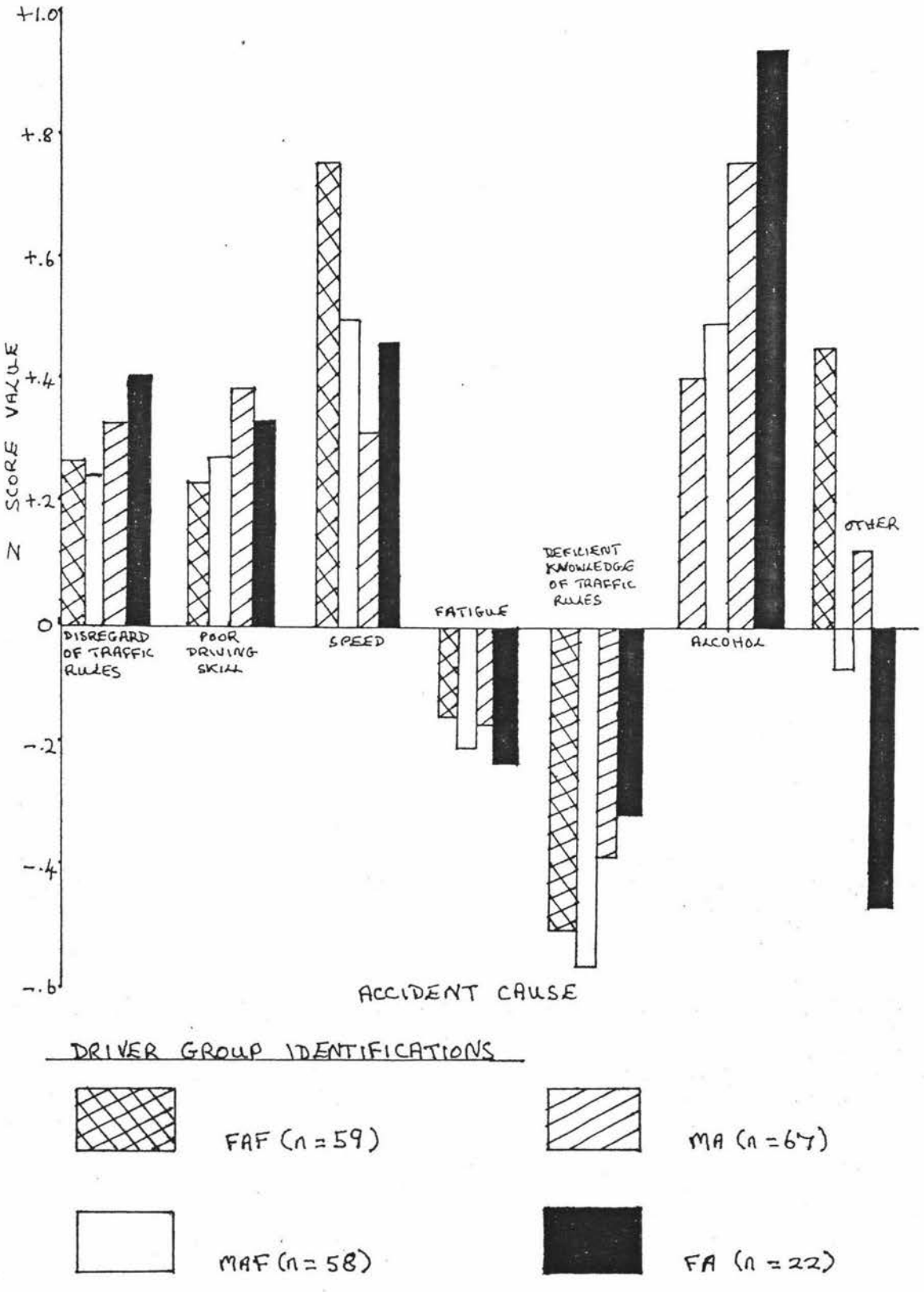
ACCIDENT CAUSE	MAF n = 58	MA n = 67	FAF n = 57	FA n = 22
DISREGARD OF TRAFFIC RULES	+.23	+.34	+.24	+.40
POOR DRIVING SKILL	+.29	+.38	+.22	+.33
SPEED	+.48	+.30	+.76	+.43
FATIGUE	-.20	-.16	-.15	-.21
DEFICIENT KNOWLEDGE OF TRAFFIC RULES	-.55	-.43	-.50	-.37
ALCOHOL	+.48	+.68	+.40	+.97
OTHER	-.04	+.13	+.45	-.45

This item as well as Item 14 was included in the Biographic Questionnaire with acknowledgement to Hakkinen (1958) and his research carried out in Finland with tram and bus drivers.

The 4 driver groups of this sample considered alcohol to be the leading cause of accidents for which drivers are most often responsible followed by speed, disregard of traffic rules and poor driving skill. Fatigue and deficient knowledge of traffic rules were not felt to be important in accident causation for which drivers are most often responsible in this sample of drivers. (See Appendix A for data on factors identified as contributing to road accidents in New Zealand.)

A bar graph follows which presents graphically data given in z scores in the above table.

18) Bar Graph: Causes of accidents for which drivers are most often considered to be responsible based on composite standard scale values given in z scores



19) Normal health status:

HEALTH STATUS	MAF n = 58	MA n = 67	FAF n = 59	FA n = 22
VERY GOOD	38 65.5%	41 61.2%	44 74.6%	12 54.5%
GOOD	20 34.5%	25 37.3%	14 23.7%	9 41 %
SATISFACTORY		1 1.5%	1 1.7%	1 4.5%
FAIR				
POOR				

In general, this sample of drivers, as might be expected with the majority of subjects being young university students, experienced very good or good health with only a small percentage claiming that their health was satisfactory.

Tillmann and Hobbs (1949) found that the low accident group of taxi driver subjects in their Canadian study tended to be health conscious.

20) Preference of having company when driving:

WHETHER COMPANY PREFERRED WHEN DRIVING	MAF n = 58	MA n = 67	FAF n = 59	FA n = 22
ALWAYS	6 10.3%	9 13.4%	4 6.8%	2 9.1%
OFTEN	24 41.4%	31 46.3%	20 33.9%	5 22.7%
SOMETIMES	25 43.1%	24 35.8%	28 47.5%	10 45.5%
SELDOM	3 5.2%	2 3 %	6 10.2%	5 22.7%
NEVER		1 1.5%	1 1.6%	

Male drivers both accident and accident free, on the whole, prefer to have company when driving more so than female drivers of both accident and accident free categories in this sample. This difference was found to be significant using chi square with the following result:-

M (A+AF) and F (A+AF) $\chi^2 = 9.804$ $p = > .02$ s

21) Whether driving is tiring:

WHETHER DRIVING IS TIRING	MAF n = 58	MA n = 67	FAF n = 59	FA n = 22
ALWAYS	1 1.7%	1 1.5%	1 1.7%	
OFTEN	6 10.3%	8 11.9%	5 8.4%	4 18.2%
SOMETIMES	23 39.7%	22 32.8%	20 33.9%	10 45.5%
SELDOM	23 39.7%	31 46.3%	27 45.8%	8 36.3%
NEVER	5 8.6%	5 7.5%	6 10.2%	

There was not great differentiation between the 4 driver groups as regards whether driving was tiring with the tendency that it was sometimes or seldom found to be so as might be expected in a sample of mainly young university students in good health.

Wilde and Grant (1970) state that the type of fatigue resulting from driving is noted to be different from that produced by physical exercise and is largely caused by stresses arising from traffic and other conditions which produce varying states of emotional arousal.

Repeated emotional arousal over a short period results in over-sensitive behaviour showing strong responses to slight irritations. If this period is prolonged it is followed by a state of lowered vigour in which there is a reduction of intensity of response to the environment and a raised threshold of arousal. Either of these states would be expected to increase the risk of accident both to the subject and other drivers.

22) Usual reaction in a stressful situation:

REACTION	MAF n = 57	MA n = 67	FAF n = 59	FA n = 22
SELF-CONTROL	47 82.4%	55 82.1%	47 79.7%	19 86.5%
PANIC/GO TO PIECES	1 1.8%	2 3 %	2 3.3%	1 4.5%
PHYSIOLOGICAL	8 14 %	6 8.9%	2 3.3%	
EMOTIONAL		2 3%	1 1.8%	
STOP DRIVING			1 1.8%	
SELF-CONTROL THEN GO TO PIECES			2 3.3%	1 4.5%
OTHER	1 1.8%	2 3%	4 6.8%	1 4.5%

The main reaction experienced by all 4 driver sub-groups in a stressful situation was that of being able to maintain self-control. A small percentage experienced other reactions to a stressful situation such as physiological ones (e.g. shaking, sweating etc.) or panic before going to pieces.

Apart from the main reaction of maintaining self-control in a stressful situation there was also a variety of other reactions experienced, as might be expected, and this can be seen in the data contained in the above table.

23) What behaviour of other drivers makes you feel:

a) Angry

b) Anxious

a) Angry

MAF Group

Disregard of traffic rules and disregard of others ranked high on the list of behaviour of other drivers that was a cause of anger in the driving situation together with inconsiderateness, selfishness, alcohol and speed. Following too close and queue jumping were mentioned several times by MAF drivers as being a source of anger when driving. Other behavioural factors provoking anger in the driving situation were slowness, no indications and not dipping headlights.

MA Group

Disregard of traffic rules and disregard of others were mentioned by the MA group as being a prime cause of anger in the driving situation as well as speed, slow driving and drivers, alcohol, stupidity and risk taking/dangerous driving and overtaking. Other factors included inconsiderateness (e.g. to pedestrians, to push bike riders and motor cyclists) reckless/careless driving, stalling at the traffic lights, not giving way, no indications and lights not being dipped.

FAF Group

With the FAF group of drivers disregard of traffic rules and disregard of others ranked high as a source of anger in the driving situation. Other behavioural factors causing anger in this group of drivers included inconsiderateness, speed, thoughtlessness, not signalling and faulty indication. 'Smart alecing' and 'acts of aggression' were mentioned also as being anger provoking in the driving situation. Other sources of anger caused by the behaviour of other drivers for this group were not giving way, suddenly braking and the need to do so, erratic behaviour, showing off, unnecessary risks, impolitness and tooting the horn.

FA Group

High on the list of anger provoking behaviour caused by other drivers for this group were disregard of traffic rules and disregard of the safety of self and others. 'Sky larking' was mentioned as being a source of anger caused by the behaviour of other drivers together with alcohol, following too close, irresponsible overtaking, lack of consideration and selfishness. Not dipping headlights, dangerous overtaking, not signalling, discourtesy, tooting the horn (e.g. in traffic jams, at traffic lights) and leaving injured animals on the road were further behavioural

factors of other drivers causing anger in this group of drivers.

23) Summary paragraph for total group for behaviour of other drivers that arouses feelings of anger:

Concerning the behaviour of other drivers that brings forth anger in this sample of drivers ranked high by all 4 driver sub-groups were disregard of traffic rules and disregard of other people followed by such factors as speed (too fast and too slow), alcohol, following too close, dangerous overtaking, inconsiderateness, not signalling and not dipping headlights.

The general trend from responses given to this item by this sample of university automobile drivers is that lack of consideration for the law and others is one of the prime causes of anger provoked by the behaviour of other drivers. There are some differences to be noted between male and female drivers of this sample. For example, tooting the horn, leaving injured animals on the road, sky larking, showing off and acts of aggression are all behavioural factors of other drivers that cause feelings of anger in female drivers in the driving situation.

The behaviour of other drivers that made this sample of drivers feel angry provides an interesting list and there is the indication of some variation of view about this between male and female drivers as well as agreement on major factors such as disregard of traffic rules and disregard of others and following too close.

It would seem from the behavioural factors of other drivers that lead to feelings of anger itemized by this sample of drivers that there are many sources of irritation and anger that increase the stress of driving.

b) Anxious

MAF Group

Topping the list of the behaviour of other drivers that made this group of MAF drivers feel anxious was erratic, unpredictable driving and drivers. The syndrome 'it cannot happen to me' was mentioned'. Other factors mentioned as being anxiety provoking for this group were driving beyond one's capabilities, poor car control, reckless and close shaves, speed both slow and fast, following too close, inattention, hesitant driving and showing off. Young children in cars and on the road were also listed as being a source of anxiety in the driving situation.

MA Group

Top of the list for behaviour of other drivers that causes anxiety for this group of drivers were erratic and unpredictable driving and drivers, driving beyond one's capabilities, poor driving skill and incompetent drivers (e.g. old people and slow drivers). Swerving and rough car/vehicle control was also a source of anxiety for this group. Disregard of traffic rules and a deficient knowledge of traffic rules were mentioned as being anxiety provoking in the driving situation as well as following too close, hesitant drivers making a situation of uncertainty about their intentions, dangerous driving, impatience and inconsiderateness. Other behavioural factors mentioned by this group that made them feel anxious were stop/start driving, lack of road courtesy and traffic cops.

FAF Group

This group of FAF drivers mentioned erratic, unpredictable driving as being a prime cause of anxiety in the driving situation together with inattention, following too close, bad weather conditions and excessive speed for those conditions. Other factors were being out of control of vehicle (e.g. due to drink, drugs), overtaking when dangerous and/or risky, selfish driving, braking suddenly, speed and slowness. Further behaviour of other drivers that made this group of FAF drivers anxious in the driving situation was blasting the horn for no specific reason, poor co-ordination (e.g. elderly people, drunken drivers), not wearing seat belts and tired commercial drivers.

FA Group

Erratic driving and behaviour on the road made this group of FA drivers feel anxious in the driving situation as well as being followed too close, speed, the influence of alcohol and driving, poor vehicle control, turning without signals and wandering over the road. Further behavioural factors of other drivers that caused this group of drivers to feel anxious in the driving situation were driving carelessly to be clever, uncertainty of knowing whether

or not the other driver knows what he is doing and seeing the possibility of an accident and not being able to do anything about it.

23) Summary paragraph for total group for behaviour of other drivers that arouses anxious feelings:

Heading the list of the behaviour of other drivers that leads to feelings of anxiety in the driving situation for this sample of drivers was erratic driving and unpredictable driving behaviour. Speed and inattention also were prominent behavioural factors in this list together with following too close, dangerous, reckless driving, not giving proper indications and poor driving skill.

Again, there was a difference between male and female drivers in this sample as regards the behaviour of other drivers that leads to anxious feelings in the driving situation. For example, tooting the horn is considered by some female drivers to be anxiety provoking in the driving situation whilst traffic cops were stated to arouse such feelings by some MA group drivers.

The various factors highlighted by this sample of both male and female drivers concerning the behaviour of other drivers that leads to anxious feelings are interesting and it would seem that many of these factors mentioned, with some effort and thought, would not lie outside the realms of remedy.

General Comment - Item 23:

Taking an overall view of the behaviour of other drivers mentioned by this sample that leads to feelings of anger and anxiety some factors such as following too close, speed (fast and slow) and alcohol are seen to be mentioned as causing both reactions possibly because a behavioural factor that might cause one driver to be angry might make another one feel anxious or even to have a mixture of both feelings as these are sometimes difficult to unravel. However, on the main points there is agreement. This sample of drivers agreed that disregard of traffic rules and disregard of others by other drivers caused them anger in the driving situation whilst erratic, unpredictable driving and drivers by other drivers caused them anxiety in the driving situation.

Underlying all this would seem to be the fact of the necessity of a change in attitude towards driving and other drivers with increased thought and consideration towards others.

24) Self-rating of driving standard:

RATING OF DRIVING STANDARD	MAF n = 58	MA n = 66	FAF n = 59	FA n = 22
VERY GOOD	8 13.8%	13 19.7%	3 5.1%	3 13.6%
GOOD	34 58.6%	42 63.6%	31 52.5%	10 45.5%
AVERAGE	13 22.4%	11 16.7%	23 39 %	5 22.7%
FAIR	2 3.5%		2 3.4%	4 18.2%
POOR	1 1.7%			

The data table above indicates that self-rating of driving standard differs between male and female drivers with the following significant difference using chi square being found:

M (A+AF) and F (A+AF) $\chi^2 = 11.109$ $p = < .01$ s

Driver subjects of the MA group, as might be expected, seem to hold a positive and over-confident opinion of their driving standard. On the other hand, FAF drivers appear to be lacking in self-confidence in the rating of their driving standard. 1.7 per cent of the MAF group considered that their driving was of a poor standard. For the MAF and FAF groups about 3 per cent of each group felt that their driving standard was fair.

It would appear that the two accident groups, especially the MA group, show over rather than under-confidence in respect of their self-rating of driving standard. In general, the indication in these data is the over-confidence of male drivers (A and AF) as opposed to the lack of self-confidence of female drivers (A and AF).

In a study carried out by Greenshields (1959) he found that only about one driver in 100 admits that he is a poor driver as would seem to be the case in the above data. Greenshields also found that 15 per cent of the drivers in his study considered themselves to be excellent drivers, 59 per cent good, 25 per cent average and 1 per cent poor. These figures approximately concur with those found for the MAF group of drivers in this study.

25) Whether smoke or not:

WHETHER SMOKE OR NOT	MAF n = 58	MA n = 67	FAF n = 59	FA n = 22
YES	9 15.5%	11 16.4%	10 16.9%	8 36.4%
NO	49 84.5%	56 83.6%	49 83.1%	14 63.6%

36.4 per cent of the FA group stated that they smoked, more than twice the percentage reported for the other 3 driver groups, with the percentage for the latter being about 15 per cent.

Using chi square no significant differences were found between those who did and those drivers who did not smoke. However, over a third (or 36.4 per cent) of the FA group smoked with this percentage being calculated in relation to the group number. This proportion of smokers in the FA group may be an indication of nervousness, lack of confidence and insecurity.

26) Average number of cigarettes smoked daily:

	MAF n = 58	MA n = 67	FAF n = 59	FA n = 22
NUMBER OF SMOKERS	6	11	10	8
NUMBER OF CIGARETTES SMOKED	83 (3 pipes)	112	106	126
AVERAGE NUMBER OF CIGARETTES SMOKED	13.83	10.18	10.6	15.75

Proportionately, in relation to the group number of 22, the FA group had the greatest number of smokers of the 4 driver groups.

The average number of cigarettes smoked daily by smokers of the FA group was 15.75 followed by the MAF group with 13.83 cigarettes plus 3 pipes.

In general, it might be said that those who smoked cigarettes in this sample of drivers did so on a moderate basis.

As a general comment regarding smoking, Rachman and Philips (1975) report that psychological research into factors which encourage a smoker to continue smoking has uncovered some interesting information.

Smoking has a physiological effect of stimulation and many smokers experience and report a calming psychologiocal effect. There is evidence that smoking produces not only calmness but also can help to dampen some of the unpleasant psychological feelings experienced during stress. The findings are consistent with the observation that long-term smokers were found to be more anxious during early adulthood than non-smokers (Dunn, 1973).

Eysenck (in Dunn, 1973) has developed an elaborate argument relating smoking to personality. Eysenck's argument begins from the premise that extraverts suffer from under-arousal of the cortex and he links this major dimension of personality to the arousing effects of smoking.

The deduction that extraverts are more likely than introverts to be continuous smokers has been confirmed. Extraverts apparently derive satisfying increases in central stimulation from smoking. Alternatively, as smoking also is capable of producing calming side-effects, over-aroused introverts also smoke.

In sum, Eysenck argues that smoking is maintained because it is an artificial aid in producing a preferred level of arousal whether this be at a heightened level for the extravert or a decreased level for the introvert.

This argument of Eysenck's concerning personality and smoking would seem to be relevant in this study, with the smokers of the FA driver group, on the whole, possibly seeking and deriving the satisfying calming effects that smoking offers whilst the increased level of stimulation to be gained from smoking would be more pertinent, on the whole, to the MA driver group.

27) Favourite Colour:

FAVOURITE COLOUR	MAF n = 52	MA n = 66	FAF n = 58	FA n = 21
RED	5 9.6%	6 9.1%	10 17.3%	1 4.8%
BLUE/TURQUOISE	16 30.8%	29 43.9%	22 37.9%	9 42.9%
YELLOW/ORANGE/ GOLD	13 25 %	7 10.6%	10 17.3%	2 9.5%
GREEN	9 17.3%	13 19.7%	9 15.5%	4 19 %
PURPLE/BURGUNDY/ WINE	1 1.9%	1 1.5%	1 1.7%	
WHITE	2 3.9%	2 3.1%		
BLACK	1 1.9%	1 1.5%	1 1.7%	1 4.8%
OTHER/ NO PREFERENCE	3 9.6%	7 10.6%	5 8.6%	4 19 %

The favourite colour chosen by all 4 driver groups of this sample was the blue/turquoise range followed by the yellow/orange/gold range of colours and green. The 'other' colour category included such colours as brown, beige and grey. 19 per cent of the FA driver group stated that their choice of favourite colour was in the 'other/no preference' category. About 10 per cent of the other 3 driver groups did likewise.

These preferences of favourite colour approximately coincide with the predominant car/vehicle colours of this sample with the exception of the white/cream colour category (see section on Method concerning the Sample - Part I, Biographic Questionnaire, P. 48)

A theory tentatively postulated by the writer was that red might be the favourite colour of accident driver personality types. Cheskin of the Colour Research Institute of America (Roon,1951) found that red has a violently stimulating effect whilst blue, the coldest of all colours, is a psychological sedative.

From these data in the table above for favourite colour, it can be seen that 19.1 per cent of the MA driver group selected red as their favourite colour followed by 17.3 per cent of the FAF driver group with only 4.8 per cent of the FA driver group choosing likewise.

In view of these data for this sample of drivers, the theory is not supported as regards accident personality type being associated with red either as a favourite colour preference or as car/vehicle colour as, in both instances, the blue/turquoise followed by the yellow/orange/gold and green colours, in that order, predominate. Of course, there may be a relationship between the colour red and a driver accident personality type although it is not shown in these data and hence could provide an area for further research.

28) Frequency of alcohol consumption:

ALCOHOL CONSUMPTION	MAF n = 58	MA n = 67	FAF n = 59	FA n = 22
REGULARLY	6 10.4%	10 14.9%	3 5.1%	2 9.1%
OFTEN	15 25.9%	23 34.3%	16 27.1%	3 13.6%
SOMETIMES	20 34.4%	23 34.3%	24 40.7%	4 18.2%
SELDOM	10 17.2%	9 13.5%	14 23.7%	9 40.9%
NEVER	7 12.1%	2 3%	2 3.4%	4 18.2%

From the data table above, it can be seen that there is a difference of drinking pattern between male (A and AF) and female (A and AF) drivers in this sample. Women drivers, in general, are less likely to drink regularly or often and more likely to be tee-totallers whilst male drivers are more likely to drink regularly or often and less likely to be tee-totallers.

Significant differences were not found using chi sqaure, fore example, between male and female drivers as regards their drinking pattern. However, this technique was not used to test for differences between observed and expected values for some of the group combinations because the actual observation entry of some cells was less than 5 and collapsing cells would have meant losing too much data. An example of such an instance is that of the MAF and FAF groups.

As one commentator has pointed out (Medical Journal of Australia, Sept. 1968), the problem of drinking and driving is not a new one for the Romans introduced legislation in an attempt to reduce the number of collisions between drunken charioteers.

There is overwhelming evidence to show the relationship between excessive liquor consumption and the incidence of traffic accidents (Whitlock, 1971). The fact that excessive use of alcohol is itself a response to stress is often ignored (Selzer and Vinokur, 1974). Dependence on alcohol usually aggravates the condition of stress, and there is no doubt that it has an inimical effect on driving. However, Selzer and Vinokur (1974) state that it is possibe that the most disastrous effects emerge in the presence of both recent life changes and excessive alcohol consumption, making the alcoholic driver exceptionally dangerous at certain times.

In some research carried out by Selzer (1969) and Selzer et al. (1968) the characteristics of 96 drivers judged to be responsible for accidents involving one or more deaths were compared with those of a control sample of the same size. It was found that the accident drivers included more alcoholics, more persons who frequently use alcohol in large quantities, more drivers with other psychopathology and more persons suffering from stressful experiences during the year preceding their accidents than did the control sample (Brenner and Selzer, 1969).

Pelz et al., (1975) carried out an investigation in the United States on the drinking and driving behaviour of young men in relation to accidents. This survey included 1,670 male drivers between the age of 16 to 24 years and the results showed that alcohol was involved in 3 to 8 per cent of all crashes of 20 year old drivers. The highest accident rates without alcohol involvement occurred in the 18 to 20 year old age group whereas the most alcohol involved accidents occurred in the 22 to 24 age range.

Nagel et al., (1973) in an in-depth study of 35 accidents found that the most frequent physiological factor in the 'at fault' driver was the use of alcohol or drugs which seemed to affect the driver's ability to perceive dangerous road conditions or to control their vehicle adequately.

In a study of the motivational and cognitive effects of alcohol Barry (1973) in the United States found, following a review of the literature, that the contrasting depressant and disinhibitory effects of alcohol can both cause highway accidents.

The depressant effect of alcohol involves the motivational components of sedation and self-destructiveness and the cognitive components of memory loss and learning deficit. These effects give rise to inattention and fatigue leading to such consequences as driving off the road or into an obstacle or the inability to cope with an emergency situation.

On the other hand, the disinhibitory effects of alcohol were found to lead to decreased fear and increased assertiveness whilst the cognitive components lead to impaired self-criticism and dissociation from sober habits. These effects give rise to risk taking and disorganisation with typical consequences in the driving situation being speeding or risky manoeuvres and loss of control in an emergency.

The motivational and cognitive effects of alcohol pointed out by Barry (1973) indicate the seriousness and danger of drinking, at least in excess, and driving.

Borkenstein (1967) states that drinking drivers are not all alike and not all bad. Neither are drivers all alike or all bad. It is where the negative aspects of both drinking and driving overlap that there are problems. A certain amount of alcohol can be taken with very little, if any, measurable effect and this is known as the 'threshold amount' with a blood alcohol reading below the level of 0.04 or 0.05 per cent being, apparently, insignificant and non-causal.

29) Frequency and type of accident:

ACCIDENT TYPE	MA n = 67	FA n = 22
VERY SERIOUS	6 5.6%	2 6.5%
SERIOUS	18 16.8%	1 3.2%
MINOR	83 77.6%	28 90.3%
TOTAL NUMBER OF ACCIDENTS	107 100%	31 100%
AVERAGE NUMBER OF ACCIDENTS	1.59	1.4

PREVENTABLE	94 87.9%	22 71%
NON-PREVENTABLE	13 12.1%	9 29%
TOTAL NUMBER OF ACCIDENTS	107 100%	31 100%

Proportionately, bearing in mind the number of driver subjects in the FA group, more male drivers sustained very serious or serious types of accident. FA drivers usually experienced minor types of accident. However, the average number of accidents for MA and FA drivers did not differ greatly being 1.59 and 1.4, respectively.

The cause of any accident that occurred when driving during the last 5 years was briefly given in this item concerning accident record of each driver taking part in the survey. It was considered that a time span of 5 years would indicate consistency of driving record and experience.

From the brief causes of accident given an arbitrary assessment was made as to whether the accident could be termed as being preventable or non-preventable. The data show that the majority of accidents incurred by the MA group were deemed to be preventable. A preventable accident is taken to be an occurrence, confrontation or accident when driving that could have been prevented had reasonable and due care been taken. A non-preventable accident is taken to be one in which the driver was judged to have reasonably done everything he or she could to prevent

the occurrence (Brandaleone et al., 1972).

In this study, accidents classified as preventable had causes given such as alcohol, speed, carelessness, fatigue and inexperience. Accidents classified as being non-preventable included such confrontations or occurrences as being hit whilst stationary, being hit by a drunken driver, another driver doing a 'U' turn in front of the subject, or running into a black cow on a black night.

29) Frequency distribution of accidents:

NUMBER OF ACCIDENTS	MA n = 67	FA n = 22
1	40 60%	16 73%
2	16 24%	5 23%
3	9 13%	
4	2 3%	
5		1 4%
TOTAL NUMBER OF SUBJECTS / TOTAL GROUP % FOR ACCIDENTS	67 100%	22 100%

The data table above shows that 60 per cent of the MA and 73 per cent of the FA group of drivers had experienced one accident during the last 5 years of their driving history. 24 per cent of the MA and 23 per cent of the FA group had sustained two accidents during the last 5 years. For the MA group 13 per cent had had 3 accidents when driving during the last 5 years and 3 per cent 4 accidents during that time. For the FA group 4 per cent had had 5 accidents during the last 5 years.

The frequency of the number of driver subjects sustaining accidents when driving during the last 5 years decreased as the number of accidents increased.

It can be seen that the frequency distribution of accidents when driving between the MA and FA group of drivers differs although this was not tested by chi square because too much data would have been lost by collapsing cells.

29) Significance of difference between the total number of accidents by male and female drivers:

The ratio of MA to FA drivers in this sample was 3:1 respectively. Using chi square it was found that there was a significant difference between observed and expected values between male and female drivers in this study who had sustained accident s when driving as follows:

	MA n = 67	FA n = 22	
NUMBER OF ACCIDENTS	Fo 107 / Fe 92	Fo 31 / Fe 46	TOTAL NUMBER OF ACCIDENTS = 138

MA/FA $\chi_c^2 = 6.855$ $p = < .01$ s

Where F_o = Frequency observed

Where F_e = Frequency expected

30) Ability to make decisions quickly and accurately when driving:

ABILITY TO MAKE QUICK/ACCURATE DECISIONS WHEN DRIVING	MAF n = 58	MA n = 67	FAF n = 59	FA n = 22
ALWAYS	13 22.4%	23 34.3%	7 11.9%	6 27.3%
OFTEN	37 63.8%	41 61.2%	45 76.2%	13 59.1%
SOMETIMES	6 10.3%	3 4.5%	7 11.9%	3 13.6%
SELDOM	2 3.5%			
NEVER				

The confidence of the MA group of driver subjects followed by the FA group in their ability to make decisions quickly and accurately when driving can be seen in the table above. There is also a difference between the MAF and FAF group of drivers in this respect.

However, using chi square, significant differences between the observed and theoretically expected values between the groups in respect of their ability to make decisions quickly and accurately in the driving situation were not found.

31) Self-estimation of judgement in the driving situation:

SELF-ESTIMATION OF DRIVING JUDGEMENT	MAF n = 57	MA n = 67	FAF n = 59	FA n = 22
EXCELLENT	7 12.3%	10 14.9%	1 1.7%	1 4.5%
GOOD	39 68.4%	50 74.6%	37 62.7%	11 50 %
AVERAGE	10 17.5%	7 10.5%	21 35.6%	9 41 %
FAIR	1 1.8%			1 4.5%
POOR				

A significant difference was found between the observed and expected values of self-estimation of judgement in the driving situation between the two accident group of drivers in this sample as follows:

• MA and FA $\chi^2 = 10.966$ $p = < .001$ s

From the data, although significant differences were not found using chi square, it would seem that there is the tendency for male (A and AF) to feel relatively confident that their judgement in the driving situation is either excellent or good as compared with female (A and AF) drivers, on the other hand, who seem to feel less confident and that their judgement in the driving situation is good or average.

32) Usual reaction after the experience of a 'near miss' when driving:

REACTION AFTER 'NEAR MISS' WHEN DRIVING	MAF n = 58	MA n = 67	FAF n = 59	FA n = 22
PHYSIOLOGICAL	14 24.1%	13 19.4%	10 16.9%	4 18.2%
EMOTIONAL	5 8.6%	11 16.4%	7 11.9%	6 27.3%
EDUCATIONAL	10 17.3%	16 23.9%	7 11.9%	2 9.1%
EXTRA CARE	14 24.1%	5 7.5%	17 28.8%	6 27.3%
STOP DRIVING		3 4.5%	3 5.1%	2 9.1%
GRATITUDE	3 5.2%	3 4.5%	5 8.5%	1 4.5%
RELIEF	8 13.8%	9 13.4%	8 13.5%	1 4.5%
OTHER	4 6.9%	7 10.4%	2 3.4%	

A variety of reactions usually experienced after a 'near miss' when driving were reported by this sample of drivers. The main reaction felt by the 4 groups of drivers following such an experience was physiological (e.g. rapid heart beat and breathing, sweating, shakiness etc.), followed by the resolution to take extra care not to repeat such an incident, however long that resolution might last, and that the 'near miss' was an education in that the driver learned something from it.

Other reactions reported were emotional ones (e.g. swearing), relief and gratitude after the experience of a 'near miss' when driving.

33) Any other comments:

MAF Group

For any other comments this group of MAF drivers indicated that a driving licence re-test, e.g. every 5 years, might help to prevent accidents and improve driving standards coupled with adequate professional training and instruction; and a more comprehensive driving test including night driving, for example, and driving under conditions of poor visibility. This group of MAF driver subjects was generally in favour of compulsory defensive driving courses, higher age limit for gaining a driving licence, harder and higher penalties for road offences.

The 'always in a hurry' syndrome was stated as being a cause of accidents. Female drivers were thought to be as good as, if not better than, male drivers but the former tend to panic more often in a difficult driving situation.

Another idea put forward by this group was that an assessment of driver aptitude and personality prior to gaining a driving licence might be implemented.

This group of MAF drivers considered that traffic officers' time was often not used to the best advantage as, for example, concentrating on speeding and neglecting other types of road offence.

MA Group

Comments from this group of MA drivers suggested that re-testing of the driving licence every 5 years, if only for the road code, might be advisable and that the driving licence age should be raised to at least 18. Standard driving tuition does not cater for driving in tricky situations such as skids and the driving test should be more comprehensive in an effort to teach better car control.

'Prevention is better than cure' was suggested adding that a driver needs to know the basic skills of defensive driving, that there should be compulsory attendance at such courses as well as driver education with campaigns against drinking and driving. Penalties should be stiffer, for example, for drinking and driving offences with automatic disqualification for committing the same and that there should be more control of the drinking driver.

Traffic officers were criticised, for example, for seemingly turning a blind eye on commercial trucks. Another comment made was that traffic officers should have mufti cars and that other cars should be brightly coloured.

Male and female drivers were thought to be of equal driving ability. A further idea concerning driving put forward by this group of MA drivers was that there should be some provision for high speed where people could enjoy the thrills of speed in relative safety. The concept of a human/machine interaction and good driving was mentioned by this group.

FAF Group

Comments from this group of FAF drivers indicated that there should be a driving licence re-test, for example, every 2 or 3 years, even if only for the theory of the road code and a defensive driving course to improve driving skills. A more rigorous driving test, especially for elderly people, for a licence to drive was recommended as well as more research on people going for driving tests as some people are irresponsible. The driving age of 15 was thought to be too low, there should be more driver education and fewer cars on the road.

This group of FAF drivers thought that there should be more control of young cyclists and children on the road and stiffer penalties for road traffic offences.

The view was expressed that traffic officers often only seem to apprehend minor offenders. Alcohol was mentioned by the group as being a major contributing factor in road accidents.

It was thought that men often put women drivers in their place and that generally female drivers are more nervous but more courteous than male drivers. The attitude that drivers have more responsibilities than rights was highlighted.

FA Group

The idea of a driving licence re-test every 5 to 10 years as a refresher type of course was mentioned by this group of FA drivers and the fact that there should be more driver education especially, for example, in defensive driver skills. The New Zealand Road Code was thought to be much too complicated with too much stress being put on memorizing it.

It was suggested by this group that the driving age should be raised together with the introduction of a provisional driving licence scheme. Penalties should be stiffer for drinking and driving offences.

Consideration on the road and for others might make it a safer place to be. Male drivers were thought to take more risks than female drivers who tend to be more patient usually and more law abiding.

33) Any other comments - Summary paragraph for the total driver groups:

Some interesting comments were made by this group of driver subjects concerning, for example, the causes and prevention of road accidents, male and female drivers etc.

What seems to emerge from these comments, taking an overall view, is that there should be a periodic driving licence re-testing scheme, a compulsory driving course for all those individuals who have a driving licence or who intend to gain one and that the minimum driving age should be raised from 15 to at least 18 years of age.

More severe penalties for road offences, especially for drinking and driving, were thought to be more than warranted. Opinion varied concerning male and female drivers with the balance coming out in favour of the latter group with the view that, in most situations, they are as good as males as regards driving.

The statement made concerning the attitude that 'drivers have more responsibilities than rights' bears a ring of truth about it and if such an attitude could be effected on a widespread scale the highway might become a safer place to be with a resultant reduction in the road toll.

Biographic Questionnaire, Part II - Summary Table:

A summary table follows of the significant chi square results, based on actual frequencies, found for Part II of the Biographic Questionnaire:-

• = Direction of significant difference

1) Member of the Automobile Association (AA) or similar motoring organisation:

•MAF and FAF	$\chi^2_c = 3.888$	p = .05	s

3) Average number of years driving licence held:

MAF and •FAF	$\chi^2_c = 16.3$	p = $<$.001	s
•MA and FA	$\chi^2_c = 25.76$	p = $<$.001	s

7) Conviction for driving offence:

MAF and •MA	$\chi^2_c = 3.85$	p = .05	s
•A(M+F) and AF(M+F)	$\chi^2_c = 7.661$	p = $<$.01	s
•M(A+AF) and F(A+AF)	$\chi^2_c = 5.669$	p = $<$.02	s

8) Number of driving offences:

•MAF and FAF	$\chi^2_c = 5.34$	p = $<$.05	s
•MA and FA	$\chi^2_c = 5.2$	p = $<$.05	s
•M(A+AF) and F(A+AF)	$\chi^2_c = 5.12$	p = $<$.05	s

15i) Enjoyment of driving:

•MA and FA	$\chi^2 = 7.213$	p = $<$.05	s

15ii) Enjoyment of the thrills and risks of modern driving:

•M(A+AF) and F(A+AF)	$\chi^2 = 17.133$	p = $<$.001	s

20) Preference of having company when driving:

•M(A+AF) and F(A+AF)	$\chi^2 = 9.804$	p = $>$.02	s

24) Self-rating of driving standard:

•M(A+AF) and F(A+AF)	$\chi^2 = 11.109$	p = $<$.01	s

31) Self-estimation of judgement in the driving situation:

•MA and FA	$\chi^2 = 10.966$	p = $<$.001	s

Biographic Questionnaire, Part I (P.58):

Sex of driver:

MA : FA $\chi_c^2 = 21.75$ $p = < .001$ s

CHAPTER XIX

NSQ, Parry's AG/AN Scale and Semantic Differential

Results are now presented for the following measures (See Section on Measuring Instruments P. 75):-

NSQ

Parry's AG/AN Scale

Semantic Differential

For the analysis of these measures inferential statistics were used. The criterion level of significance is taken as being p = .05 although as Wallach and Kogan (1965) state, in an exploratory investigation such as one of this kind, factors at p =.10 level of significance are worthwhile studying again.

Wallach and Kogan (1965) deem it advisable in an exploratory study such as this to increase somewhat the probability of a Type I error, that is rejecting the null hypothesis or H_o when it is true and to reduce somewhat the probability of a Type II error, that is accepting the null hypothesis or H_o when it is in fact false. They suggest raising p or probability to the .10 level. This would mean that hypotheses rejected at the .05 level, yet with p at less than or equal to .10 ($p \leq .10$) could be explored again (See Section 4 on Treatment of Results, P. 88).

t tests (See Section 4 on Treatment of Results, P. 88) were used to test the significance of difference between mean scores obtained for these measuring instruments using the following scheme of group combinations:

1) M(A+AF) and F(A+AF)
2) MAF and FAF
3) MAF and MA
4) FAF and FA
5) MA and FA
6) AF(M+F) and A(M+F)

This makes a total of 6 driver group combinations based on sex of driver and accident category. Using this combination of groups, t tests were carried out and significant results found are shown in each data table for the NSQ and Parry AG/AN variables (Table II - VII P. 155- 164) and Semantic Differential (Table IX - XIV, P. 178 - 183).

Calculations have been made using as the base figure the number of driver subjects actually responding to the particular item. The number responding is shown in the data tables as in some instances this varies. For example, three driver subjects of the MA group (No = 67) did not complete the NSQ making a total of 64 who did as a basis for calculation.

NSQ and Parry's AG/AN Scale:

In Tables I - VII (P. 155 - P. 164) data is given for the NSQ and Parry AG (Aggression)/AN (Anxiety) Scale being a total of 7 variables.

The data shown in these tables is based on raw scores. The following symbols and abbreviations (See Results, P. 104, for explanation of abbreviated terms used for driver groups) are used in the data tables for NSQ and Parry AG/AN variables:

n = number
$\bar{X}$ = Mean Score
s = Standard deviation
t = t score
p = probability
s = Significant
ns = Not Significant
$<$ = Less Than
$>$ = Greater Than
• = Direction of Difference
NSQ Total = Total NSQ Score - Composite score of all scale components
NSQ I = Sensitive - Tough Component
NSQ F = Depressed - Cheerful Component
NSQ E = Submissive- Dominance Component
NSQ An = Anxious - Not Anxious Component

Parry AG/AN Scale = Parry's Aggression/Anxiety Scale

Table I - Gives the mean and standard deviation for the 7 variables of the NSQ and Parry AG/AN Scale of the 4 groups of driver subjects.

Table Ia- Shows mean and standard deviation for these 7 variables of the NSQ and Parry AG/AN Scale for a combination of driver groups i.e.

M(A+AF)
F(A+AF)

A(M+F)
AF(M+F)

Profile I (P. 156) - This is a profile of 6 variables of the NSQ and Parry AG/AN Scale (excluding total NSQ score) based on mean score. Variations and similarities for this sample of 4 driver groups can be seen in this profile.

resentation of Tables I - VII (P.155-164) and Profile I
or the NSQ and Parry AG/AN Scale now follows.

NSQ and Parry's AG/AN Scale Variables:

ean Score and Standard Deviation of Each Variable

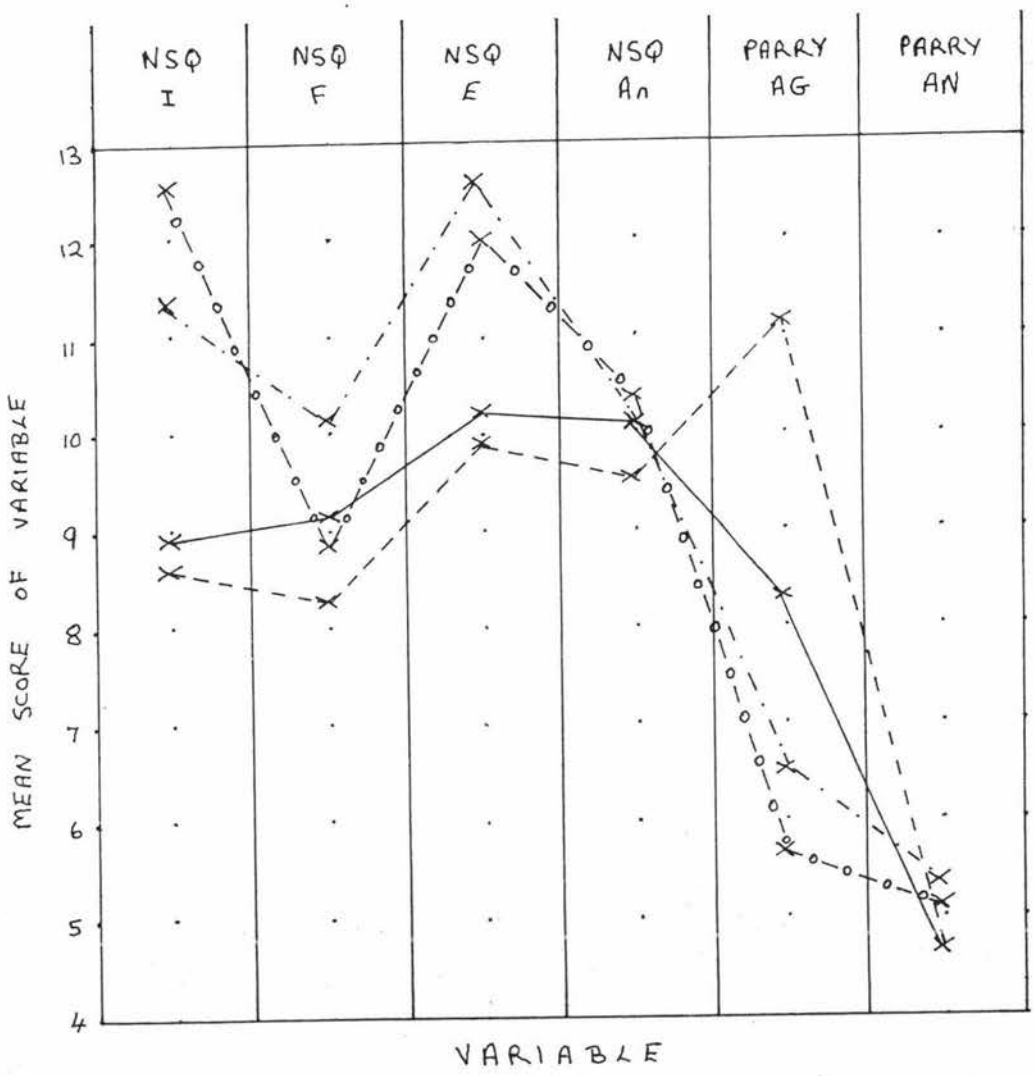
Q AL	NSQ I	NSQ F	NSQ E	NSQ An	Parry AG	Parry AN
57	57	57	57	57	58	58
38.56	8.96	9.21	10.26	10.12	8.38	4.74
8.38	3.17	3.77	3.37	3.84	4.12	2.28
4	64	64	64	64	67	67
.64	8.67	8.31	9.94	9.58	11.13	4.76
.46	3.04	3.57	3.39	3.47	4.50	2.57
	22	22	22	22	22	22
	12.64	8.91	12.0	10.36	5.77	5.18
	1.47	3.96	4.23	3.96	3.26	2.77
	58	58	58	58	59	59
41	11.31	10.14	12.57	9.59	6.53	5.39
.75	2.73	3.63	3.47	3.51	3.09	2.79

- Gives the mean score and standard deviation for the 7
variables of the NSQ and Parry AG/AN Scale for the MAF,
d FAF driver groups. The number of driver subjects responding
riable is also given and this is used as the base figure for
ns.

Profile 1 - Profile based on mean scores of 6 variables of the NSQ and Parry's AG/AN Scale (excluding total NSQ mean score) for the following 4 driver groups:

——— = MAF (n = 58) —·—· = FAF (n = 59)

— — — = MA (n = 67) —o—o = FA (n = 22)



Profile 1 - Differences can be seen for the profiles of personality characteristics for the above 4 driver groups for the mean scores of the NSQ and Parry's AG/AN Scale variables, excluding the NSQ total mean score, shown in Table 1 (P. 155).

The FA and FAF driver groups show similar profiles of personality characteristics as do also the MA and MAF driver groups. These 4 groups of drivers share a common meeting point for the NSQ and Parry's AN variables.

Table Ia - NSQ and Parry's AG/AN Scale Variables:
Mean Score and Standard Deviation of Each Variable

		NSQ TOTAL	NSQ I	NSQ F	NSQ E	NSQ An	PARRY AG	PARRY AN
M(A+AF)	n	121	121	121	121	121	125	125
	$\bar{X}$	37.55	8.81	8.74	10.09	9.85	9.86	4.75
	s	7.93	3.4	3.68	3.37	3.64	4.52	2.43
F(A+AF)	n	80	80	80	80	80	81	81
	$\bar{X}$	43.25	11.68	9.8	12.41	9.8	6.32	5.33
	s	8.2	2.51	3.74	3.68	3.63	3.13	2.81
A(M+F)	n	86	86	86	86	86	89	89
	$\bar{X}$	38.3	9.69	8.47	10.47	9.78	9.81	2.61
	s	8.52	3.23	3.66	3.71	3.59	4.81	4.87
AF(M+F)	n	115	115	115	115	115	117	117
	$\bar{X}$	41.0	10.15	9.68	11.43	9.85	7.44	5.07
	s	8.36	3.17	3.71	3.60	3.67	3.73	2.59

Table Ia - This table gives the mean score and standard deviation for the 7 variables of the NSQ and Parry AG/AN Scale for the M(A+AF), F(A+AF), A(M+F) and AF(M+F) driver groups. The number of driver subjects responding to each variable is also given and this is used as the base figure for calculations.

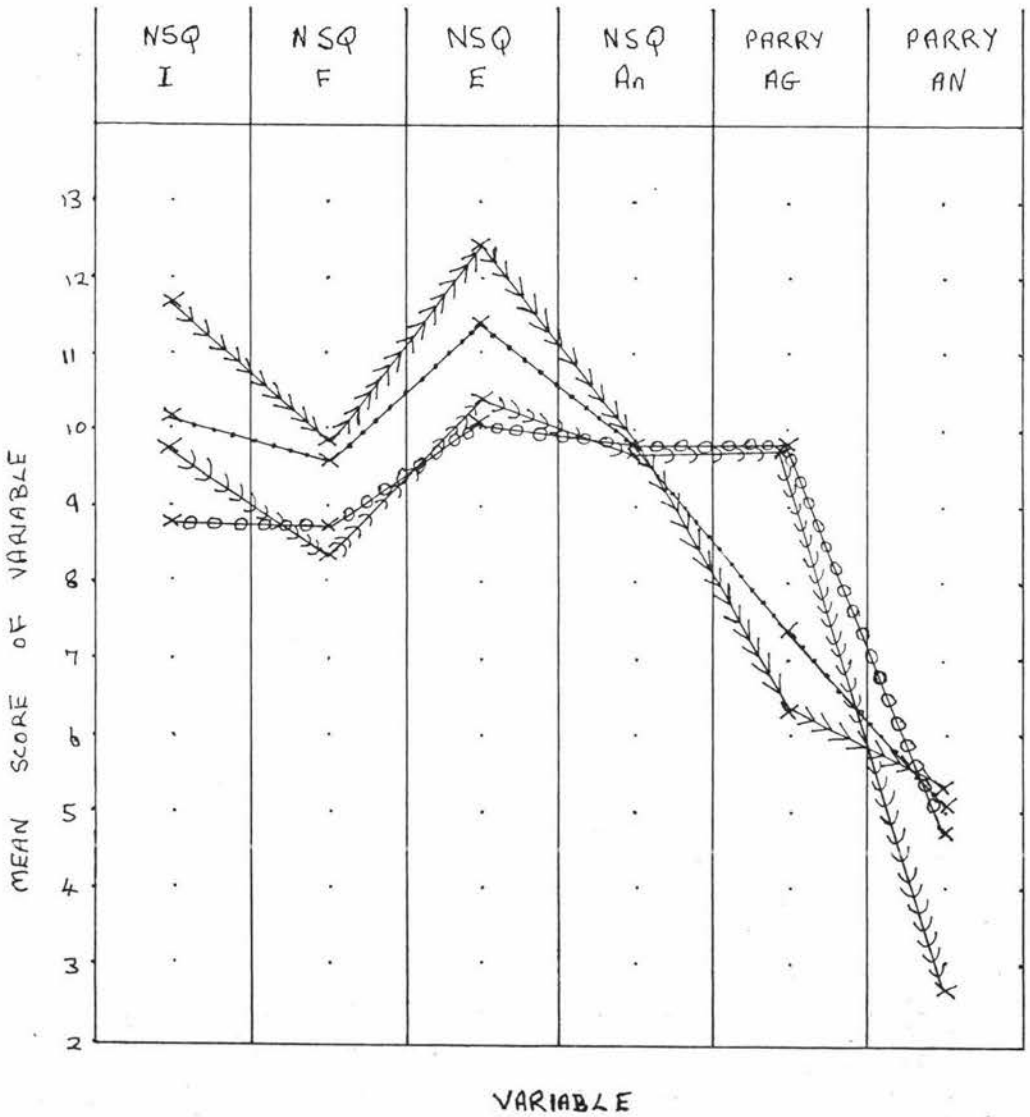
Profile Ia - Profile based on mean scores of 6 variables of the NSQ and Parry's AG/AN Scale (excluding total NSQ mean score) for the following 4 driver groups:

= F(A+AF) (n = 81)

= A(M+F) (n = 89)

= M(A+AF) (n = 125)

= AF(M+F)(n = 117)



Profile Ia - The F(A+AF) and AF(M+F) driver groups have a similar profile of personality characteristics as do also the M(A+AF) and A(M+F) driver groups with a common meeting point at the NSQ An variable and Parry's AN Scale variable except for the A(M+F) driver group.

The NSQ total mean score can be seen in Table Ia (P. 157).

Table II - NSQ and Parry's AG/AN Scale Variables:
MAF and MA Driver Groups

		NSQ TOTAL	NSQ I	NSQ F	NSQ E	NSQ An	PARRY AG	PARRY AN
MAF	n	57	57	57	57	57	58	58
	$\bar{X}$	38.56	8.96	9.21	10.26	10.12	8.38	4.74
	s	8.38	3.17	3.77	3.37	4.28	4.12	2.28
MA	n	64	64	64	64	64	67	67
	$\bar{X}$	36.64	8.67	8.31	9.94	9.58	11.13	4.76
	s	7.46	3.04	3.57	3.39	3.47	4.50	2.57
	t	1.33		1.34			3.55	
	p	$<.10$		$<.10$			$<.001$	
SIGNIFICANCE		ns	ns	ns	ns	ns	s	ns

A significant difference was found between the mean scores of Parry's AG Scale variable for the MAF and MA driver groups as follows:-

Parry AG MA/MAF $t = 3.55$ $p = <.001$ s

Table III - NSQ and Parry's AG/AN Scale Variables:
FAF and FA Driver Groups

		NSQ TOTAL	NSQ I	NSQ F	NSQ E	NSQ An	PARRY AG	PARRY AN
FAF	n	58	58	58	58	58	59	59
	$\bar{X}$	43.41	11.31	10.14	12.57	9.59	6.53	5.39
	s	7.75	2.73	3.63	3.47	3.51	3.09	2.79
FA	n	22	22	22	22	22	22	22
	$\bar{X}$	43.65	12.64	8.91	12.0	10.36	5.77	5.18
	s	9.50	1.47	3.96	4.23	3.96	3.26	2.77
	t		2.01	1.32				
	p		$<.05$	$<.10$				
SIGNIFICANCE		ns	s	ns	ns	ns	ns	ns

For the NSQ I (Sensitivity-Tough Component) a significant difference was found between the mean scores of the FAF and FA driver groups as follows:-

NSQ I FA/FAF t = 2.01 p = $<.05$ s

Table IV - NSQ and Parry's AG/AN Scale Variables: MAF and FAF Driver Groups

	NSQ TOTAL	NSQ I	NSQ F	NSQ E	NSQ An	PARRY AG	PARRY AN
MAF n	57	57	57	57	57	58	58
$\bar{X}$	38.56	8.96	9.21	10.26	10.12	8.38	4.74
s	8.38	3.17	3.77	3.37	4.28	4.12	2.28
FAF n	58	58	58	58	58	59	59
$\bar{X}$	43.41	11.31	10.14	12.57	9.59	6.53	5.39
s	7.75	2.73	3.63	3.47	3.51	3.09	2.79
t	3.22	4.25		3.61		3.17	
p	$<.001$	$<.001$		$<.001$		$<.001$	
SIGNIFICANCE	s	s	ns	s	ns	s	ns

Using t tests to test for the significance of difference between mean scores of the variables, 4 differences between the MAF and FAF driver groups as follows:-

NSQ Total (Composite Anxiety Score) MAF/FAF $t = 3.22$ $p = <.001$ s

NSQ I (Sensitive-Tough Component) MAF/FAF $t = 4.25$ $p = <.001$ s

NSQ E (Submission-Dominance Component) MAF/FAF $t = 3.61$ $p = <.001$ s

Parry AG (Aggression Variable) MAF/FAF $t = 3.17$ $p = <.001$ s

Table V - NSQ and Parry's AG/AN Scale Variables:
MA and FA Driver Groups

	NSQ TOTAL	NSQ I	NSQ F	NSQ E	NSQ An	PARRY AG	PARRY AN
MA n	64	64	64	64	64	67	67
$\bar{X}$	36.64	8.67	8.31	9.94	9.58	11.13	4.76
s	7.46	3.04	3.57	3.39	3.47	4.50	2.57
FA n	22	22	22	22	22	22	22
$\bar{X}$	43.45	12.64	8.91	12.0	10.36	5.77	5.18
s	9.50	1.47	3.96	4.23	3.96	3.26	2.77
t	6.94	7.47		2.76		5.16	
p	$<.001$	$<.001$		$>.01$		$<.001$	
SIGNIFICANCE	s	s	ns	s	ns	s	ns

Significanct differences, using t tests, were found between the mean scores of 4 variables for the MA and FA driver groups as follows:

NSQ Total (Composite Anxiety Score) MA/FA $t = 6.94$ $p = <.001$ s

NSQ I (Sensitive-Tough Component) MA/FA $t = 7.47$ $p = <.001$ s

NSQ E (Submission-Dominance Component) MA/FA $t = 2.76$ $p = >.01$ s

Parry AG (Aggression Variable) MA/FA $t = 5.16$ $p = <.001$ s

Table VI - NSQ and Parry's AG/AN Scale Variables:
M(A+AF) and F(A+AF) Driver Groups

	NSQ TOTAL	NSQ I	NSQ F	NSQ E	NSQ An	PARRY AG	PARRY AN
M(A+AF) n	121	121	121	121	121	125	125
$\bar{X}$	37.55	8.81	8.74	10.09	9.85	9.86	4.75
s	7.93	3.1	3.68	3.37	3.64	4.52	2.43
F(A+AF) n	80	80	80	80	80	81	81
$\bar{X}$	43.25	11.68	9.8	12.41	9.8	6.32	5.33
s	8.2	2.51	3.74	3.68	3.63	3.13	2.81
t	1.95	16.66	1.99	4.60	.067	6.14	1.57
p	$>.05$	$<.001$	$<.05$	$<.001$	$>.20$	$<.001$	$>.10$
SIGNIFICANCE	ns	s	s	s	ns	s	ns

Combining male (A+AF) and female (A+AF) groups of drivers 4 significant differences were found between the mean scores of the following variables:-

NSQ I (Sensitive-Tough Component)
M(A+AF)/F(A+AF) $t = 16.66$ $p = <.001$ s

NSQ F (Depressed-Cheerful Component)
M(A+AF)/F(A+AF) $t = 1.99$ $p = <.05$ s

NSQ E (Submission-Dominance Component)
M(A+AF)/F(A+AF) $t = 4.60$ $p = <.001$ s

Parry AG(Aggression Variable)
M(A+AF)/F(A+AF) $t = 6.14$ $p = <.001$ s

Table VII - NSQ and Parry's AG/AN Scale Variables: A(M+F) and AF(M+F) Driver Groups

		NSQ TOTAL	NSQ I	NSQ F	NSQ E	NSQ An	PARRY AG	PARRY AN
A(M+F)	n	86	86	86	86	86	89	89
	$\bar{X}$	38.3	9.69	8.47	10.47	9.78	9.81	2.61
	s	8.52	3.23	3.66	3.71	3.59	4.81	4.87
AF(M+F)	n	115	115	115	115	115	117	117
	$\bar{X}$	41.0	10.15	9.68	11.43	9.85	7.44	5.07
	s	8.36	3.17	3.71	3.6	3.67	3.73	2.59
	t	2.20	1.02	2.31	1.85	.141	3.98	.56
	p	$>.02$	$>.20$	$>.02$	$<.10$	$>.20$	$<.001$	$>.20$
SIGNIFICANCE		s	ns	s	ns	ns	s	ns

Driver groups were combined according to accident category and three significant differences, using t tests, were found between mean scores of the following variables:-

NSQ Total (Composite Anxiety Score)
A(M+F)/AF(M+F) $t = 2.20$ $p = >.02$ s

NSQ F (Depressed-Cheerful Component)
A(M+F)/AF(M+F) $t = 2.31$ $p = >.02$ s

Parry AG (Aggression Variable)
A(M+F)/AF(M+F) $t = 3.98$ $p = <.001$ s

NSQ and Parry's AG/AN Scale Variables:

For the 7 variables of the NSQ and Parry's AG/AN Scale variables mean scores and standard deviations are shown in Table 1 (P. 155) and Ia (P. 157). Profile I (P. 156) and Ia (P. 158) based on mean scores graphically depict the profiles of personality characteristics for each of the driver groups. Appendix B (P. 286) shows the distribution graphs of scores for each of these 7 variables for the MAF, MA, FAF and FA driver groups.

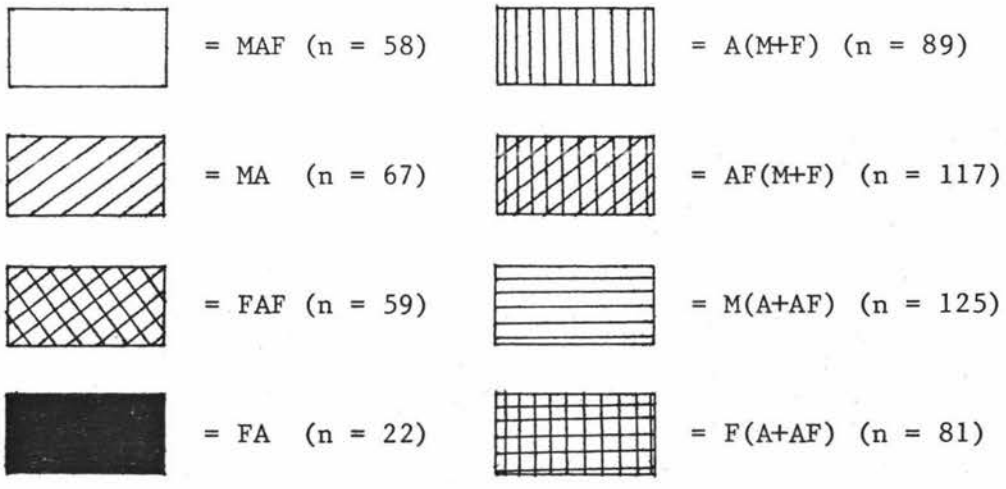
Using 6 driver group combinations for the purposes of comparison based on sex of driver and accident category, significant differences, using t tests, were found between the mean scores of several variables.

No significant differences were found between the mean scores of the NSQ An and Parry's AN variables. Parry's AG (Aggression) variable is found to differ significantly between 5 groups of drivers followed respectively by the NSQ I, occasionally called the feminity versus masculinity dimension, NSQ E, NSQ Total and NSQ F variables.

A summary table follows giving the significant differences found between mean scores of variables for driver groups with a bar graph to show the differences graphically. Following this summary table a pen picture is drawn of the characteristics typically found in a driver of each group or groups.

Summary Table - NSQ and Parry AG/AN Scale Variables:
Significant Differences of Mean Scores of Variables

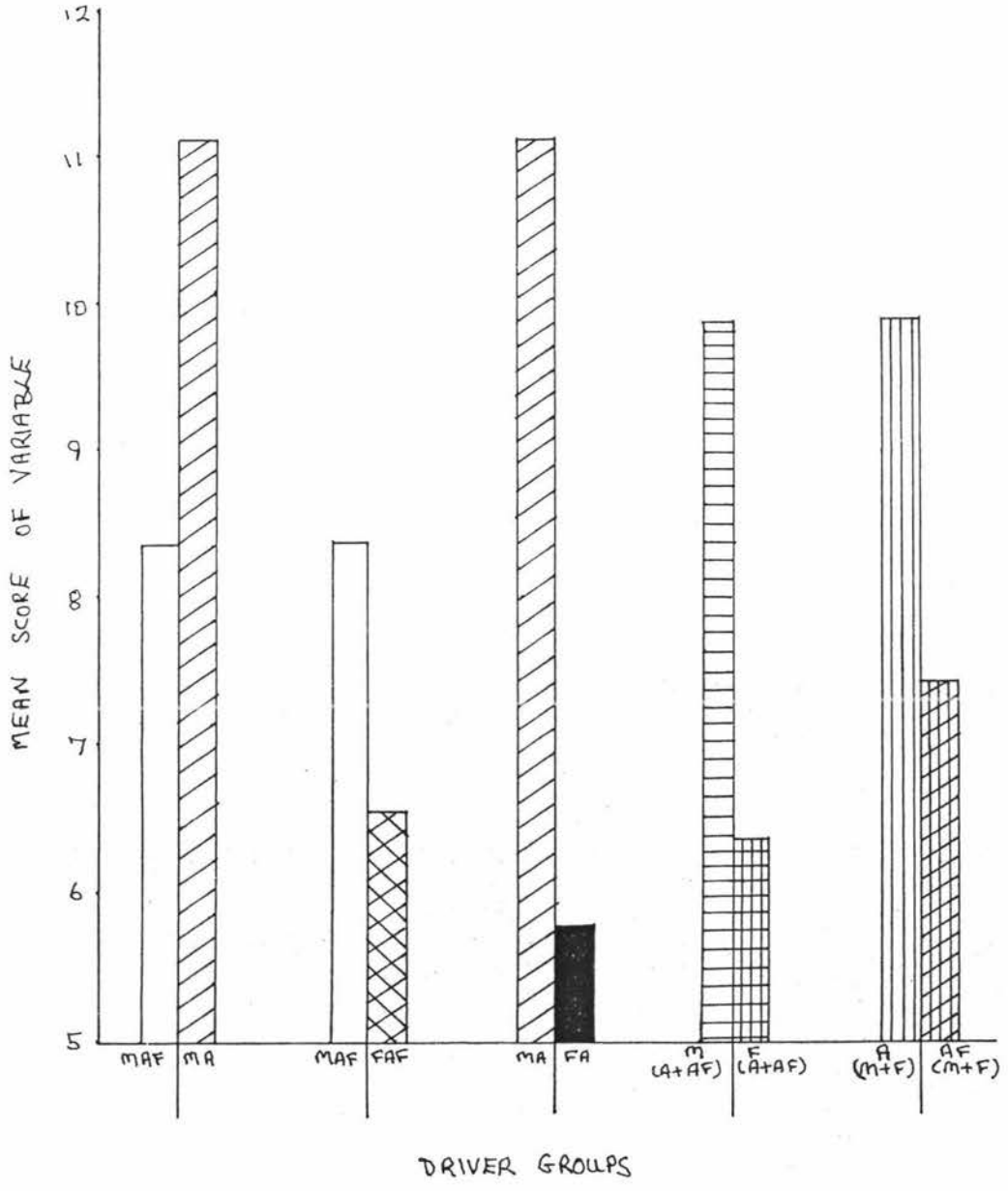
Group identifications used in the bar graphs of the summary table for variables found to differ significantly are as follows:-



1) Parry's AG (Aggression) Variable:

Table II	MAF and $\dot{M}A$	t = 3.55	p = $<$ .001 s
Table IV	$\dot{M}AF$ and FAF	t = 3.17	p = $<$ .001 s
Table V	$\dot{M}A$ and FA	t = 5.16	p = $<$ .001 s
Table VI	$\dot{M}$(A+AF) and F(A+AF)	t = 6.14	p = $<$ .001 s
Table VII	$\dot{A}$(M+F) and AF(M+F)	t = 3.98	p = $<$ .001 s

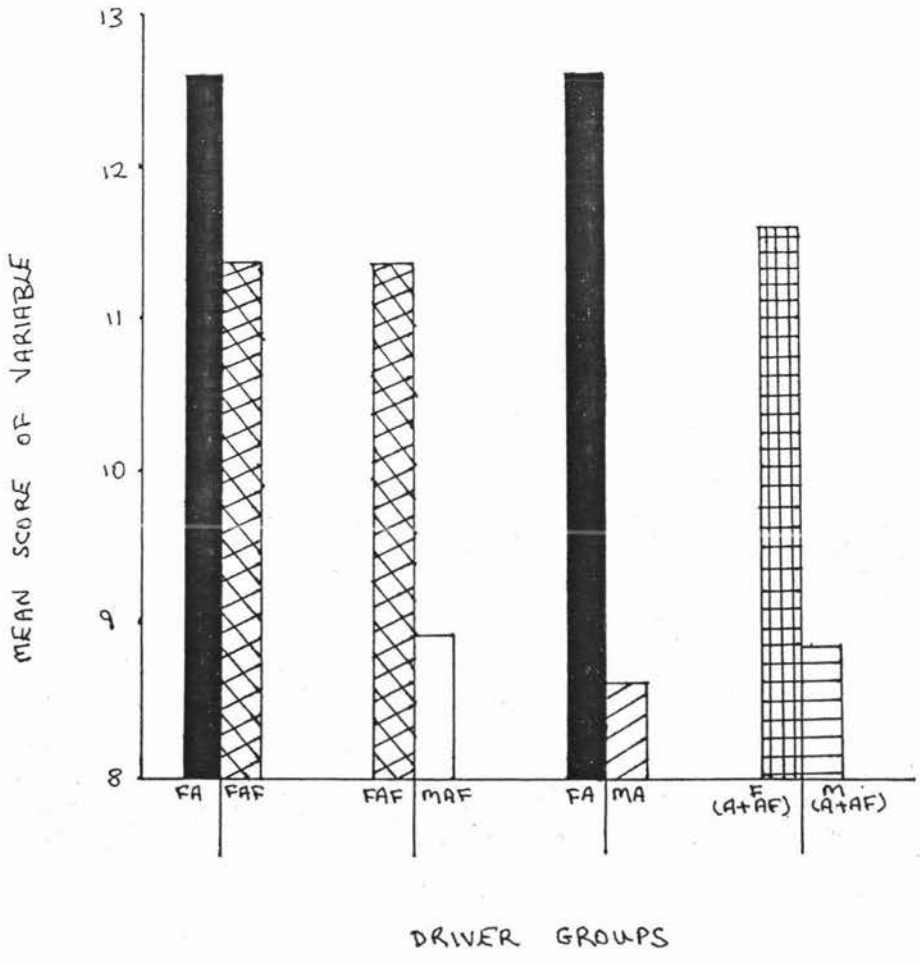
Graph i - Bar Graph to Show the Significant Differences of Mean Scores for Parry's AG Variable



2) NSQ I (Sensitive-Tough Component)

Table III	FAF and FA	t = 2.01	p = $<$.05 s
Table IV	MAF and FAF	t = 4.25	p = $<$.001 s
Table V	MA and FA	t = 7.47	p = $<$.001 s
Table VI	M(A+AF) and F(A+AF)	t =16.66	p = $<$.001 s

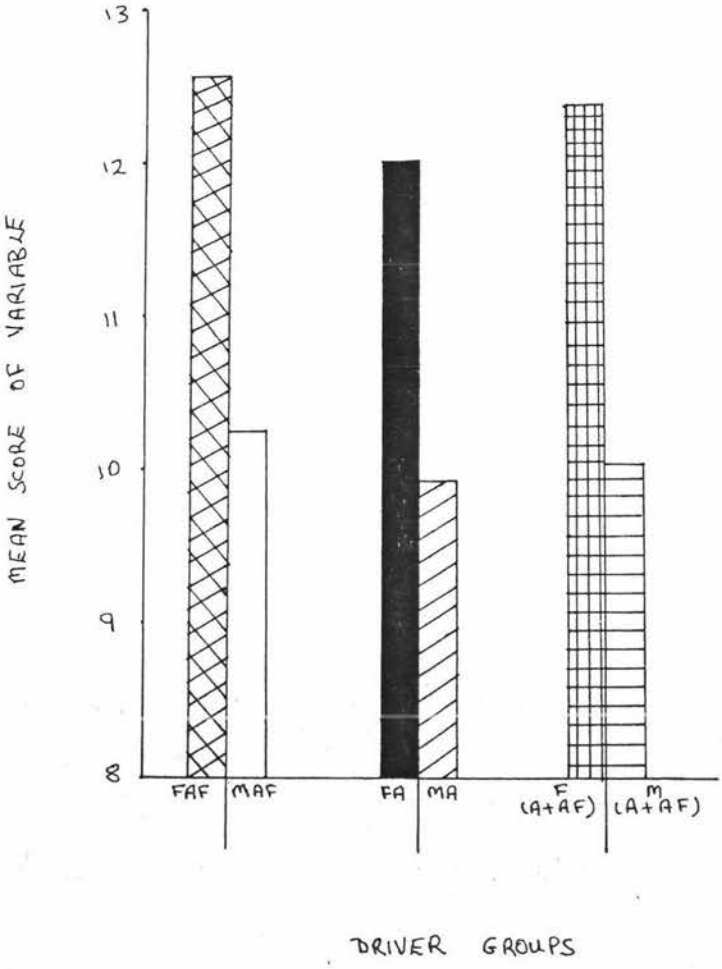
Graph ii - Bar Graph Showing the Significant Differences of Mean Scores for the NSQ I Component



3) NSQ E (Submission-Dominance Component)

Table IV	MAF and FAF	$t = 3.61$	$p = < .001$ s
Table V	MA and FA	$t = 2.76$	$p = < .001$ s
Table VI	M(A+AF) and F(A+AF)	$t = 4.60$	$p = < .001$ s

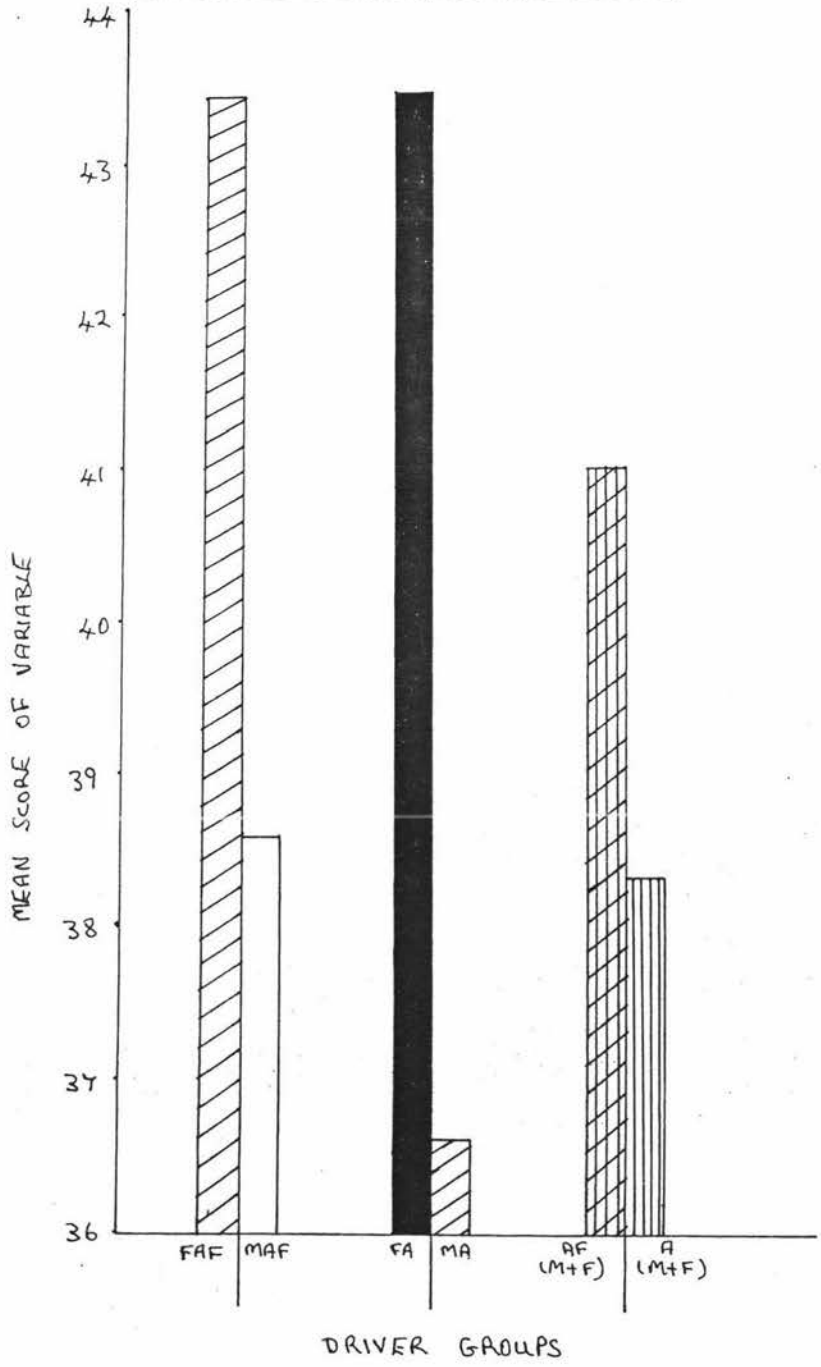
Graph iii - Bar Graph to Show the Significant Differences of Mean Scores for the NSQ E Component



4) NSQ Total (Composite Anxiety Score of NSQ Components)

Table IV	MAF and FAF	t = 3.22	p = $<$ .001	s
Table V	MA and FA	t = 6.94	p = $<$ .001	s
Table VII	A(M+F) and AF(M+F)	t = 2.20	p = $>$ .02	s

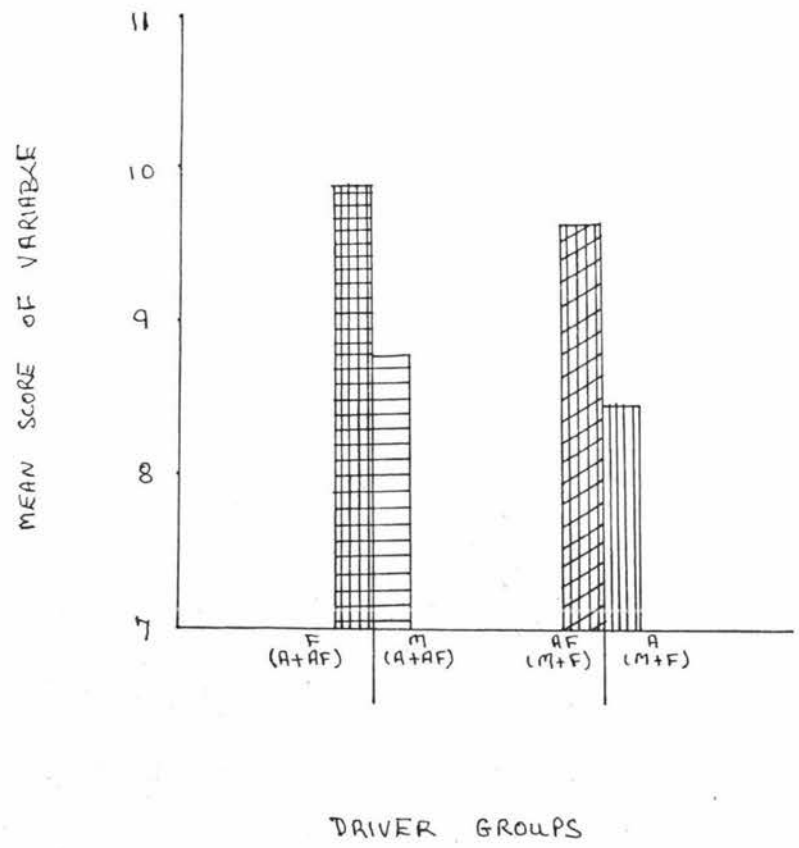
Graph iv - Bar Graph to Show the Significant Differences of Mean Scores for the NSQ Total Variable



5) NSQ F (Depressed - Cheerful Component)

Table VI	M(A+AF) and F(A+AF)	t = 1.99	p = $<$.05 s
Table VII	A(M+F) and AF(M+F)	t = 2.31	p = $>$.02 s

Graph v - Bar Graph to Show the Significant Differences of Mean Scores for the NSQ F Component



CHAPTER XX

NSQ and Parry's AG/AN Scale -

Pen Pictures of Driver Groups

Pen pictures are now drawn from data for the NSQ and Parry's AG/AN Scale variables of characteristic personality features of a typical driver from each driver group.

MAF Driver - The MAF driver is tough and hard rather than sensitive. He tends to be cheerful, rather dominant, self-assertive and aggressive. He is not a particularly anxious individual.

MA Driver - The MA driver is not very sensitive and tends to be tough responsible and a no-nonsense type of individual. He is reasonably cheerful, dominant, decisive and forceful. He is not anxious but is aggressive, belligerent and even pugnacious.

FAF Driver - The FAF driver is sensitive and tender-minded. She tends to be somewhat depressed, submissive, complaisant and dependent. She is moderately anxious and not aggressive.

FA Driver - The FA driver is fairly sensitive, cheerful and outgoing. She tends to be rather submissive and anxious although she is not dominant and aggressive.

M(A+AF) and A(M+F) Driver - The typical driver from either of these two groups tends to be tough, cheerful and dominant. Such a driver is not anxious but is rather belligerent and aggressive.

F(A+AF) and AF(M+F) - The typical driver from either of these two groups tends to be sensitive and tender-minded. Such a driver is relatively submissive and dependent. Anxiety level is not too high nor is such a driver aggressive.

These pen pictures give the characteristic tendency of a typical driver from each driver group in this sample although, of course, there will be individual variations. However, such pictures do indicate what kind of personality characteristics might be associated with a driver from a particular driver group, in this instance compiled from data obtained for the NSQ and Parry AG/AN Scale variables.

From these pen pictures it can be seen that there are differences of personality characteristics according to the sex of driver and accident category.

These pen pictures of a typical driver from a particular driver group delineate various characteristics that differ and the amount or quantity of difference is better ascertained in Tables I and Ia and in Profiles I and Ia. For example, from the description given the MA and FA driver seem similar but they do, in fact, differ, as regards the degree of the variable manifested. This can be viewed on a continuum or in a bar graph as shown in Graphs i - v. (P. 166-170). Graph i (P. 166)

shows that the MA driver group is high in aggression, followed by the M(A+AF) and MAF driver groups. Female drivers, both A and AF, are not found to be aggressive, at least in the driving situation, according to Parry's AG Scale variable.

The same applies to the other variables of the NSQ and Parry's AN Scale from which these pen pictures have been drawn up whether significant differences were found or not between mean scores, using t tests. The aim has been to portray an overall picture of the typical personality characteristics associated with a driver of a particular driver group of this sample.

What seems to occur is that male and female drivers tend to retain their respective roles in the driving situation and in fact, there may even be an accentuation of these within the relatively anonymous environment of an automobile.

Society has ready made roles and expectations taught from earliest days into which an individual is supposed to fit according to sex. As a rule, due to pressures to conform, these roles and expectations become reality. A woman's characteristic mould is to be nurturant, submissive, tender, passive, non-defensive, retiring etc., whilst a man's role is to be active, assertive, outgoing, decisive, tough, belligerent, aggressive, a provider etc. The latter qualities tend to be extraverted while the former tend to be introverted. (See Eysenck, 1964).

Such roles and the subsequent personality characteristics brought about and related to them, are frequently carried over into the driving situation. With the feeling of relative anonymity and invulnerability cloistered within an automobile and the sense of power behind the wheel, behaviour otherwise not permissible or possible in every day life, such as the necessity to hunt for food or defend one's territory, may come to the fore witnessed, for example, in aggressive behaviour, speed, discourtesy and inconsiderateness, and general reckless/risky manoeuvres when driving.

Many individuals may drive as they live or feel a brief respite of release from every day restrictions and pressures and drive as they would like to live especially if suppression, frustration, inferiority, lack of achievement, challenge and excitement etc., are predominant features of their life style.

In fact, for some drivers their alter ego may have an opportunity to manifest itself, an alter ego which may be far from desirable and dangerous in the driving situation as it seeks to compensate for certain deprivations of daily life.

CHAPTER XXI

Semantic Differential

The Semantic Differential technique was used to rate the driver subjects' self-concept as a driver on 3 semantic factors of E(Evaluation), A(Activity) and P(Potency). Where appropriate, t tests were used to test the significance of difference between mean scores obtained on the 3 semantic factors of this measure. The following group combinations were used for this purpose as follows:-

1) M(A+AF) and F(A+AF)
2) MAF and FAF
3) MAF and MA
4) FAF and FA
5) MA and FA
6) AF(M+F) and A(M+F)

This makes a total of 6 driver group combinations based on sex of driver and accident category. Using this combination of driver groups t testswere carried out and significant results found are shown in data tables IX - XIV. (P. 178 -183).

In Tables VIII - XIV (P. 174-183) data is given for the semantic differential and this is based on raw scores. The following symbols and abbreviations (See Results P. 104 for explanation of abbreviated terms used for driver groups) are used in the data tables for the semantic differential as follows:-

n = number
$\bar{X}$ = Mean Score
s = Standard Deviation

t = t score
p = probability
s = significant
ns = not significant
$<$ = Less than
$>$ = Greater than
• = Direction of Significant Difference

E Factor = Evaluation Factor
A Factor = Activity Factor
P Factor = Potency Factor

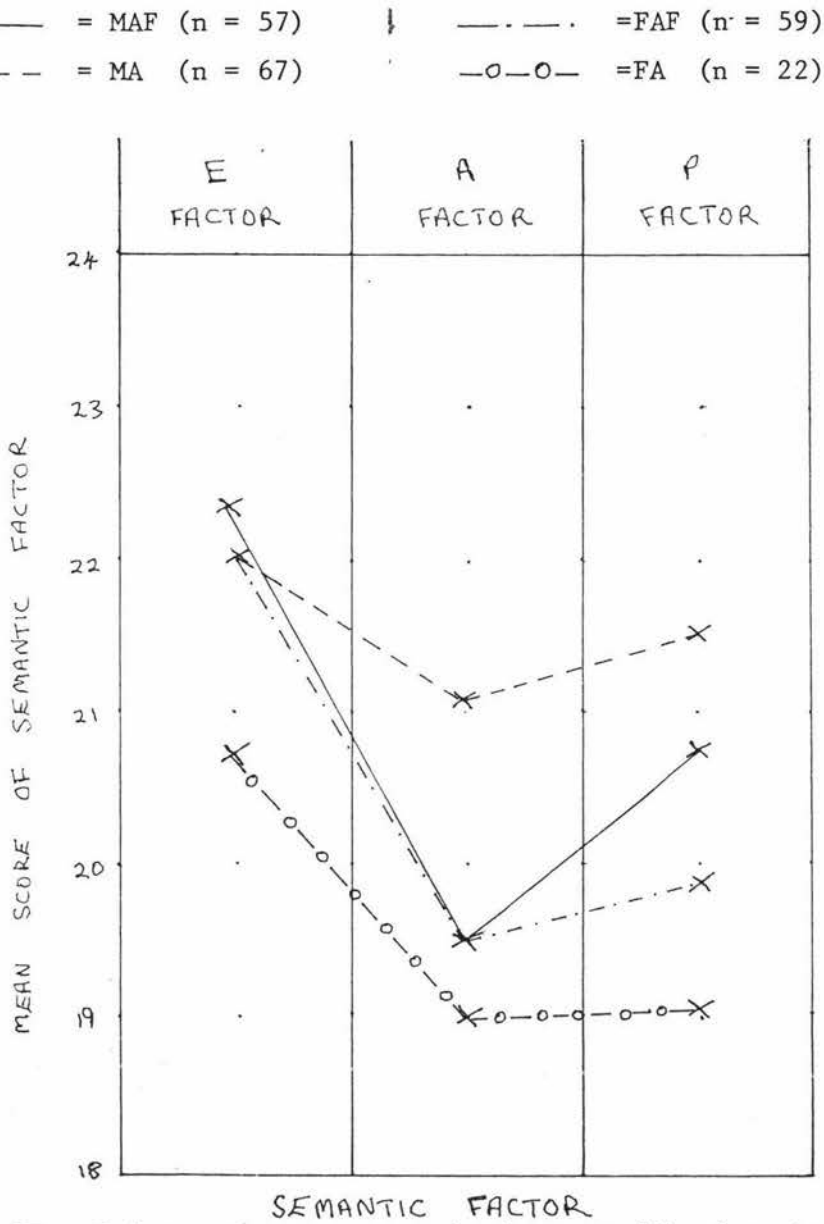
Calculations have been made using as the base figure the number of driver subjects actually responding to the particular item. The number responding is shown in the data tables as in some instances this varies. For example, one driver subject of the MAF (n = 58) did not respond to this semantic differential scale.

Table VIII - Semantic Differential:
Mean Score and Standard Deviation of Each Semantic Factor Rating Self-Concept as a Driver

		E FACTOR	A FACTOR	P FACTOR
MAF	n	57	57	57
	$\bar{X}$	22.32	19.51	20.77
	s	2.64	2.87	2.84
MA	n	67	67	67
	$\bar{X}$	22.06	21.15	21.51
	s	3.14	2.57	2.24
FA	n	22	22	22
	$\bar{X}$	20.77	19.0	19.14
	s	5.08	3.0	3.43
FAF	n	59	59	59
	$\bar{X}$	22.03	19.59	19.86
	s	3.07	2.78	3.28

Table VIII - This table gives the mean and standard deviation for 3 semantic factors of the Semantic Differential rating self-concept as a driver for the MA, MAF, FAF and FA driver groups.

Profile II - Semantic Differential Profile Based on Mean Score Rating Self-Concept as a Driver



Profile II - Using mean score as a basis a profile for the E, A and P factors of the Semantic Differential rating self-concept as a driver has been compiled for the MA, MAF, FAF and FA driver groups.

This profile shows the difference between the MA and FA driver groups on the E, A and P factors of the Semantic Differential with the MAF and FAF driver groups forming a similar profile on these 3 semantic factors when rating self-concept as a driver.

Table VIIIa - Semantic Differential
Mean Score and Standard Deviation of Each Semantic Factor Rating Self-Concept as a Driver

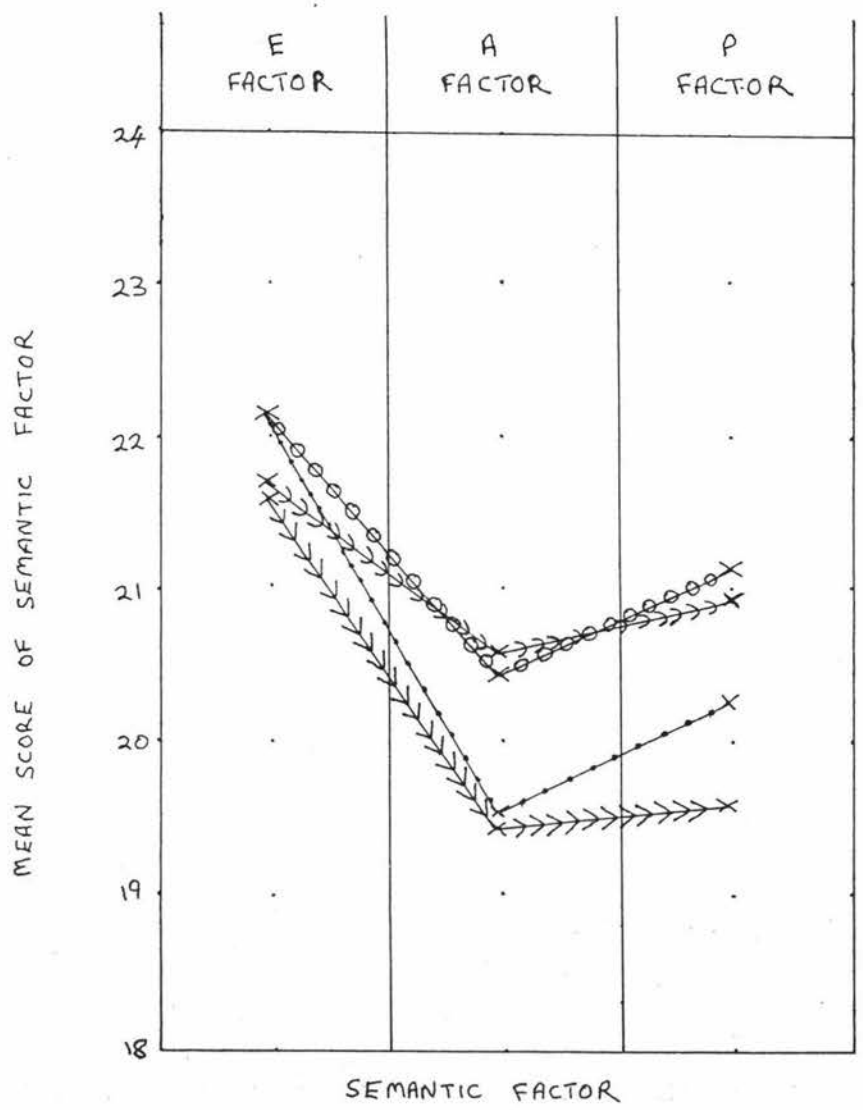
		E FACTOR	A FACTOR	P FACTOR
M(A+AF)	n	124	124	124
	$\bar{X}$	22.18	20.46	21.17
	s	2.91	2.82	2.55
F(A+AF)	n	81	81	81
	$\bar{X}$	21.69	19.43	19.67
	s	3.73	2.84	3.31
A(M+F)	n	89	89	89
	$\bar{X}$	21.74	20.62	20.92
	s	3.73	2.82	2.76
AF(M+F)	n	116	116	116
	$\bar{X}$	22.17	19.55	20.31
	s	2.86	2.81	3.09

Table VIIIa - This table gives the mean score and standard deviation for 3 semantic factors of the Semantic Differential rating self-concept as a driver for the M(A+AF), F(A+AF), A(M+F) and AF(M+F) driver groups.

Profile IIa - Semantic Differential Profile Based on Mean Score Rating Self-Concept as a Driver

F(A+AF) (n = 81) A(M+F) (n = 89)

M(A+AF) (n = 124) AF(M+F) (n = 116)



Profile IIa - Using mean score as a basis a profile for the E,A and P factors of the Semantic Differential rating self-concept as a driver has been compiled for the F(A+AF), M(A+AF), A(M+F) and AF(M+F) driver groups.

This profile outlines the similarity of male/accident and female accident free driver groups in the rating of self-concept as a driver by the semantic differential technique.

Table IX - Semantic Differential Rating Self-Concept as a Driver: MA and MAF Driver Groups

		E FACTOR	A FACTOR	P FACTOR
MAF	n	57	57	57
	$\bar{X}$	22.32	19.51	20.77
	s	2.64	2.87	2.84
MA	n	67	67	67
	$\bar{X}$	22.06	21.15	21.51
	s	3.14	2.57	2.24
	t	.485	3.36	1.61
	p	$<.20$	$<.001$	$>.10$
SIGNIFICANCE		ns	s	ns

A significant difference was found between the mean scores of the MA and MAF driver groups for the A (Activity) Factor of the Semantic Differential rating self-concept as a driver as follows:-

A Factor MA/MAF $t = 3.362$ $p = <.001$ s

Table X - Semantic Differential Rating Self-Concept as a Driver: FAF and FA Driver Groups

		E FACTOR	A FACTOR	P FACTOR
FAF	n	59	59	59
	$\bar{X}$	22.03	19.59	19.86
	s	3.07	2.78	3.28
FA	n	22	22	22
	$\bar{X}$	20.77	19.0	19.14
	s	5.08	3.0	3.43
	t	1.36	1.33	.878
	p	$<.20$	$<.20$	$>.20$
SIGNIFICANCE		ns	ns	ns

No significant differences were found between mean scores of the FAF and FA driver groups when rating self-concept as a driver by the Semantic Differential technique.

Table XI - Semantic Differential Rating Self-Concept as a Driver: MAF and FAF Driver Groups

	E FACTOR	A FACTOR	P FACTOR
MAF n	57	57	57
$\bar{X}$	22.32	19.51	20.77
s	2.64	2.87	2.84
FAF n	59	59	59
$\bar{X}$	22.03	19.59	19.86
s	3.07	2.78	3.28
t			
p			
SIGNIFICANCE	ns	ns	ns

For the MAF and FAF driver groups no significant differences were found between the mean scores obtained on the 3 factors of the Semantic Differential rating self-concept as a driver.

Table XII - Semantic Differential Rating Self-Concept as a Driver: MA and FA Driver Groups

		E FACTOR	A FACTOR	P FACTOR
MA	n	67	67	67
	$\bar{X}$	20.06	21.15	21.51
	s	3.14	2.57	2.24
FA	n	22	22	22
	$\bar{X}$	20.77	19.0	19.14
	s	5.08	3.0	3.43
	t		3.27	3.78
	p		$> .001$	$< .001$
SIGNIFICANCE		ns	s	s

Two significant differences were found between the mean scores obtained by the MA and FA driver groups on the A (Activity) and P (Potency) factors of the Semantic Differential rating self-concept as a driver as follows:-

A Factor	MA/FA	$t = 3.27$	$p = > .001$ s
P Factor	MA/FA	$t = 3.78$	$p = < .001$ s

Table XIII - Semantic Differential Rating Self-Concept as a Driver: M(A+AF)and F(A+AF) Driver Groups

		E FACTOR	A FACTOR	P FACTOR
M(A+AF)	n	124	124	124
	$\bar{X}$	22.18	20.40	21.17
	s	2.91	2.82	2.55
F(A+AF)	n	81	81	81
	$\bar{X}$	21.69	19.43	19.67
	s	3.73	2.84	3.31
	t	1.05	2.41	3.67
	p	$> .20$	$< .02$	$< .001$
SIGNIFICANCE		ns	s	s

Two significant differences were found between the mean scores obtained by the M(A+AF) and F(A+AF) driver groups on the A(Activity) and P(Potency) factors of the Semantic Differential rating self-concept as a driver as follows:-

A Factor	M(A+AF)/F(A+AF)	t = 2.41	p = $< .02$	s
P Factor	M(A+AF)/F(A+AF)	t = 3.67	p = $< .001$	s

Table XIV - Semantic Differential Rating Self-Concept: A(M+F) and AF(M+F) Driver Groups

		E FACTOR	A FACTOR	P FACTOR
A(M+F)	n	89	89	89
	$\bar{X}$	21.14	20.62	20.92
	s	3.73	2.82	2.76
AF(M+F)	n	116	116	116
	$\bar{X}$	22.17	19.55	20.31
	s	2.86	2.81	3.09
	t	.93	.19	1.46
	p	$>.20$	$>.20$	$>.20$
SIGNIFICANCE		ns	ns	ns

Applying t tests to test the significance of difference between mean scores obtained by the A(M+F) and AF(M+F) driver groups for the E, A and P factors of the Semantic Differential when rating self-concept as a driver no significant differences were found.

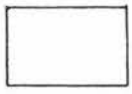
Semantic Differential

For the E,A and P Factors of the Semantic Differential mean scores and standard deviations are shown in Table VIII (P. 174) and VIIIa (P. 176). Profile II (P. 175) and IIa (P. 177) based on mean scores, graphically depict the profile of characteristics of each driver group according to the 3 factors of the Semantic Differential when rating self-concept as a driver.

No significant differences were found among the driver groups for the E (Evaluation) Factor. However, differences were found to be significant for the A(Activity) and P(Potency) Factors of the Semantic Differential. A summary table follows giving the significant differences found between mean scores of semantic factors for the driver groups with a bar graph to depict differences graphically.

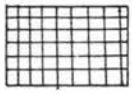
Summary Table

Group identifications used in the bar graphs of the summary table of semantic factors found to have significant differences between mean scores, applying t tests, between driver groups are as follows:-


= MAF (n = 57)


= M(A+AF) (n = 124)


= MA (n = 67)

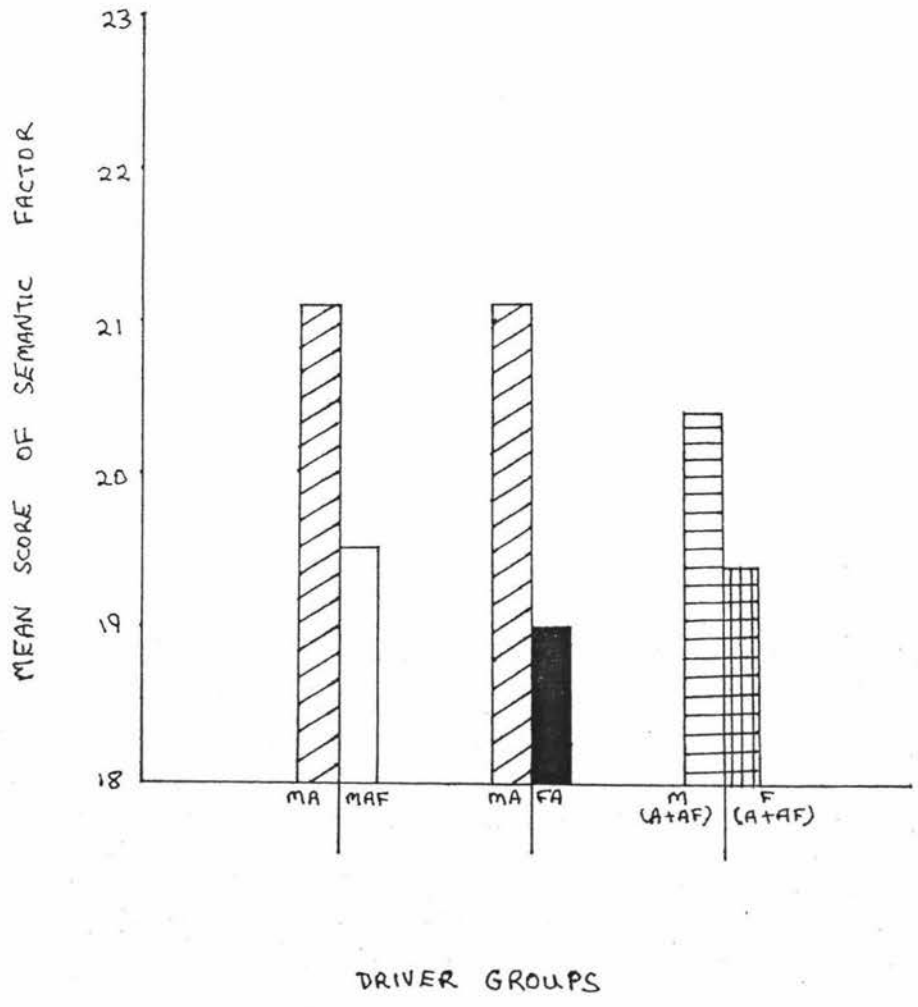

= F(A+AF) (n = 81)


= FA (n = 22)

1) Semantic Differential Rating Self-Concept as a Driver: A (Activity) Factor

Table IX	$\dot{M}A$ and MAF	$t = 3.362$	$p = < .001$	s
Table XII	$\dot{M}A$ and FA	$t = 3.27$	$p = > .001$	s
Table XIII	$\dot{M}(A+AF)$ and F(A+AF)	$t = 2.41$	$p = < .02$	s

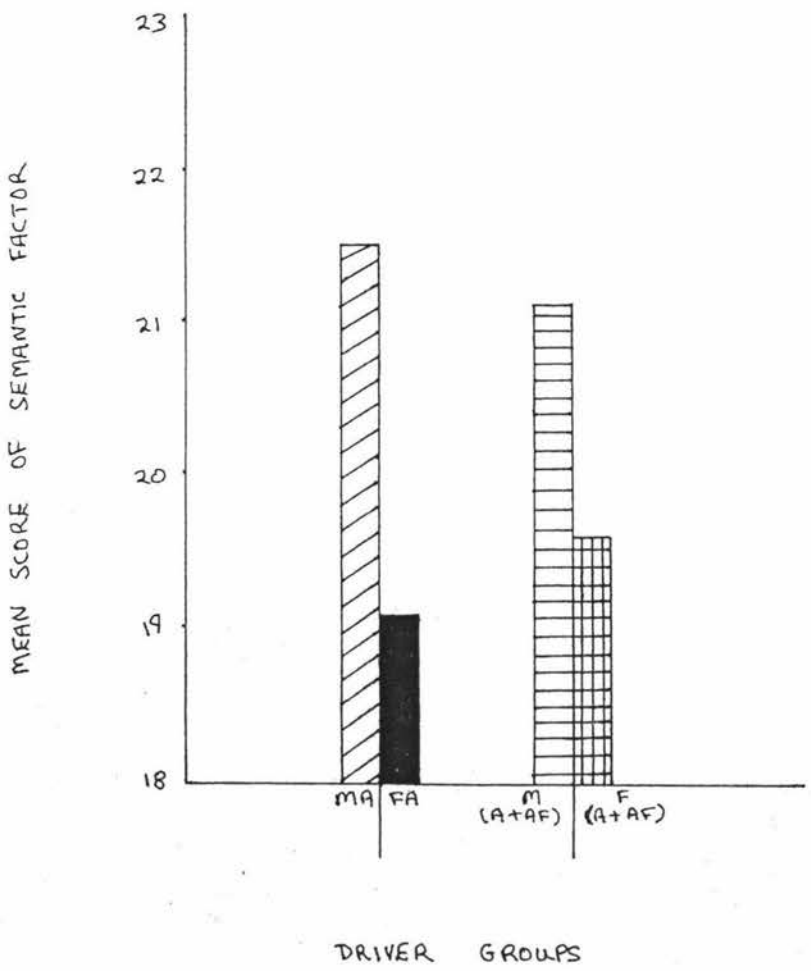
Graph vi - Bar Graph Showing Significant Differences of Mean Score Found for the A Factor of the Semantic Differential



2) Semantic Differential Rating Self-Concept as a Driver:
P (Potency) Factor

Table XII	$\dot{M}A$ and FA	t = 3.78	p = $<$.001 s
Table XIII	$\dot{M}$(A+AF) and F(A+AF)	t = 3.67	p = $<$.001 s

Graph vii - Bar Graph Showing Significant Differences of Mean Score Found for the P Factor of the Semantic Differential



Semantic Differential

In Profile II (P. 175) and Table VIII (P. 174), it can be seen that the FA group of drivers differs from the MA, MAF and FAF groups on the E (Evaluation) factor (e.g. good-bad, fair-unfair, valuable-worthless) of the Semantic Differential rating self-concept as a driver. The MA and FA group of drivers differ on the A (Activity) Factor (e.g. active-passive, fast-slow) and P (Potency) Factor (e.g. weak-strong, delicate-rugged), with the MAF and FAF driver groups forming profiles between the two accident groups.

Unlike the FA group, the MA,MAF and FAF groups display a more positive rating of themselves as drivers on the E Factor of the Semantic Differential verging towards the fair, good, valuable, pleasant end of the bipolar continuum. The FA group does not indicate such a positive self-concept as a driver on the E factor as the other three driver groups.

For the A Factor (e.g. active-passive, fast-slow) and P Factor (e.g. dull-sharp, secure-insecure) the MA and FA groups differ with the MAF and FAF driver groups holding an intermediary position between the two accident profiles.

The MA self-concept as a driver tends to be that of being active, fast, definite, hot (A Factor), rugged, sharp, secure and strong (P Factor). The FA group of drivers rating the same concept tend to show the reverse characteristics whilst the two accident free groups lie between the two accident groups for these two factors of the Semantic Differential.

In Profile IIa (P. 177) and Table VIIIa (P. 176) where the driver groups have been combined there is a less marked difference of profiles. The E Factor of the Semantic Differential is by far the strongest one and there is similarity of rating for the self-concept as a driver with driver groups tending to hold a reasonably positive concept of themselves in their capacity as drivers, judging that they are good, fair, pleasant and valuable as drivers.

However, a difference is noted for the A and P Factors. What occurs here is that there is a similarity of profile of male and accident drivers as well as for female and accident free drivers. The former demonstrate an active and potent self-concept as a driver according to the Semantic Differential whilst the latter tend to indicate a less active and potent concept in this respect.

In other words, from this data, maleness and accidentness seem to be associated as well as femaleness and accident freeness, forming two distinct sets of concept characteristics, at least in the global meaning of self-concept as a driver.

There is the indication that male and accident drivers feel that as drivers they are quick, decisive, strong, active and tough whilst female

drivers display less active and vigorous characteristics in this role, feeling, for example, rather uncertain, insecure and passive.

In fact, what seems to be highlighted is the difference of male and female characteristics inculcated and expected from earliest days with traits being associated with the former such as dominance, activity, decisiveness and strength etc., whilst traits associated with the latter include, for example, submissiveness, nurturance and dependence etc.

These qualities may be viewed as being like two sides of a coin or ends of a yardstick rather than referring to them as 'positive' and 'negative' with the surplus emotional loading and value judgements these two terms might carry with them. 'Positive' in this respect often infers that such qualities are desirable whilst 'negative' ones are not and this is not necessarily the case.

Such characteristics would appear to have been carried over into the driving situation and may even take on exaggerated proportions in the relative anonymity of the man/machine combination and in a 'civilized' life-style where there is less outlet for aggressive activity such as there was in former times with, for example, hunting in order to survive.

The driving situation offers an opportunity and outlet for the release of pent-up energy, frustration and tension that in less 'civilized' days would have been dispelled by the battle to survive. The mere pressure of the foot can give a sense of thrill, power and command so that a man may temporarily, at least, drive as he would like to live.

Plummer and Das (1973) carried out some research on dichotomous thought processes in accident prone drivers. To dichotomize is to polarize personally relevant events, meanings and attitudes etc., in such a way as to experience them in their most extreme forms. The dichotomous thinker can see only extreme alternatives. He cannot perceive that moderate choices are open to him.

From this study by Plummer and Das (1973), it was concluded that those persons who frequently become involved in motor vehicle accidents seem to dichotomize their thinking to a greater extent than do persons who become involved in accidents only infrequently. The Semantic Differential was used as the measuring technique in this study by Plummer and Das.

Dichotomous thinking would appear to be present within this sample of drivers. Profile II (P. 175) shows thinking in absolute terms by the FA and MA driver groups in contrast to the more moderate thinking of the MAF and FAF driver groups.

In Profile IIa (P. 177) when the driver groups are combined rather than dichotomous thought processes the association of masculinity and accidentness versus femininity and accident freeness becomes apparent.

The research by Plummer and Das (1973) on dichotomous thought processes in accident prone drivers is an interesting one,and may well represent a possible means of being able to detect potential and actual 'accidentness' of the driver by a study of dichotomous thought processes using a technique such as the Semantic Differential or by a different approach to the study of cognitive processes. It is possible that although accidents may result from many different causes the essential feature may be the cognitive make-up of the individual on which the causes operate.

CHAPTER XXII

Exploratory Investigations

Two exploratory investigations were carried out using Pearson's correlation coefficient technique concerning the relationship between:-

a) NSQ E (Submission-Dominance Component) and Parry's AG (Aggression) variables.

b) NSQ An (Anxious-Not Anxious Component) and Parry's AN (Anxiety) variables.

a) NSQ E and Parry's AG Variables

Component E of the NSQ was selected as the variable against which to test Parry's AG variable. This was chosen as it was considered to be the most suitable variable to see if a relationship existed with Parry's AG variable. Some of the qualities of an individual scoring low on the NSQ E component include aggressiveness, dominance, assertiveness, wilfulness and self-assurance. A high score obtained for this component indicate such characteristics as dependence, submission and unassertiveness.

For Parry's AG variable a low score obtained would indicate lack of aggressive tendencies in the driving situation whilst a high score would indicate the reverse.

A moderate negative correlation was found between these two variables for all driver groups at the .01 or .001 level of significance. Correlations found between the driver groups in this sample of drivers for the NSQ E and Parry's AG variables are as follows:-

MA	$r = -.336$	$p = < .01$	s
MAF	$r = -.302$	$p = > .01$	s
FA	$r = -.603$	$p = < .01$	s
FAF	$r = -.348$	$p = < .01$	s
F(A+AF)	$r = -.418$	$p = < .001$	s
M(A+AF)	$r = -.319$	$p = < .01$	s
A(M+F)	$r = -.447$	$p = < .001$	s
AF(M+F)	$r = -.368$	$p = < .001$	s

A negative relationship means that an individual scoring low on one variable tends to score high on a second variable and vice versa. In this case, scoring low on the NSQ E component signifies the traits mentioned such as aggressiveness, assertiveness and dominance whilst scoring high on Parry's AG Scale signifies aggressive tendencies and attitudes at least in the driving situation.

The NSQ E (Submission-Dominance Component) and Parry's AG (Aggression) Scale variables are both measures of aggression, dominance etc., but vary in that the former is a generalised personality measure. One variable has been checked against the other with the finding that they are negatively correlated.

Profile I (P. 156) and Ia (P. 158) based on data shown in Table I (P. 155) and Ia (P. 157) indicate the characteristic tendencies of the driver groups in relation to aggression. The female and accident free driver groups tend to be moderate to high on the NSQ E variable signifying submission, dependence etc., and low on Parry's AG variable signifying low aggression in the driving situation.

On the other hand, the male and accident driver groups tend to score low on the NSQ E variable indicating dominance, self-assertion, aggression etc., and high on Parry's AG variable signifying aggression in the driving situation.

Such findings are interesting and offer a fairly clear-cut difference between male/accident and female/accident free drivers in respect of personality characteristics like two sides of a coin.

b) NSQ An and Parry AN Variables

Component An (Anxious-Not Anxious) of the NSQ was chosen as the variable against which to test Parry's AN (Anxiety) Scale. The NSQ An was considered to be the most suitable variable from the NSQ for this purpose as the Total NSQ variable score is a composite of 4 different components within this measure and the other 3 components of the NSQ measure different dimensions of personality.

An individual scoring high on the NSQ An component has, for example, feelings of anxiety, frustration and loneliness. He is emotionally immature, unstable, excitable, tense and has a low frustration tolerance level.

Parry's AN Scale was devised to detect feelings of anxiety in the driving situation and attitudes towards driving and other drivers.

Thus, both variables are measures of anxiety with the NSQ An Component measuring more free-floating or generalised anxiety whilst Parry's AN Scale measures more specific or situational anxiety. One variable is acting as a check on the other.

A moderate positive correlation was found between these two variables of anxiety for all driver groups, significant in all cases except for the FA driver group which almost reached a significant level. The results found are as follows:-

MA	$r = +.333$	$p = < .01$	s
MAF	$r = +.433$	$p = < .01$	s
FA	$r = +.412$	$p = < .10$	s
FAF	$r = +.315$	$p = < .02$	s
F(A+AF)	$r = +.335$	$p = < .001$	s
M(A+AF)	$r = +.376$	$p = < .001$	s
A(M+F)	$r = +.357$	$p = .001$	s
AF(M+F)	$r = +.354$	$p = < .001$	s

Profile I (P. 156) and Ia (P. 158) based on data shown in Table I (P. 155) and Ia (P. 157) indicate the characteristic tendencies of the driver groups in relation to anxiety as measured by the NSQ An and Parry's AN variables. Differentiation among the driver groups for these two variables of anxiety is not so marked as for aggression. A more clear-cut difference emerges from Table I (P. 155) and Ia (P. 157) for the NSQ Total score, a composite of all the NSQ personality dimensions, and this shows that female/accident free driver groups have higher overall anxiety than the male/accident driver groups.

However, to revert to the indications of findings of the NSQ An and Parry AN variables. Moderate positive correlations at a significant level were found between these two variables except for the FA driver group where the finding was almost at a significant level. A positive correlation means that individuals scoring high on one variable tend to obtain high scores on a second variable and vice versa.

The positive correlations would suggest that these two variables are tapping the same trait, the NSQ An being general and Parry's AN being specific or situational, with one being a check against the other. Anxiety indicated by one measure is correspondingly indicated by the second measure, with the same applying to lack of anxiety and anxious tendencies. However, the difference among the driver groups is not so marked and differentiated for anxiety as for the NSQ E and Parry AG variables.

CHAPTER XXIII

Parry's AG (Aggression) Scale

Appendix C (P. 300) contains a table giving full details of data for each item of Parry's AG Scale given as an actual frequency count as well as the percentage of response for each driver group for each item. Scores that differ by about 7 per cent or in degree of aggression have been underlined.

Graph VI in Appendix B (P. 296) gives a frequency distribution graph of raw scores for Parry's AG Scale obtained by the MAF, MA, FAF and FA driver groups although not for the 4 driver group combinations - M(A+AF), F(A+AF), A(M+F) and AF(M+F) - for which actual frequency of response and the percentage of response for each group are given in Appendix C (P. 300).

MA, MAF, FAF and FA Driver Groups

The MA driver group is high in aggressive attitude as regards driving and other drivers according to Parry's AG Scale. Responses made by this group of drivers suggest that such drivers are irritable, easily annoyed and aroused in the driving situation apart from the degree of aggressive attitude displayed. Full details can be seen of data for Parry's AG Scale in Appendix C (P.300) However, some results for the MA and MAF driver groups now follow:-

Item No.	Parry AG Scale Item	MA n = 67	MAF n = 58
2	I am easily provoked when driving	17 25.4%	7 12.1%
7	On occasions I have tried to edge another car off the road	11 16.4%	2 3.4%
8	I would not mind being a racing driver	42 62.7%	22 37.9%
9	I like driving fast	55 82.1%	38 65.5%
16	I am an aggressive driver	32 47.8%	9 15.5%
22	I have given chase to another driver who has annoyed me	14 20.9%	8 13.8%
24	Sometimes I take a risk for the sake of it (the risk)	27 40.3%	14 24.1%

Generally, the MAF driver group indicated a lesser degree of aggression than the MA driver group with the FAF and FA driver groups showing the least aggressive tendencies in attitude toward driving and other drivers. For full results of responses given to Parry's AG Scale by the MA, MAF, FAF and FA driver groups refer to Appendix C (P. 300

M(A+AF), F(A+AF), A(M+F) and AF(M+F) Driver Groups

Full details may be seen in Appendix C (P. 300) for the actual frequency response and the percentage of response for each group for Parry's AG Scale.

What is indicated with the 4 driver group combinations is that the M(A+AF) and A(M+F) driver groups are high in aggressive attitude towards driving and other drivers as rated by Parry's AG Scale. These two groups of drivers appear to be readily aroused and provoked along a continuum of aggression in the driving situation. Some results for these two driver groups are as follows:-

Item No.	Parry AG Scale Item	M(A+AF) n = 125	A(M+F) n = 89
4	I have been in a fight with another driver	4 3.2%	3 3.4%
7	On occasion I have tried to edge another car off the road	13 10.4%	11 12.4%
8	I would not mind being a racing driver	64 51.2%	48 53.9%
9	I like driving fast	93 74.4%	67 75.3%
15	I have driven at another vehicle in anger	13 10.4%	10 11.2%
22	I have given chase to another driver who has annoyed me	22 17.6%	14 15.7%
27	Most drivers are worse drivers than I am	92	63

The F(A+AF) and AF(M+F) driver groups are low in aggressive attitudes in the driving situation and towards other drivers according to Parry's AG Scale.

Confirmation of Parry's AG variable measuring situational aggression in the driving situation is given by the results for the NSQ E (Submission-Dominance Component) (See Profile I (P. 156) and Ia (P.158) based on data in Table I (P. 155) and Ia (P.157).

Profile II (P. 175) and IIa (P. 177) based on data given in table VIII (P. 174) and VIIIa (P. 176) offers further evidence to the fact that male and female drivers differ. Male drivers have an active and potent self-concept of themselves as drivers with significant differences being found.

The results from Parry's AG Scale provide confirmation of previous evidence concerning the self-confident, tough, aggressive tendencies of the MA, M(A+AF) and A(M+F) driver groups with the reverse situation occurring for the female/accident free driver groups with the tendency to lack aggressive tendencies, in the driving situation or generally, and self-confidence.

Parry's AN (Anxiety) Scale

Appendix D (P. 305) contains a table giving full details of data for each item of Parry's AN Scale given as an actual frequency response as well as the percentage of response for each driver group for each item. Scores that differ about 7 per cent or in degree of anxiety have been underlined.

Graph VII in Appendix B (P. 298) gives a frequency distribution graph of scores obtained for Parry's AN Scale by the MA, MAF, FAF and FA driver groups. Frequency distribution graphs for Parry's AN Scale have not been drawn up for the 4 group combinations of M(A+AF), F(A+AF), A(M+F) and AF(M+F) driver groups although actual frequency of response and the percentage of response for each driver group are given in Appendix D (P. 305).

MA, MAF, FAF and FA Driver Groups

The FAF and FA driver groups indicate moderate to high anxiety attitudes towards driving and other drivers whilst the MAF and MA driver groups indicate low anxiety tendencies in the driving situation according to Parry's AN Scale. Responses made by the former two driver groups suggest that they do tend to worry and be nervous about certain aspects of driving indicated by some of the following results:-

Item No.	Parry's AN Scale Item	FAF n = 59	FA n = 22
2	I worry about getting lost when driving	14 23.7%	5 22.7%
3	I become nervous if others use their horns at me	22 37.3%	7 31.8%
15	I get quite tense when driving	16 27.1%	9 41.0%

The fact that there are only 22 driver subjects in the FA group needs to be considered. Full details of results for Parry's AN Scale for the MA, MAF, FAF and FA driver groups can be seen in Appendix D (P. 305).

What emerges from the data from Parry's AN Scale for these 4 driver groups is that female drivers, both accident and accident free, do tend to be anxious and nervous in the driving situation. For certain items the MA and MAF driver groups also show a fair degree of anxiety. For example, 60.3% of the MAF group of drivers worry about doing the wrong thing when driving (Item 10) and for the MA group of drivers concerning Item 13 of this scale, 82.1% felt a little apprehensive when they noticed a police car about or following behind them.

M(A+AF), F(A+AF), A(M+F) and AF(M+F) Driver Groups

For these 4 driver group combinations what emerges from the data gathered from Parry's AN Scale is that, on the whole, the female/accident free groups of drivers display a fair amount of nervousness and anxiety of attitude towards driving and other drivers. Anxiety is also shown for some items for the male/accident groups of drivers but, on the whole, this is less marked than for the female/accident free groups.

Full results are given in Appendix D (P. 305) for the 4 driver group combinations. However, some results for the F(A+AF) and AF(M+F) driver groups are given as follows:-

Item No.	Parry AN Scale Item	F(A+AF) n = 81	AF(M+F) n = 117
2	I worry about getting lost when driving	19 23.5%	24 20.5%
3	I become nervous if others use their horns at me	29 35.8%	37 31.6%
15	I get quite tense when driving	25 30.9%	24 20.5%

Although the female/accident free driver groups, on the whole, tend to display more anxiety in the driving situation according to Parry's AN Scale, for two items the male/accident groups indicate more anxious tendencies. For example, Item 1, 68.4% of the M(A+AF) and 66.3% of the A(M+F) driver groups persistently look at the fuel gauge while driving; and for Item 9, 56.8% of the M(A+AF) driver groups quite often have thoughts of and picture themselves in an accident.

Parry's AG (Aggression) / AN (Anxiety) Scale

Taking an overall view of the results for Parry's AG/AN Scale for the 4 driver groups and 4 driver group combinations, confirmation of evidence from other measures used in this study, the NSQ and Semantic Differential, becomes apparent.

Stereotype masculine and feminine characteristic qualities seem to emerge for the male/accident and female/accident-free driver groups forming two sides of a coin. The male/accident driver comes through as displaying characteristic tendencies of aggression, self-assurance, self-confidence, cheerfulness, low degree of anxiety, toughness and even a degree of pugnaciousness. On the other hand, female/accident-free drivers show up as being non-aggressive, submissive, dependent, somewhat depressed and relatively anxious.

By using other measures in conjunction with Parry's AG/AN Scale, the original research carried out by Parry (1968) in England has been expanded and confirmed in certain respects with clear-cut differences emerging for male/accident and female/accident-free drivers studied in this sample.

Relationship Between Parry's AG/AN Scale Variables

The relationship between Parry's AG/AN Scale variables was investigated using Pearson's product moment correlation technique (See Treatment of Results, P. 98).

Only one relationship between Parry's AG/AN variables was found to be at a significant level. This was for the MA driver group where a low positive correlation was found at a significant level. The data for correlations between Parry's AG/AN variables for the 4 driver groups and 4 driver group combinations are as follows:-

MA	r = +.255	p = .05	s
MAF	r = +.094	p > .10	ns
FA	r = +.006	p > .10	ns
FAF	r = +.117	p > .10	ns
F(A+AF)	r = +.033	p > .10	ns
M(A+AF)	r = +.190	p < .10	ns
A(M+F)	r = +.159	p > .10	ns
AF(M+F)	r = +.027	p > .10	ns

A low positive relationship indicates that individuals scoring high on one variable tend also to score high on the second variable and vice versa. This would suggest that the qualities of aggression and anxiety at least according to rating by Parry's AG/AN Scale, are present to a low, but significant degree of relationship in the MA driver group or that their is the absence of significant amounts of these two traits. The former possibility is most likely to be the case for the MA group of drivers as indicated by results of the NSQ and item analysis of Parry's AG/AN Scale. (NSQ Results - See Profile I (P.156) and Ia (P. 158) and Table I (P. 155) and Ia (P.157). Parry's AG/AN Scale Results - See Appendix C and D (P. 300) and (P. 305), respectively.)

The data for these correlations indicates that the AG and AN variables of Parry's Scale are relatively independent with almost no relationship at a significant level except for the MA driver group where a low positive correlation at the .05 level of significance was found between Parry's AG and AN variables. In fact, this is what would be expected to be the case.

Parry (1968) with his study showed that there was a tendency for high aggression whether or not in combination with high anxiety to make for greater liability to accidents. For the MA group of drivers in this study this finding has been confirmed.

SECTION 6

DISCUSSION OF RESULTS

'Rage supplies all arms. When an angry man thirsts for blood, anything will serve him as a spear.'

Claudius

'There is no passion that so much transports men from their right judgement as anger.'

Montaigne

DISCUSSION OF RESULTS

In Section 2 on Statement of the Problem (P. 45) at the outset of this study of the automobile driver and accidents in relation to biographical, attitudinal and personality factors, it was stated that the results would show in particular:-

a) The incidence of accidents by age and sex

b) The frequency of accidents categorised as very serious, serious and minor.

c) The frequency of accidents according to whether considered to be preventable or non-preventable

d) The incidence and type of traffic offence

Results for the above are now discussed.

a) The data for the incidence of accidents by age and sex are to be found in the Section on Method (P. 53) discussing the sample of drivers in this study shown in tabular form and as a frequency distribution graph.

From the table showing data for the incidence of accidents by age and sex, it can be seen that those drivers incurring the greatest frequency of accidents are drivers in the MA group of under 25 years of age followed by the FA group of 20 years and under.

Research findings as discussed in the Literature Review (P. 2) for this study are confirmatory. For example Wilde and Grant (1970) state that drivers under 24 years of age and those over 60 have a higher accident rate than those in the intermediate age range. Munden (1966), Lauer (1960) and Leeming (1969) all found a 'U' shaped relationship of driver accident rate by age.

McFarland and Moseley (1954) found that those under 35 years of age and especially those under 24 years of age in their study of truck drivers had far in excess of their expected amount of accidents. They found that 45 followed by 35 to 45 years of age were the safest groups as regards driving.

Thus, the evidence seems to point to the fact that youthful drivers, at the peak of their potential strength and skill, are the ones most frequently involved in traffic accidents as has also been shown by the data in this study although it has to be remembered that the majority of subjects taking part in this study were university students and, therefore, this would give a bias effect.

b) and c) The frequency of accidents categorised as very serious, serious and minor as well as whether considered to have been preventable or non-preventable can be seen in the Section on Results in Part II of the Biographic Questionnaire, Item 29, (P.142).

From the table showing data for the frequency and type of accident sustained, the discrepancy between the frequency and type of accident incurred by MA and FA driver groups can be seen. The MA driver group incurred more accidents classified as being very serious or serious than the FA driver group did who tended to experience accidents of a minor type whilst driving.

The ratio of MA to FA drivers was found to be 3:1, respectively, with the number of drivers in the MA driver group being 67 and in the FA driver group 22. Using chi square, a significant difference was found between the observed and expected frequency values of MA to FA drivers in the direction of the former group as follows:-

$\overset{\bullet}{\text{MA:FA}}$ $\qquad \chi_c^2 = 21.75 \qquad p = < .001 \qquad s$

Using chi square to test for the significance of difference between accidents actually incurred by the MA and FA driver groups and those theoretically expected, a significant difference was found in the direction of the MA driver group as follows:-

$\overset{\bullet}{\text{MA:FA}}$ $\qquad \chi_c^2 = 6.855 \qquad p = < .01 \qquad s$

Where $\bullet$ = Direction of significant difference

s = Significant

χ_c^2 = Chi square corrected for continuity

These results indicate that male drivers are involved in more accidents whilst driving than female drivers and also that accidents incurred by them are more likely to have been of a more serious nature. The driver subjects participating in this study were not selected on the basis of sex or accident category and, on subsequent analysis of data, the proportion of MA:FA drivers was found to be a significant ratio of 3:1, respectively. For the whole sample, the proportion of Male:Female drivers was found to be a ratio of 1.5:1 and was not significant.

However, the data collected for the sample of drivers taking part in this study of the automobile and accidents may give an indication of the proportions of male to female drivers and also the types and frequency of accidents incurred by the general population of drivers.

d) The incidence and type of traffic offence results can be seen in the Section on Results (P. 8) of the Biographic Questionnaire, Part II, Item 8.

This item of the Biographic Questionnaire indicates the frequency and type of traffic offence committed by the driver groups of this sample of drivers for both accident and accident free groups. The greatest incidence of traffic offences is seen to be committed by the MA driver group followed by the MAF driver group. Female drivers, of both accident and accident free groups, had a low frequency of traffic offences.

Significant differences were found between observed and expected frequencies for the number of traffic offences committed using chi square for 3 of the driver groups as follows:-

•M(A+AF)	and F(A+AF)	$\chi_c^2 = 5.12$	$p = < .05$	s
•MAF	and FAF	$\chi_c^2 = 5.34$	$p = < .05$	s
•MA	and FA	$\chi_c^2 = 5.2$	$p = < .05$	s

Where • = Direction of significant difference

s = Significant

χ_c^2 = Chi square corrected for continuity

Among all driver groups speeding was found to be the main traffic offence committed. Munden (1967) in a study on 'The Relation Between a Driver's Speed and his Accident Rate' found that both fast and slow drivers have high accident rates which may imply that driving speed is correlated with certain other driver traits which are likely to cause accidents.

McFarland and Moseley (1954) in their study of truck driver came up with one finding that speeding violations in private driving were characteristic of accident repeaters. Also, greater toleration of accepting and operating defective equipment on the part of accident repeaters (AR's) suggests that maintenance of equipment may be an indicator of accident liability. In this study of drivers, perusing the list of traffic offences committed that might be classified as 'general carelessness' (e.g. no Warrant of Fitness or W.O.F., excessive noise etc.), apart from those offences not detected, especially for the MA driver group and to some extent for the MAF driver group, these might well be indicators of potential accident liability.

McFarland and Moseley (1954) found that there was a marked tendency for more accident repeater (AR) than accident free (AF) truck drivers in their study to have committed minor violations and it may be said that the presence of such violations (e.g. speeding, violation of traffic rules such as going through a red/amber light, failing to give way or not stopping at a stop sign, following too closely etc.,) may be weighed as being predictive of the tendency to have accidents. Knowing that a driver had committed a serious offence in this study did not help to distinguish between accident repeater and accident free drivers. McFarland and Moseley (1954) found that no matter what the classification a record may be an accident predictor.

This factual finding of McFarland and Moseley (1954) would seem to be borne out by the data collected for this sample of drivers concerning driving record particularly for the MA driver group who not only have the greatest frequency and variety of type of driving offence committed but also have a record of having sustained one or more accidents whilst driving during the past 5 years.

CHAPTER XXIV

HYPOTHESIS I:

To investigate:

> 'Whether there is a typical driver personality profile that emerges from the data to differentiate an A (accident) from an AF (accident free) type according to the driver group classification used in this study.'

Taking into consideration all the data obtained from the measuring instruments used in this study, namely the Biographic Questionnaire incorporating a Semantic Differential Scale rating self-concept as a driver, the NSQ and Parry's AG (Aggression)/AN (Anxiety) Scale, differences were found to emerge between an A and an AF typical driver personality type or specifically between the following:-

MA and MAF Driver
FA and FAF Driver

A(M+F) and AF(M+F) Driver

Typical A and AF Driver Personality Types

According to the driver group classification system adopted in this study, 4 driver groups were formed namely -

MA Driver Group
MAF Driver Group

FA Driver Group
FAF Driver Group

This means that comparisons can be made on the basis of sex or accident category as follows:-

a) MA compared with MAF

b) FA compared with FAF

c) A(M+F) compared with AF(M+F)

In this investigation, it was found that it was not just a matter of there being a typical A and AF driver personality type as the finding that emerged from the data was that there was also differentiation between the two accident profiles, that is between MA and FA.

The AF driver, that is MAF and FAF, may be stated as being the 'control' group although differences were found to occur according to sex of the accident free driver so that comparisons could not always be made across groups meaning that each group of drivers in many instances, has to be considered as a separate entity in its own right.

Thus, a complex situation seems to be in operation as the analysis of data for this sample of driver revealed. This complexity becomes more complex, yet even more revealing, when the 4 original driver group classifications, that is MA, MAF, FA and FAF, are combined and

A(M+F) is compared with AF(M+F)

Using chi square and t tests significant differences were found between the following driver groups:-

MA (n = 67) and MAF (n = 58)

FA (n = 22) and FAF (n = 59)

A(M+F) (n = 89) and AF(M+F) (n = 117)

The summary table below draws together significant findings that emerged for the above 3 driver groups and full details of results may be seen in the appropriate section for the particular measuring instrument in question (see Section 5 - Results, P. 104). In this summary table only the fact that a significant difference was found between the A and AF driver is given and the direction of significance.

Summary Table of Significant Differences Found Between an A and AF Driver

Measuring Instrument	MA/MAF	FA/FAF	A(M+F)/AF(M+F)
Biographic Questionnaire using chi square			
Item 7 Conviction for driving offence	• MA/MAF		• A(M+F)/AF(M+F)
Parry's AG Scale using t test			
Aggressive attitudes towards driving and other drivers	• MA/MAF (Table II)		• A(M+F)/AF(M+F) (Table VII)
NSQ using t tests			
NSQ Total Anxiety Score - Composite of 4 NSQ Components			• A(M+F)/AF(M+F) (Table VI)

Summary Table - Significant Differences Between A and AF Driver (Cont)

	MA/MAF	FA/FAF	A(M+F)/AF(M+F)
NSQ I Component (Sensitive-Tough)		• FA/FAF (Table III)	
NSQ F Component (Depressed-Cheerful)			• A(M+F)/AF(M+F) (Table VII)
Semantic Differential Rating self-concept as a driver			
Semantic Factor A (Activity)	• MA/MAF (Table IX)		

Where • = Direction of significant difference.

From this table above, it may be seen, for example, that the MA and A(M+F) driver groups differ significantly from the MAF and AF(M+F) driver groups as regards conviction for a driving offence and aggressive attitudes towards driving and other drivers.

The AF(M+F) driver group was found to differ significantly from the A(M+F) driver group in respect of total anxiety score of the NSQ and the NSQ F Component.

The FA driver group was found to be significantly more sensitive than the FAF driver group whilst the MA driver group was found to be significantly more active as regards rating self-concept as a driver.

This hypothesis is concerned with the question of whether there is differentiation between a typical A (accident) and AF (accident free) driver personality type. The evidence indicates that there is differentiation to be noted between the typical A and AF driver personality type.

Full details of the differences found to exist between the typical MA/MAF and FA/FAF driver personality are given in Appendix I and also presented in summary form outlining the main characteristic differences found to emerge between the typical A and AF driver personality type in the Summary and Concluding Statement (Section 7, P. 242).

Typical Personality Profiles of the A and AF Driver

Full details of the typical personality profiles that emerged from the data for the MA and FA driver are given in Appendix G. The same details are given in Appendix H for the typical personality profiles of the MAF and FAF driver.

Summary tables are given below showing the significant differences found between the typical MA and FA driver personality type as well as for the typical MAF and FAF driver personality type.

a) Typical Personality Profile of the A Driver

Two typical A (accident) driver personality types were found to emerge from the data obtained for this study of the automobile driver and accidents in relation to biographical, attitudinal and personality factors (Appendix C gives full details, P. 300).

Summary Table of Significant Differences Found Between the MA and FA Driver

Biographic Questionnaire	MA/FA
Item 3 Average number of years driving licence held	• MA/FA
Item 8 Number of driving offences committed	• MA/FA
Item 15i Enjoyment of driving	• MA/FA
Item 31 Self-estimation of driving judgement	• MA/FA
Parry's AG (Aggression) Scale Aggressive attitudes towards driving and other drivers	• MA/FA (Table V)
NSQ Total Anxiety Score Composite of 4 NSQ components	• MA/FA (Table V)
NSQ I Component (Sensitive-Tough)	• MA/FA (Table V)

Summary Table - Significant Differences Between A and AF Driver (Cont)

NSQ E Component (Submission - Dominance	• MA/FA (Table V)
Semantic Differential Rating self-concept as a driver	
Semantic Factors A(Activity) Factor	• MA/FA (Table XII)
P(Potency) Factor	• MA/FA (Table XII)

Where • = Direction of significant difference

It can be seen from this table that, for example, the typical MA driver personality in comparison with the typical FA driver personality was found significantly to have committed a greater number of driving offences, to enjoy driving more, to be more aggressive in attitudes towards driving and other drivers and to hold a more active and potent self-concept as a driver.

On the other hand, the typical FA driver personality type in comparison with the typical MA driver personality type was found to be significantly more anxious, sensitive and submissive.

b) Typical Personality Profile of the AF Driver

Full details of the profiles found to emerge from the data for the typical MAF and FAF driver personality are given in Appendix H (P. 339).

In this study the AF driver, that is MAF and FAF, may be stated as being in the 'control' group. However, differences were found to occur between the MAF and FAF driver groups. Some of these differences were at a level of statistical significance a summary table of which follows.

Summary Table of Significant Differences Found Between the MAF and FAF Driver

Biographic Questionnaire	MAF/FAF Driver
Item 1 Automobile Association (AA) Membership	• MAF/FAF
Item 3 Average number of years driving licence held	• MAF/FAF
Item 8 Number of driving offences committed	• MAF/FAF
Parry's AG (Aggression) Scale Aggressive Attitudes towards driving and other drivers	• MAF/FAF (Table IV)
NSQ	
NSQ Total Anxiety Score Composite of 4 NSQ Components	• MAF/FAF (Table IV)
NSQ I Component (Sensitive - tough)	• MAF/FAF (Table IV)
NSQ E Component (Submission - Dominance)	• MAF/FAF (Table IV)

Where • = Direction of significant difference

From this table above, it can be seen that the typical MAF driver personality in comparison with the typical FAF driver personality was found significantly to be a member of the Automobile Association (AA), to have committed a greater number of driving offences and to be more aggressive in attitude towards driving and other drivers.

On the other hand, the typical FAF driver personality in comparison with the typical MAF driver personality was found significantly to have held a driving licence for a greater number of years, to be more anxious, sensitive and submissive.

What is found to emerge from the data obtained for this sample of drivers is that a rather complex situation seems to be in operation. Differentiation was not just found to occur between the typical A and AF driver personality type. Differentiation was also found to exist within each of the A and AF driver types, particularly the former, forming 3 (possibly 4) typical driver personality profiles (see Appendices G, H and I for full details ; Pages 332, 339 and 346, respectively).

This complexity is further augmented with significant sifferences being found between the typical A(M+F) and AF(M+F) driver groups as shown previously in summary table form (P. 206).

The summary table below presents the significant differences found to occur in this sample of drivers between the typical MA and FA driver personality as well as between the typical MAF and FAF driver personality. As in the previous summary tables only the direction of significance is indicated and further details can be seen in the Section on Results (P. 104) where data tables are presented for each measuring instrument used in this study.

Summary Table of Significant Differences Found to Occur Between the Typical MA/FA and MAF/FAF Driver Personality

Measuring Instrument	MA/FA Driver	MAF/FAF Driver
Biographic Questionnaire		
Item 1 Automobile Association (AA) Membership		• MAF/FAF
Item 3 Average Number of years driving licence held		• MAF/FAF
Item 8 Number of driving offences committed	• MA/FA	• MAF/FAF
Item 15i Enjoyment of driving	• MA/FA	
Item 31 Self-estimation of driving judgement	• MA/FA	
Parry's AG (Aggression) Scale Aggressive attitudes towards driving and other drivers	• MA/FA (Table V)	• MAF/FAF (Table IV)

Summary Table of Significant Differences Between MA/FA and MAF/FAF Driver (Cont)

NSQ or Neuroticism Scale Questionnaire		
NSQ Total Anxiety Score Composite of 4 NSQ Components	• MA/FA (Table V)	• MAF/FAF (Table IV)
NSQ I Component (Sensitive - Tough)	• MA/FA (Table V)	• MAF/FAF (Table IV)
NSQ E Component (Submission - Dominance)	• MA/FA (Table V)	• MAF/FAF (Table IV)
Semantic Differential		
Rating self-concept as a driver		
Semantic Factors		
A(Activity) Factor	• MA/FA (Table XII)	
P(Potency) Factor	• MA/FA (Table XII)	

Where • = Direction of significant difference

Details of the differences found to occur between the typical MA/MAF and FA/FAF driver personality are outlined in Appendix I (P. 346). Also, the main characteristic that is likely to be predictive in distinguishing the MA from the MAF and the FA from the FAF driver are presented in the section on Summary and Concluding Statement (P 242).

Of course, one major difference between the typical A and AF driver personality type is that the latter is reported not to have incurred any accident(s) whilst driving during the last 5 years of driving experience. However, the typical AF driver is not necessarily free of having committed a driving offence or driving offences although the average number committed was found to be lower than for the typical A driver, with speeding being the main driving offence committed by both the A and AF driver.

Pen pictures of the typical A driver personality, both MA and FA, and AF driver personality, both MAF and FAF, can be seen in the section on Summary and Concluding Statement (P. 242). Summary tables from which these pen pictures have been drawn are presented in Appendix G (P. 332) for the typical MA and FA driver personality and Appendix H (P. 339) for the typical MAF and FAF driver personality.

What seems to emerge from the data obtained for this sample of drivers is that, in general, the typical AF driver personality type holds an intermediary position on a continuum with the typical MA driver at one end and the typical FA driver personality type at the other. In other words, the typical AF driver personality, male and female, seems to display and possess more moderate characteristics, on the whole, than the more extreme manifestations of characteristics shown by the typical A driver personality, both male and female.

The summary table (P. 211) showing significant differences found to exist between the MA/FA and MAF/FAF typical driver indicates, for example, that the typical MA driver is more aggressive than the FA driver and that the typical MAF driver is more aggressive than the typical FAF driver, at least in relation to driving. Other characteristic tendencies displayed by the typical MA driver personality are toughness, dominance, relatively high activity and potency in respect of the rating of self-concept as a driver, the tendency to drink fairly frequently and not to be a tee-totaller, the enjoyment of driving especially the thrills and risks of modern driving and aggressiveness particularly as regards attitude towards driving and other drivers.

On the other hand, the typical FA driver personality shows characteristic tendencies of sensitivity, relatively high anxiety, low activity and potency in the rating of self-concept as a driver, the tendency to drink seldom or to be a tee-totaller and non-aggressiveness, at least in respect of driving.

The typical AF driver personality, that is MAF and FAF, in general, holds a mid-way position between the two extremes of the two typical A type driver personalities. The typical MAF driver was found to display less extreme characteristics, on the whole, than the typical MA driver although in the same direction along the continuum with the same applying to the typical FAF driver in relation to the typical FA driver at the other end of the continuum.

This means that, for example, the typical MAF driver personality displays characteristic tendencies of aggression, dominance, etc., although not possessing such qualities, on the whole, to the same extreme extent as was found to be the case for the typical MA driver personality.

The typical FAF driver, for example, was found to be sensitive, submissive etc., with such characteristic traits being possessed to a less marked degree, in general, than was found to be the case for the typical FA driver personality.

Differentiation was found to exist, in some instances significantly, in two ways between the typical A and AF driver personality. Firstly, differentiation was found between the A(M+F) and AF(M+F) driver with, for example, the former being more aggressive in attitude towards driving and other drivers and the latter being more anxious (NSQ Total Anxiety Score) and having a tendency towards depression (NSQ F Component).

Secondly, besides differentiation being found to exist between the typical A and AF driver personality, it was also found to occur within each driver accident category. For the A driver two distinct personality profiles emerged, that is one for the typical MA and one for the typical FA driver. Also, differences were found to occur for the typical AF driver, that is between the MAF and FAF driver.

What this means is that there are 3, possibly 4, typical driver personality types to consider in view of the profiles that emerged from the data for this sample of drivers (see Appendices G, P. 332 and H, P. 339). However, the calibre and category of the sample of automobile drivers under investigation in this research as compared with one that might be drawn from the general population of drivers needs to be considered and borne in mind.

Further research into this area of the A and AF driver personality would seem to be a worthwhile proposition and consideration. For example, in the field of male and female 'stereo-type' characteristics which were found to be carried over into the driver's role and driving situation where they may be even more accentuated and exaggerated, could be one area for investigation. For example, the aggressiveness of the male driver and submissiveness of the female driver would seem to be displayed to a more extreme extent within the driving situation than outside of it. Such knowledge would be helpful in, for example, future approaches to driver education and training.

Thus, the hypothesis regarding whether there is differentiation between the typical A and AF driver personality type, with the qualifications mentioned of there being two rather than one A driver type, that is MA and FA, and possibly two accident free driver types, that is MAF and FAF, is supported.

CHAPTER XXV

HYPOTHESIS II

To investigate:

'Whether there is a relationship between a driver's self-concept and the incidence of accidents.'

Data from 3 measuring instruments used in this investigation of the automobile driver and accidents in relation to biographical, attitudinal and personality factors, was drawn together to form a fairly composite picture of a driver's self-concept in relation to the incidence of accidents. The 3 measuring instruments concerned are:-

a) Semantic Differential Scale included in Part II of the Biographic Questionnaire rating self-concept as a driver.

b) Biographic Questionnaire, Part II, Items 16, 17, 24, 30 and 31 relating to estimation of driving ability

c) NSQ E (Submission-Dominance) Component giving a general personality dimension of such qualities as self-assurance, aggressiveness, dominance etc.

a) Semantic Differential

Details of the Semantic Differential technique are given in the section on Measuring Instruments (P. 77) and data for the Semantic Differential Scale used in this study for rating self-concept as a driver are given in the Section on Results (P. 173).

b) Biographic Questionnaire, Part II

Date from several items of the Biographic Questionnaire, Part II (P. 107) are pertinent to the driver's self-concept and the incidence of accidents as follows:-

Item 16 Errors made whilst driving

Item 17 Blame of other driver when driving errors occur

Item 24 Self-rating of driving standard

Item 30 Ability to make decisions quickly and accurately when driving

Item 31 Self-estimation of judgement in the driving situation

c) NSQ E (Submission-Dominance) Component

The NSQ E Component was selected from the NSQ as it gives an indication of general personality trend for this particular dimension of submission-dominance. Scoring high on this dimension signifies the tendency to be modest, retiring, non-defensive, non-assertive and submissive whereas scoring low on this dimension indicates the tendency to be dominant, assertive, self-assured, decisive and aggressive.

Drawing together this data from (a), (b) and (c) above an indication of the self-concept of each driver group participating in this study may be ascertained from 3 different angles -

i) General personality trait - NSQ E Component

ii) Self-estimation as a driver - Biographic Questionnaire, Part II (Items 16, 17, 24, 30 and 31).

iii) Rating of self-concept as driver - Semantic Differential technique

The aim is to give a relatively comprehensive picture of self-concept as driver going beyond sole reliance on the Semantic Differential Scale used in this study and linking the data obtained from this with data from other measuring instruments used. It was found that the data for this sample of automobile drivers from the 3 different measures used in this study and according to the driver group classification system adopted were confirmatory as regards the relationship between a driver's self-concept and the incidence of accidents.

With regard to this hypothesis concerning a driver's self-concept and the incidence of accidents, data from the 3 measures mentioned will be discussed as follows for:-

1) MA, FA, MAF and FAF driver groups

2) A(M+F) and AF(M+F) driver groups

1) MA, FA, MAF and FAF Driver Groups

By drawing together data from the 3 measures previously mentioned the relationship between a driver's self-concept and the incidence of accidents was investigated from 3 different angles.

a) Semantic Differential

Profile II (P. 175) based on mean score data given in Table VIII (P. 174) outlines profiles for the MA, FA, MAF and FAF driver groups based on mean scores obtained for the E (Evaluation), A (Activity) and P (Potency) Factors of the Semantic Differential scale rating self-concept as a driver.

These profiles suggest that there is a relationship between a driver's self-concept and the incidence of accidents.

In the case of the MA driver group the tendency is towards high mean scores for the E, A and P Factors of the Semantic Differential suggesting that the MA driver holds a fairly positive self-concept of himself as a driver. The reverse situation occurs for the FA driver group whereby a rather low mean score is obtained on the E, A and P Factors, suggesting that self-concept as a driver tends to be somewhat negative.

The MAF and FAF driver groups obtained high mean scores for the E Factor when rating self-concept as a driver by the Semantic Differential technique and a rather low mean score for the A Factor. For the P Factor the MAF driver group obtained a moderately high mean score whereas the FAF driver group obtained a fairly low mean score on this semantic factor. For the A and P Factors the two accident-free groups hold an intermediary position between the two accident group profiles whilst for the A Factor the MA, MAF and FAF obtained similar mean scores.

Significant differences found for the Semantic Differential scale used in this study when rating self-concept as a driver are as follows -

A (Activity) Factor (Table IX)	• MA/MAF	$t = 3.362$	$p = < .001$	s
A (Activity) Factor (Table XII)	• MA/FA	$t = 3.27$	$p = > .001$	s
P (Potency) Factor (Table XII)	• MA/FA	$t = 3.78$	$p = < .001$	s

Where • = Direction of significant difference

What this would seem to signify is that the self-concept as a driver held by the MA driver group tends to be confident to the extent of over-confidence, self-assured with regard to driving ability, quick, strong and decisive. On the other hand, the self-concept as a driver of the FA driver group tends to be lacking in confidence, indecisive, uncertain, hesitant, and not particularly active or strong.

Except for the strongest factor E of the Semantic Differential on which the MA, MAF and FAF driver groups obtained similar mean scores, the two accident-free driver groups seem to hold an intermediary position between the two distinct profiles of the MA and FA driver groups. Using a simile, this situation could be imagined to be like a yardstick with the MA driver group at one end and the FA at the other, with the MAF and FAF driver groups ranged somewhere in-between the two.

Plummer and Das (1973) carried out some research on dichotomous thought processes in accident prone drivers using the Semantic Differential technique.

The dichotomous thinker can only see extreme alternatives or think in absolute terms. To dichotomize is to polarize personally relevant events, meanings, attitudes etc., in such a way as to experience them in their most extreme forms. The dichotomous thinker cannot perceive what moderate choices are open to him. Profile II (P. 175) for the Semantic Differential scale used in this study rating self-concept as a driver for this sample of automobile drivers tends to suggest that with the two accident driver groups dichotomous cognitive processes are operating with the more moderate thinking of the two accident-free groups also in evidence.

Plummer and Das (1973) concluded from their study that individuals who frequently become involved in motor vehicle accidents seem to dichotomize their thinking to a greater extent than do individuals who become involved in such incidents infrequently or not at all.

The conclusion from this study by Plummer and Das (1973) would seem to be relevant to this investigation of automobile drivers and confirmatory of their findings. Of course, it is possible that although accidents may and do result from many different causes, the essential feature may be the cognitive make-up of the individual driver on which the causes operate, certainly an area worthy of further investigation.

b) Biographic Questionnaire

Items 16, 17, 24, 30 and 31 in Part II of the Biographic Quesionnaire relate to self-concept as a driver in that driver subjects gave a self-estimation of their driving standard, judgement etc. For the typical profile of the MA/FA and MAF/FAF driver personality types refer to Appendix G (P. 332) and Appendix H (P. 339), respectively.

The MA driver group tends to be confident to the point of over-confidence in their ability to drive estimating -

i) that their driving judgement is excellent to good (Item 31)

ii) that their driving standard is very good to good (Item 24)

iii) that they can always or often make decisions quickly and accurately when driving (Item 30)

iv) that they sometimes or seldom make errors when driving (Item 16)

v) that they often or sometimes blame the other driver when driving errors occur (Item 17)

On the other hand, the FA driver group presents a different picture to the MA driver group as regards self-concept as a driver tending to lack confidence in their driving ability and estimating -

i) that their driving judgement is good to average (Item 31)

ii) that their driving standard is good to average (Item 24)

iii) that they can often make decisions quickly and accurately when driving (Item 30)

iv) that they often or sometimes make errors when driving (Item 16)

v) that they sometimes or seldom blame the other driver when driving errors occur (Item 17)

A significant difference was found between the MA and FA driver groups concerning self-estimation of judgement in the driving situation (Item 31) as follows:-

$$\overset{\bullet}{\text{MA and FA}} \qquad \chi^2 = 10.966 \qquad p = < .001 \qquad s$$

Where $\bullet$ = Direction of significant difference

These data indicate that a distinct difference does occur in respect of self-concept as a driver between the MA and FA driver groups with the MAF and FAF holding an intermediary position somewhere between the two accident poles.

Thus, the suggestion is that there is a relationship between a driver's self-concept and the incidence of accidents but that this differs as between the MA and FA driver.

c) NSQ E (Submission-Dominance) Component

For this personality dimension of the NSQ the indication is that the MA driver group and to a lesser extent the MAF driver group are, in general, relatively self-assured and dominant whilst the FA and, even more so, the FAF driver group indicate submissiveness and dependence.

What would seem to emerge from the data in relation to self-concept as a driver and the incidence of accidents is the difference indicated between male (A+AF) and female (A+AF) driver characteristics (see Profile I, P. 156 - NSQ and Parry AG/AN variables).

2) A(M+F) and AF(M+F) Driver Groups

The MA, FA, MAF and FAF driver groups were combined according to accident category to form the A(M+F) and AF(M+F) driver groups.

Profile IIa (P. 177) based on mean score data given in Table VIIIa outlines profiles for the E, A and P Factors of the Semantic Differential rating self-concept as a driver for the A(M+F) and AF(M+F) driver groups as well as for the M(A+AF) and F(A+AF) driver groups.

With the combination of driver groups, male/accident and female/accident free, profiles when rating self-concept as a driver show similarity.

a) Semantic Differential

The Semantic Differential technique rating self-concept as a driver was included in Part II of the Biographic Questionnaire according to the three semantic factors of E (Evaluation), A (Activity) and P(Potency).

E (Evaluation) Factor

For this primary evaluative factor, the strongest of the three semantic factors, in this Semantic Differential scale rating self-concept as a driver both A(M+F) and AF(M+F) driver groups obtained moderately high mean scores.

A(Activity) Factor

The A(M+F) driver group obtained a fairly high mean score on the A Factor whilst the AF(M+F) driver group obtained a fairly low mean score.

P (Potency) Factor

The A(M+F) and AF(M+F) driver groups do not differ greatly when rating self-concept as a driver as regards mean scores obtained for the P Factor with the latter group obtaining a rather lower mean score than the former.

In Profile IIa (P. 177) for the Semantic Differential scale used in this study rating self-concept as a driver a different situation is apparent from that displayed in Profile II (P. 175) for the same scale, where, in the latter case, two distinct profiles can be seen for the MA and FA driver groups with the two accident free groups being in an intermediary position between the two accident groups.

The differentiation between the A and AF driver group profiles seen in Profile IIa (P.177) for the E, A and P Factors of the Semantic Differential Scale rating self-concept as a driver is not so marked as between the MA and FA driver groups except for the A factor.

What can be seen in Profile IIa (P.177) is that male/accident and female/accident free driver groups become associated and form similar profiles particularly for the A and P Factors.

The indication is that the self-concept as a driver of the A(M+F) driver group is fairly positive, obtaining a moderately high mean score on the E, A and P Factors. In rating self-concept as a driver by the Semantic Differential technique, the AF(M+F) driver group obtained a rather higher mean score on the E Factor than the A(M+F) driver group, but a fairly low mean score was obtained on the A Factor rising a little on the P Factor.

Overall, the self-concept as a driver of the AF driver was not found to be as positive as that held by the A driver.

b) Biographic Questionnaire

For Items 16, 17, 24, 30 and 31 of Part II of the Biographic Questionnaire relating to a driver's self-concept significant differences were not found between the A(M+F) and AF(M+F) driver groups. However, typical profiles have been drawn up for the MA and FA driver as well as for the MAF and FAF driver and are discussed in Appendix G (P. 332) and Appendix H (P.339), respectively, with a summary table of significant differences found being given in Hypothesis I (P. 205) discussed above.

c) NSQ E (Submission-Dominance) Component

Profile Ia (P. 158) based on data diven in Table Ia shows the profiles for the A(M+F) and AF(M+F) driver groups for the NSQ and Parry's AG/AN variables, 7 in all.

With particular reference to the NSQ E Component, significant differences were not found between the A(M+F) and AF(M+F) driver groups. The AF(M+F) driver group indicates the tendency to be submissive and dependent whilst the A(M+F) driver group indicates the tendency to be dominant and self-assured.

Whilst differentiation between the A(M+F) and AF(M+F) driver groups is not so marked as found for the MAF, MA, FAF and FA driver groups in respect of self-concept as a driver, a trend found is that male/accident and female/accident free characteristics become associated. Also, although not within the province of the discussion of this hypothesis relating to a driver's self-concept and the incidence of accidents which concerns accident and accident freeness, significant differences were found between M(A+AF) and F(A+AF) drivers as shown in the section on Results (P. 104).

Taking an overall view, what does all this mean in respect of whether there is a relationship between a driver's self-concept and the incidence of accidents.

It would seem that there is a relationship between a driver's self-concept and the incidence of accidents but that this differs as between MA and FA drivers so that different personality factors are operating with the two accident free driver groups, MAF and FAF, holding a more moderate stance between the two accident driver types, at least as regards self-concept as a driver.

For the MA driver an abundance of certainty and confidence to the point of over-confidence in ability as a driver is indicated. Possibly the level of this sureness may be further enhanced by the experience of having so much power at the touch of the foot, coupled with the youthful male traits such as immaturity, lack of emotional control and instability, lack of experience, exuberance etc., may result in a potentially dangerous combination which may take several years to work through. This fact is borne out by research (e.g. Lauer, 1952, 1954, 1960; Comments, 1971) that the male driver learns slowly after gaining his driving licence and may even get worse before improvement occurs sometimes taking as long as 5 years or more, if indeed, he is still driving.

On the other hand, the FA driver shows different characteristic tendencies in that she rather lacks confidence and certainty regarding her ability as a driver. In fact, this very lack of confidence may well be in part responsible for her accident record whereas the opposite is the case for the MA driver with his over-confidence. Research has shown (e.g. Lauer 1954, 1960) that unlike the male driver the female driver seems to improve right from the start of her driving experience.

Thus, the hypothesis regarding whether there is a relationship between a driver's self-concept and the incidence of accidents, with the qualifications mentioned, is supported.

CHAPTER XXVI

HYPOTHESIS III

Within this hypothesis the following relationships were investigated:-

i) The relationship between age and the incidence of accidents, being an exploratory investigation with no specific hypothesis being postulated.

ii) The relationship between level of aggression and accident frequency testing the null hypothesis (H_0) that there is no relationship against the alternative hypothesis (H_1) that the relationship between level of aggression and accident frequency will be non-linear.

iii) The relationship between level of anxiety and accident frequency testing the null hypothesis (H_0) that there is no relationship against the alternative hypothesis (H_1) that the relationship between level of anxiety and accident frequency will be non-linear.

iv) An exploratory investigation into the nature of the relationship between Parry's AG (Aggression) and Parry's AN (Anxiety) variables.

v) Two other relationships were explored with no specific hypotheses being postulated:

   a) The relationship between the NSQ E (Submission-Dominance) and Parry's AG(Aggression) variables

   b) The relationship between the NSQ An (Anxious-Not Anxious) and Parry's AN (Anxiety) variables

A discussion of findings for Hypothesis III stated above follows.

HYPOTHESIS III

i) To investigate -

> 'The relationship between age and the incidence of accidents, being an exploratory investigation with no specific hypothesis being postulated.'

In the Section on Method (P. 48) discussing the sample taking part in this study of the automobile driver and accidents, the age distribution of driver subjects was presented in both tabular and graphic form.

From these data, it can be seen that the majority of driver subjects are 25 years and under as might be expected in a sample of mainly university students although as university staff also participated in this survey besides any students who might be of more mature years, the age distribution of this sample of automobile driver spreads to 60+ years of age.

The beginnings of a 'U' shaped curve can be seen in the distribution graph of drivers according to age group (See Section on Method, P. 48 discussing sample). With more driver subjects at the upper end of the age range this 'U' shaped curve of the relationship between age and accident frequency might have been more pronounced. The 'U' shaped curve of the relationship between age and incidence of accidents concurs with research findings (e.g. Lauer, 1960; Munden 1966; Leeming 1969; See also section on Age/Experience/Sex of Driver discussed in the Literature Review, P. 2).

The data for this sample of automobile drivers shows that there is a relationship between youthfulness and the incidence of accidents as indicated by the MA driver group and, to a lesser extent, by the FA driver group with the age of about 25 years and under forming a cut-off or critical turning point. It would seem that after the age of about 25 a turning point is reached and a change occurs in that young drivers have by that time lost some of the 'first flush of youth', matured, gained driving experience or been eliminated from their driving career. Whatever may be the cause, a decline of accident incidence occurs.

At the other end of the age spectrum, the accident incidence begins its climb again owing to such factors as general bodily deterioration. But, as this sample of automobile drivers is composed, for the main part, of young university students, this second ascent can only be presumed to occur as gathered from other research findings (e.g. Munden 1966; Cresswell and Froggatt 1963).

A further difference that occurs is in the age structure of the accident and accident free driver groups with the former, on the whole, being younger. This may be significant in relation to attitudes, general maturity and stability of behaviour in relation to the incidence of accidents.

The FA driver group of this sample is mainly aged 20 years and under, the MA driver group mainly aged up to 25 years of age whilst the MAF and FAF driver groups have an age range of up to 60+ years.

The relationship between age and the incidence of accidents formed an exploratory investigation with no specific hypothesis being postulated.

From these data for this sample of automobile drivers, a relationship between youth and the incidence of accidents is indicated reaching a peak in the 21 to 25 age range for the MA driver group and reaching a peak for the FA driver group in the 20 years and under age range.

Factors that would contribute to this accident toll in those drivers at the peak of their potential vitality and skill would be inexperience of driving and the driving situation or as it may be termed 'lack of road sense' although Tillmann (1948) found that youth rather than inexperience caused driver accidents, immaturity, thrill seeking, poor driving skill, instability of temperament, moods and emotions, reckless behaviour etc., all possible signs of youthfulness.

HYPOTHESIS III

ii) To investigate -

> 'The relationship between level of aggression and accident frequency testing the null hypothesis (H_0) that there is no relationship against the alternative hypothesis (H_1) that the relationship between level of aggression and accident frequency will be non-linear.'

An assessment of the level of aggression and its relationship to accident frequency was ascertained by piecing together data from various measures used in this study as follows:-

1) Biographic Questionnaire, Part II, Item 29 concerning accident record

2) Parry's AG(Aggression) Scale

3) NSQ E (Submission-Dominance) Component

4) NSQ I (Sensitive-Tough) Component

1) Biographic Questionnaire

In Part II of the Biographic Questionnaire, Item 29, each driver subject gave an account of his/her driving record during the last 5 years of driving experience and from this subjective account driver subjects were divided into the following driver groups -

MA Driver Group n =	67
MAF Driver Group n =	58
FA Driver Group n =	22
FAF Driver Group n =	59
Total N =	206

Further driver group combinations were made according to sex of driver and accident category as follows:-

M(A+AF) Driver Group n =	125
F(A+AF) Driver Group n =	81
Total N =	206

A (M+F) Driver Group n =	89
AF(M+F) Driver Group n =	117
Total N =	206

Brief causes were given of accidents incurred during the last 5 years of each subject's driving experience. Responsibility for the accident was not considered although an arbitrary judgement was made as to whether the accident was deemed to have been preventable or not, with the majority of incidents considered to have been avoidable or non-essential occurrences for both the MA and FA driver groups, especially the former.

From the stated causes of accident it was deduced that the MA driver group tended to sustain very serious or serious accidents whilst driving as opposed to the FA driver group who tended to sustain accidents whilst driving categorised as being of a minor nature.

Some of the main stated causes of accidents whilst driving for the MA group were alcohol, inexperience, speed, carelessness etc., whilst for the FA driver group some of the main reported causes of accidents that had occurred whilst driving were general misjudgement e.g. backing into a lamp-post or garage door, being hit whilst stationary as, for example, whilst waiting for the traffic lights to change from red/amber, road/weather conditions.

This indicates a difference between the MA and FA driver groups as regards the type of accident sustained whilst driving during the last 5 years of driving experience, with an additional contributing factor for the former driver group of a generally higher activity level than the latter. This is borne out by data from the Semantic Differential technique included in the Biographic Questionnaire rating self-concept as a driver (See Results, P. 173 for the Semantic Differential).

2) Parry's AG (Aggression) Scale

Profile I (P. 156) based on mean score data given in Table I (P. 155) gives profiles for the MA, MAF, FA and FAF driver groups according to mean scores obtained for the NSQ and Parry AG/AN Scale variables (7 in all).

From Profile I it can be seen that the MA driver group obtained a high mean score on Parry's AG Scale measuring level of aggressive attitude toward driving and other drivers. The FA driver group indicates low aggressive tendencies towards driving and other drivers as rated by Parry's AG Scale. The two accident free driver groups retain an intermediate position between the two accident driver groups of this sample of automobile drivers.

These data indicate that whilst aggressive attitudes of the MA driver group are probably a contributory factor to their accident record, lack of aggressive tendencies might be a contributory accident factor of the FA driver group.

This is an interesting finding with these two extremes of the MA and FA driver groups being found according to Parry's AG Scale rating situational aggression, with the MAF and FAF driver groups, particularly the latter, showing more moderate attitudes of aggression towards driving and other drivers.

3) NSQ E (Submission-Dominance) Component

The finding that emerges for the NSQ E Component is that the MA driver group tended to obtain a low to moderate mean score for this variable signifying a tendency towards dominance, assertiveness, competitiveness, aggressiveness and even pugnacity (See Profile I, P. 156).

On the other hand, the FA driver group and even more so the FAF driver group, obtained a high mean score on the NSQ E Component indicating dependence, lack of aggression, submissiveness and unassertiveness.

What shows up in Profile I (P. 156) for the NSQ E Component is the difference between male (A+AF) and female (A+AF) drivers. Male drivers are, on the whole, aggressive, dominant, assertive etc., whilst female drivers, in general, tend to be submissive, unassertive, complaisant etc.

4) NSQ I (Sensitive-Tough) Component

The NSQ I (Sensitive-Tough) component (See Profile I, P. 156) has occassionally been referred to as the femininity versus masculinity dimension although this is only one aspect of this dichotomy and should not be used alone to establish, for example, femininity or homosexuality.

This component of the NSQ shows even more clearly than the NSQ E (Submission-Dominance) Component discussed above, the difference between male and female drivers. The MA and MAF driver groups indicate the tendency towards toughness, lack of sensitivity, practical 'no-nonsense' characteristics. The two female driver groups, particularly the FA driver group, indicate the tendency towards great sensitivity, kindliness, over-protection and tender-mindedness.

Thus, drawing together the data from the various measures used in this study of the automobile driver and accidents in relation to biographical, attitudinal and personality factors, the picture that emerges is that of the MA driver group particularly, and to a lesser extent the MAF driver group being aggressive, self-assured, self-confident, belligerent and dominant. On the other hand, the FA driver group, and to a lesser extent the FAF driver group, tends to be submissive, sensitive and lacking in aggressive tendencies.

Again, it can be seen that the two accident driver groups, that is MA at one extreme and FA at the other, hold extreme positions with the two accident free driver groups, that is MAF and FAF, holding an intermediary, more moderate one.

This investigation was undertaken concerning the relationship between level of aggression and accident frequency. Correlation between Parry's AG (Aggression) Scale variable and accident frequency was not found to be significant using Pearson's product moment correlation technique. However, this does not necessarily mean that there is not a relationship between level of aggression and accident frequency but that the relationship may be non-linear as Pearson's correlation technique has linearity as its basic assumption.

In fact, piecing together the data there does, indeed, appear to be a relationship between the level of aggression and accident frequency differing as between MA and FA drivers.

There is a relationship between level of aggression and accident frequency but the variation in the level of aggression would seem to be a contributory factor towards the incidence of accidents and probably the type of accident sustained whilst driving.

For the MA driver, the high level of aggression according to both situational and general personality measures would be a contributory factor resulting in an accident record. For the FA driver group, the opposite applies with lack of aggression, submissiveness and lack of confidence being indicated by both situational and general personality measures and playing a contributory part in accident record.

Thus, a differing picture emerges for the MA and FA driver groups with a relatively high level of aggression being significant for the former and low level of aggression being significant for the latter driver group in relation to accident frequency.

The null hypothesis (H_o) that there is no relationship between level of aggression and accident frequency is rejected whilst the alternative hypothesis (H_1) is supported that there is a non-linear relationship between the level of aggression and accident frequency, with the qualifications mentioned.

HYPOTHESIS III

iii) To investigate -

> 'The relationship between the level of anxiety and accident frequency testing the null hypothesis (H_o) that there is no relationship against the alternative hypothesis (H_1) that the relationship between level of anxiety and accident frequency will be non-linear.'

An assessment of the level of anxiety and its relationship to accident frequency was ascertained by piecing together data from various measures used in this study as follows:-

1) Biographic Questionnaire, Part II, Item 29 and the following items that tie in with anxiety feelings in the driving situation:

   Item 23 What behaviour of other drivers makes you feel anxious

   Item 22 Reaction in a stressful situation

   Item 32 Reaction after the experience of a 'near miss'.

   Item 25 Whether smoke or not

   Item 26 Average number of cigarettes smoked by smokers

2) NSQ Total Anxiety Score

3) NSQ An (Anxious-Not Anxious) Component

4) Parry's AN (Anxiety) Scale

1) Biographic Questionnaire

In Part II of the Biographic Questionnaire, Item 29, each driver subject gave an account of his/her driving record during the last 5 years of driving experience and from this the driver sample was divided into the following 4 driver groups:-

MA	Driver Group	n =	67
MAF	Driver Group	n =	58
FA	Driver Group	n =	22
FAF	Driver Group	n =	59
	Total	N =	206

Four further driver group combinations were formed according to sex of driver and accident category as follows:-

M(A+AF)	Driver Group	n =	125
F(A+AF)	Driver Group	n =	81
	Total	N =	206

A(M+F)	Driver Group	n =	89
AF(M+F)	Driver Group	n =	117
	Total	N =	206

In Item 29 of the Biographic Questionnaire, brief causes were given of accidents incurred whilst driving during the last 5 years of the subject's driving history and it was found for the MA driver group that accidents sustained tended to be of a very serious or serious nature and were usually deemed, by arbitrary decision, to have been preventable or non-essential occurrences. This differs from apportioning responsibility for the incident to one part or another. The FA driver group, on the other hand, tended to sustain accidents of a minor nature during the last 5 years of their driving experience, often of a preventable or avoidable type.

Some reported accident causes for the MA driver group were speed, alcohol, inexperience, inattention etc., whilst for the FA driver group some stated causes of accidents whilst driving were general misjudgement, being hit whilst stationary or being hit by a drunken driver.

On the whole, the level of activity for the types of accidents incurred by male and female drivers is seen to differ following the general trend of personality traits indicated for the respective sex of the driver group. For example, there is evidence from the data for the Semantic Differential Scale included in the Biographic Questionnaire rating self-concept as a driver that indicates that male drivers, especially the MA, have a higher level of activity in rating this concept than female drivers do, especially the FA driver group (See Results, P. 173 for the Semantic Differential).

For reaction following a 'near miss' whilst driving (Item 32) and reaction in a stressful situation (Item 22) anxiety as such was not stated to be one of the reactions experienced by any of the 4 driver groups in this sample.

For all driver groups commenting on the behaviour of other drivers that made them feel anxious in the driving situation (Item 23), erratic driving and unpredictable drivers headed the poll, followed by such factors as speed, being followed too close, reckless driving, poor driving skill etc. This forms an interesting list especially in view of the fact that speed and inattention, for example, as well as alcohol were stated causes of accidents incurred by the MA driver group, yet these very same factors appeared to arouse anxiety in this group of drivers.

It would seem that many behaviours of other drivers arouse anxiety in this sample of drivers regardless of driver category.

A further factor emerges in respect of smoking (Items 25 and 26). Proportionately, the FA driver group smoked the most with over one third of this group of 22 drivers being smokers whilst only about 16 per cent of the MA, MAF and FAF driver groups were smokers.

On average, the smokers of the FA driver group smoked 15.75 cigarettes per day compared with the MA driver group's average of 10.18 cigarettes per day which was the lowest average of cigarettes smoked daily for the 4 driver groups. Of course, this was a sample of mainly university students and so economic factors may well act as a restriction on the number of cigarettes smoked.

However, bearing this in mind, the behavioural pattern for smoking of the FA driver group may be due to the reasonably high level of tension, anxiety, nervousness and lack of confidence displayed, on the whole, by this group with the reverse situation applying to the MA driver group displaying relative freedom from anxiety, tension and worry and moderate cheerfulness.

2) NSQ Total Anxiety Score

The NSQ Total Anxiety Score forms a composite of the following 4 NSQ dimensions:-

NSQ I Component - Sensitive-Tough Dimension

NSQ F Component - Depressed-Cheerful Dimension

NSQ E Component - Submissive-Dominance Dimension

NSQ An Component - Anxious-Not Anxious Dimension

Table I (P. 155) shows that the FA and FAF driver groups are high in overall anxiety according to this personality measure of general anxiety status. The NSQ Total Anxiety Score is a composite of the 4 NSQ components given above. The total neuroticism score is really a mosaic, a mixture of essentially unrelated ingredients, each of which must be assessed if the mixture is to be understood thoroughly. What the total meuroticism score does is to indicate the probability of whether it belongs in the neurotic category or not. The total neuroticism score for quick screening and assessment gives a most broadly based and reliable estimate of further action that may be necessary such as the need of treatment or of further testing.

For this study of automobile drivers and accidents, the NSQ as a measure of free-floating or general anxiety trends was included not only to measure anxiety trends but also to complement Parry's AN (Anxiety) Scale measuring situational or specific anxiety trends within the driving situation.

Calculations for the Total NSQ Anxiety Score were based on raw score data. Table I (P. 155) indicates the relatively high level of overall anxiety for the FA and FAF driver groups for the Total NSQ Anxiety Score. The MA and MAF driver groups, especially the former, show relatively low overall anxiety tendencies.

In general, level of anxiety and tension, low in the male and fairly high in the female driver, is a characteristic difference found between the two and this difference of anxiety level is highlighted by these data for drivers of this sample. Men and women are generated by different levels of anxiety and tension, and the latter, especially those of child-bearing years, are usually subject to fairly regular cyclic fluctuations of anxiety and tension.

3) NSQ An (Anxious-Not Anxious) Component

Profile I (P. 156) based on mean score data presented in Table I (P. 155) shows that the differentiation between the MA, MAF, FAF and FA driver groups for the NSQ An Component is not marked.

The FA driver group indicates the highest level of anxiety on this dimension of the NSQ closely followed by the MAF driver group. The MA and FAF driver groups as rated by the NSQ An dimension obtained the same mean scores.

In fact, the 4 driver groups indicate a moderate degree of general anxiety as the spread of mean scores between them is not great. A moderate NSQ An mean score would signify a moderate degree of anxiety, excitability, irritability etc. The FA followed by the MAF driver group displays these characteristics to a slightly more pronounced degree than the FAF and MA driver groups do.

4) Parry's AN (Anxiety) Scale

Mean scores obtained on Parry's AN (Anxiety) Scale measuring situation anxiety as regards attitudes towards driving and other drivers for the MA, MAF, FAF and FA driver groups were not high or widely spread. The FAF and FA driver groups obtained the highest mean score followed by similar mean scores for the MA and MAF driver groups.

There is even less differentiation among mean scores of the driver groups obtained for Parry's AN Scale measuring anxious attitudes in the driving situation than there was found to be for the NSQ Total Anxiety and the NSQ An Component mean scores, measuring general or free-floating anxiety.

The two female groups of drivers do show rather higher anxiety attitudes towards driving and other drivers according to Parry's AN Scale than the two groups of male drivers in this sample of automobile drivers do. Correlations between the NSQ An and Parry's AN variables were found to be significant and findings are discussed in a later section of this hypothesis (See Hypothesis III, v)b, P 238).

In general, for the level of the anxiety and its relationship with accident frequency, the FA driver group inidcates a moderate to high degree of overall anxiety and tension whilst the MA driver group displays the reverse tendency with rather low levels of anxiety both general and situational.

A study was made in the USA of drivers employed by a large trucking company (Moffie et al., 1952; Alexander, 1953). One conclusion from this study was that a significant tendency to be free of worry and tension appeared to be associated with a high record of accidents. This finding is pertinent to the data obtained for the MA driver group of this sample of automobile drivers.

A conclusion that might be drawn from these data is that lack of anxiety in the MA driver group is possibly a contributory factor in their accident record whilst the rather high amount of general anxiety and tension feelings of the FA driver is pertinent as a contributory factor to their accident experience and record.

It would seem that there is a relationship between the level of anxiety and accident frequency. Using Pearson's product moment correlation technique findings were not significant for the relationship between Parry's AN variable and accident frequency.

However, this does not mean that there is not a relationship between anxiety and accident frequency but that the relationship may be non-linear as Pearson's correlation technique has linearity as its basic assumption. Drawing together the data like pieces in a jig-saw puzzle, a relationship between anxiety level and accident frequency is indicated but differs as between the MA and FA driver groups of this sample of automobile drivers.

The level of anxiety associated with the relationship with accident frequency varies as, indeed, it was found to do between the level of aggression and accident frequency discussed above. But, this difference of anxiety level is not so marked according to the measures used in this study as it was for level of aggression.

With the MA driver group the generally low level of anxiety and freedom from worry and tension is probably a contributory accident factor whilst for the FA driver group the somewhat high level of anxiety acts as a contributory factor in the accident process. Thus, there is a difference to be noted between the level of anxiety and the relationship with accident frequency as between MA and FA driver groups.

The null hypothesis (H_o) that there is no relationship between the level of anxiety and accident frequency is rejected whilst the alternative hypothesis (H_1) that there is a non-linear relationship between the level of anxiety and accident frequency is supported, with the qualifications mentioned.

HYPOTHESIS III

iv) 'An exploratory investigation into the nature of the relationship between Parry's AG (Aggression) and Parry's AN (Anxiety) Scale variables.'

The nature of the relationship between Parry's AG (Aggression) / AN (Anxiety) Scale variables was investigated on an exploratory basis. (See Section on Results, P. 197). Pearson's product moment correlation technique was used for this purpose (See Section on Treatment of Results, P. 98).

Only one significant relationship was found between Parry's AG/AN variables for the 4 driver groups and for the 4 driver group combinations as follows:-

Parry's AG/AN Variables MA Driver Group $r = +.255$ $p = .05$ s

A positive relationship indicates that an individual scoring high on one variable tends to score high on a second variable and vice versa.

A low positive correlation was found between Parry's AG and AN variables at a significant level for the MA driver group but there were no significant findings for the other driver groups as regards correlation between these two variables of aggression and anxiety.

The finding for the MA driver group suggests that mean scores obtained on Parry's AG/AN Scale were moderately high or low on both variables for this driver group. The indication is that there is a significant degree of aggressive and anxious attitudes towards driving and other drivers for the MA driver group (See Profile I, P. 156, and Profile Ia, P. 158, profiles based on NSQ and Parry's AG/AN variables).

Apart from this one significant finding the data for the correlations between Parry's AG and AN variables for the other driver groups suggest that these two variables are relatively independent of each other. In fact, this is what would be expected to be the case.

The data in this study of automobile drivers and accidents in relation to biographical, attitudinal and personality factors gives confirmation of Parry's finding regarding the variables of aggression and anxiety, particularly for the MA driver group where a significant, low positive correlation was found between Parry's AG and AN variables.

This was an exploratory investigation into the nature of the relationship between Parry's AG (Aggression) and AN (Anxiety) Scale variables and the finding was that these two variables were relatively independent of each other except for the MA driver group where confirmation is given of Parry's (1968) finding that there was a tendency for high aggression whether or not combined with high anxiety to make for greater accident liability.

HYPOTHESIS III

v) The exploration of two relationships with no specific hypotheses being postulated -

a) To investigate the relationship between the NSQ E (Submission-Dominance) and Parry's AG (Aggression) variables

b) To investigate the relationship between the NSQ An (Anxious-Not Anxious) and Parry's AN (Anxiety) variables

a) The Relationship Between the NSQ E (Submission-Dominance) and Parry's AG (Aggression) Variables

Moderate negative correlations at a level of statistical significance were found between the NSQ E and Parry's AG variables for the MA, MAF, FAF and FA driver groups as well as for the 4 driver group combinations of M(A+AF), F(A+AF), A(M+F) and AF(M+F), (See Section on Results, P. 190, Exploratory Investigations).

A negative relationship means that individuals scoring low on one variable tend to score high on a second variable and vice versa.

In this case, the FA and FAF driver groups tended to obtain high mean scores on the NSQ E Component and a low mean score on Parry's AF Scale. The reverse trend occurs for the MA and MAF driver groups tending to obtain moderately low mean scores on the NSQ E Component and high mean scores, especially the MA driver group, on Parry's AG Scale variable, (See Profile I, P. 156, based on mean score data given in Table I, P. 155).

For the 4 driver group combinations an interesting situation occurs whereby the F(A+AF) and AF(M+F) driver groups tend to score fairly high on the NSQ E variable and fairly low on Parry's AG variable whilst the M(A+AF) and A(M+F) driver groups tend to obtain lower NSQ E mean scores and higher Parry's AG variable mean scores (See Profile Ia, P. 158, based on mean score data presented in Table Ia, P. 157).

Profile I (P. 156) showing NSQ E and Parry AG variables in relation to other NSQ and Parry AN variables for the MA, MAF, FAF and FA driver groups, indicates male driver characteristics as being aggressive, dominant and assertive whilst female driver traits tend to be those of submission, unassertiveness and lack of aggression.

The finding is interesting that a general personality variable, the NSQ E, and a specific or situational personality variable, Parry's AG, were significantly correlated. What seems to emerge is 'stereotype' male and female characteristics in this sample of automobile drivers.

Profile Ia (P. 158) of the 4 driver group combinations indicates a different situation whereby female/accident free and male/accident characteristic qualities show similar trends. Female/accident free drivers tend to be rather submissive and non-aggressive whilst male/accident drivers indicate dominant, aggressive, assertive tendencies.

These findings are interesting and offer a clear-cut difference between male and female driver characteristics as well as male/accident and female/accident free ones. In general, what might be described as 'masculine' and 'feminine' qualities are indicated with the former being associated with male drivers, particularly the MA driver group and to a lesser extent seen with the male/accident driver category, whilst, on the other hand, the latter traits are found to be associated with female drivers, especially the FA driver group and to a lesser extent with the female/accident free driver category.

What occurs is that the MA and FA driver groups differ distinctly with the former found to show aggressive, dominant, etc., tendencies, whilst the latter were found to be submissive, sensitive etc., rather like two ends of a pole. To a lesser extent this is also seen with the male/accident and female/accident free driver characteristic trends.

Significant correlations were found between the NSQ E and Parry's AG variables; and, stereotype male and female characteristic tendencies were found to be displayed.

No specific hypothesis was postulated as this was an exploratory investigation as regards the relationship between the NSQ E (Submission–Dominance) and Parry's AG (Aggression) variables. A moderate, negative correlation was found to exist at a significant level between these two variables for the MA, MAF, FAF and FA driver groups as well as for the 4 driver group combinations of M(A+AF), F(A+AF), A(M+F) and AF(M+F) driver groups (See Section on Results, P. 190).

HYPOTHESIS III

b) The Relationship Between the NSQ An (Anxious-Not Anxious) and Parry's AN (Anxiety) Variables

A moderate positive correlation was found to exist between the NSQ An and Parry's AN variables for the MA, MAF, FAF and FA driver groups as well as for the 4 driver group combinations, namely the M(A+AF), F(A+AF), A(M+F) and AF(M+F) driver groups (See Section on Results, P. 190 - Exploratory Investigations).

A positive relationship means that an individual scoring high on one variable tends to accompany this by a corresponding high score on a second variable and vice versa.

Profile I (P. 156) based on data presented in Table I (P.155) shows that differentiation of mean scores is not pronounced for these two variables among the MA, MAF, FAF and FA driver groups. Profile Ia (P. 158) based on data presented in Table Ia (P. 157) shows that when driver groups are combined according to sex of driver and accident category there is even less differentiation among the mean scores obtained by the driver groups for the NSQ An and Parry AN variables except for the A(M+F) driver group with a low mean score obtained for Parry's AN variable.

It would seem that there is consistency here in that female, that is FA and FAF, drivers and to a lesser extent the female/accident free driver groups tended to obtain moderate mean scores for the NSQ An variable and fairly low mean scores for Parry's AN variable. The same applies to male, that is MA and MAF, drivers and to a lesser extent male/ accident drivers as regards mean scores obtained for the NSQ An and Parry AN variables with the tendency to obtain moderate mean scores for the former variable and fairly low mean scores for the latter variable (See Profile I, P. 156, and Profile Ia, P. 158).

The NSQ An Component measures anxiety as a general or free-floating dimension, whilst Parry's AN Scale rates specific or situational anxiety. It is interesting to note that these two variables, one general and one specific, were found to correlate significantly.

From the data for these two variables the picture that emerges is that of female, that is FA and FAF not FA plus FAF, drivers having a fair degree of anxiety, tension and frustration, displayed to a lesser extent by the female/accident free driver groups, that is F(A+AF) and AF(M+F).

On the other hand, male drivers, that is MA and MAF particularly the former, and the male/accident, particularly the A(M+F), driver groups show tendencies towards lack of tension, anxiety and worry, both generally and specifically.

What is illustrated again here is female and male characteristic

qualities with these two variables of anxiety as was also the case with the NSQ E and Parry AG variables discussed in (a) above (P. 236).

No specific hypothesis was postulated as this was an exploratory investigation as regards the relationship between the NSQ An (Anxious-Not Anxious) and Parry's AN (Anxiety) variables. A moderate positive relationship at a significant level was found to exist between these two variables for the MA, MAF, FAF and FA driver groups as well as for the 4 driver group combinations of M(A+AF), F(A+AF), A(M+F) and AF(M+F) driver groups.

Discussion of Results - Concluding Comment

In the foregoing Discussion of Results (P. 201) many interesting findings have emerged concerning male and female driver personality qualities as well as what might be termed as 'accident' and 'accident free' personality factors, measured both in a general and specific way.

Male/accident and female/accident free characteristic qualities of driver groups were found to be associated. Typical male and female traits that are shown to exist in this sample of automobile drivers might be even further exaggerated in the role of driver and in the driving situation generally. Even if such characteristic trends are not more accentuated than in the 'non-driving' situation, they can be of considerable potential danger whether individuals 'drive as they live' or alternatively 'drive as they would like to live', in an effort to work out and through pent up tensions and emotions.

Male and female driver characteristics have shown up like two sides of a coin or like being at opposite ends of a pole or yardstick with the MA driver group at one end and the FA driver group at the other with the two accident free driver groups, that is the MAF and FAF, being ranged somewhere in between.

SECTION 7

SUMMARY AND CONCLUDING STATEMENT

'There is no such thing as an accident.
What we call by that name is the effect
of some cause which we do not see'

Voltaire.

'We have learned that almost everywhere
we examine the traffic problem, things
are not what they seem.'

Dr. R.K.Y.Dusinberre

'If preventable, why not prevented?'

Edward VII

SUMMARY AND CONCLUDING STATEMENT

CHAPTER XXVII

SUMMARY

In considering the results obtained from this study of automobile drivers and accidents in relation to biographical, attitudinal and personality factors, it must be borne in mind that a sample of drivers taken from a university population comprises a somewhat different case, at least in some respects, than if a sample of automobile drivers had been taken from the general driving population or if professional drivers had been studied.

This study consisted of a sample of 206 licensed automobile drivers drawn from a university population, divided during the analysis of data into the following 4 driver groups:-

MA	Driver Group	n	= 67
MAF	Driver Group	n	= 58
FAF	Driver Group	n	= 59
FA	Driver Group	n	= 22
	Total	N	= 206

The 4 driver groups above were combined on the basis of sex of driver and accident category to form the following 4 driver group combinations:-

M(A+AF)	Driver Group	n	= 125
F(A+AF)	Driver Group	n	= 81
	Total	N	= 206

A(M+F)	Driver Group	n	= 89
AF(M+F)	Driver Group	n	= 117
	Total	N	= 206

In this study of the automobile driver and accidents in relation to biographical, attitudinal and personality factors, a particular focus was played upon the personality traits of aggression and anxiety, both in a general and specific sense although not to the exclusion of other personality variables.

A widespread publicity campaign on the university campus was embarked upon in which licensed automobile driver subjects, both university staff and students, were invited to participate in this research. Subjects taking part did so on, to coin a phrase, 'a random volunteer' basis. All of those driver subjects presenting themselves were requested to fill in three questionnaire forms namely -

i) Biographic Questionnaire including a Semantic Differential Scale rating self-concept as a driver

ii) NSQ or Neuroticism Scale Questionnaire

iii) Parry's AG (Aggression) / AN (Anxiety) Scale

Data obtained from these measures above covered biographical, attitudinal and personality factors.

Admittedly, those driver subjects volunteering to take part in this survey probably differed in some way from those not volunteering to do so. The issue of the difference between volunteers and non-volunteers for this or any other similar study, is a study in itself. But this topic is not considered here and it was found, as it happened, on later analysis of data that there was a good mixture of those with and without driving records during the last 5 years of their driving experience, if indeed they had been driving that long, to give some indication of the likely proportions between accident and accident free drivers as well as between male and female drivers.

If interest to participate had mainly been aroused in driver subjects with clear accident or driving offence records, then there would have been a bias in that direction. But this did not occur. In fact, there was rather the reverse tendency. Of course, it may be that those driver subjects with driving records hoped that by taking part that they may help themselves and, in an altruistic way, others to avoid similar experiences.

From the wealth of data collected for this sample of drivers, some general conclusions may be reached concerning the incidence of accidents whilst driving in relation to biographical, attitudinal and personality factors.

One important finding is that it transpires that there is not just a typical 'accident' driver personality type as opposed to an 'accident free type'. Two typical driver personality profiles were found to emerge for the MA and FA driver groups of this sample of automobile drivers, besides the MAF and FAF driver personality types. In effect, this means that there are three, possibly four, rather than just two typical personality types among drivers as was previously conceived, namely an accident and accident free type (See Profile I, P. 156 ; Discussion of Results, P. 205, Hypothesis I).

When the 4 driver groups, that is MA, MAF, FAF and FA, are combined according to sex of driver and accident category, the finding that emerges is that female/accident free and male/accident driver characteristics indicate similar trends (See Profile Ia, P. 158, and Profile IIa, P. 177).

The typical personality profile of the MA and FA driver as found in this sample of university automobile drivers will now be presented in the form of a pen-picture of each type. A summary table of the data from which these pen-pictures have been drawn is given in Appendix G (P. 332). This summary table is divided into sections as follows:-

a) Biographical Factors - e.g. driving record, education, behaviour patterns such as smoking, drinking, car/vehicle maintenance etc.

b) Attitudinal Factors - e.g. attitudes towards driving and other drivers, self-estimation of driving ability etc.

c) Personality Factors - e.g. overall anxiety status.

When drawing the following pen-pictures for the typical MA and FA driver personality type, the three sections above of the summary chart (See Appendix G, P. 332) have been adhered to and form a guided outline to make a composite unit with the endeavour to give a relatively clear portrayal of the typical MA and FA driver personality type as found in this sample of automobile drivers.

Pen-Pictures of the Typical MA and FA Driver Personality Type

1) Typical MA Driver Personality Type

The typical MA driver as found in this sample of licensed university automobile drivers is 25 years of age and under, single, with U.E. (University Entrance) or H.S.C. (Higher School Certificate) as his highest educational qualification. He is a full-time student in his first or second year of university study for a Bachelor's Degree in Science including Horticulture, Agriculture, Veterinary Science etc.

His hobbies are predominantly sport, technical such as car maintenance, electronics, model aeroplane, railway and boat making, artistic and literary pursuits and social activities (e.g. talking, drinking, gambling etc.). His average number of other interests besides hobbies is 1.83 including such things as poultry, politics, dog trials/training, travel, sunbathing/beach, ski diving, hand-gliding and vegetarianism.

The vintage of car/vehicle that he normally drives is a 1961 or later model with an engine capacity of up to 2000 c.c. (cubic capacity) covered by comprehensive insurance and of white/cream, blue/aqua or green colour, respectively. As an aside and adjunct to the colour of automobile usually driven by the typical MA driver, his favourite colour, in order of priority, is blue/turquoise, green, yellow/orange/gold and other/no preference.

The health status of the typical MA driver is very good to good and driving is seldom found to be tiring.

A typical behaviour pattern of the MA driver is regular car/vehicle maintenance. When driving he nearly always wears a seat-belt. In a stressful situation his usual reaction is to maintain self-control and after the experience of 'a near-miss' when driving his usual reaction in order of priority is educational, physiological, emotional, relief or some other reaction such as to slow down, to try and forget the incident or a reaction of the 'near-miss' having had no effect.

The typical MA driver does not usually smoke, but if he does the average number of cigarettes smoked daily is 10.2. Alcohol is imbibed on a relatively frequent basis and the typical MA driver is rarely a tee-totaller.

As regards driving experience and record, the main method of learning to drive is tuition from friends and/or relatives. The MA driver manages to obtain his driving licence on the first time of taking his driving test which he feels to be inadequate. 7.2 years is the average length of time of his having held a driving licence.

The typical MA driver is an AA (Automobile Association) member or member of a similar motoring organisation and, as a rule, he has not attended a course in the art of defensive driving. He enjoys driving especially the thrills and risks of modern driving and prefers to have company when driving.

The typical MA driver is likely to have had his driving licence suspended and to have been convicted for one or more driving offences. The main type of driving offence committed is speeding as well as others such as dangerous driving and general carelessness (e.g. not possessing a current driving licence, no Warrant of Fitness (W.O.F.), not stopping at a stop sign or going through a red/amber traffic light).

The annual mileage clocked up by the typical MA driver is estimated to be between 3,000 to over 10,000 miles per annum mainly driven on a combination of rural and city roads.

The type of accident incurred by the typical MA driver during the last 5 years of his driving history is likely to have been of a very serious or serious nature and often he has experienced more than one accident whilst driving during this time. On the whole, the majority of confrontations or incidents sustained whilst driving were deemed to have been preventable or 'non-essential' events had due care been taken.

Typical causes of accidents experienced and reported by the MA driver included alcohol, inattention, carelessness, inexperience and speed. There was found to be a significant difference, using chi square, between the observed and expected frequency of accidents sustained by MA and FA drivers in the ratio of 3:1, respectively.

The typical MA driver considered that road accidents are most often caused by driver failure, alcohol, road conditions and speed, respectively. In order of priority, the causes of accidents for which drivers were thought by the MA drivers to be most often responsible were alcohol, poor driving skill, disregard of traffic rules and speed.

Concerning the estimation of his driving ability and capability, the typical MA driver feels that he sometimes or seldom makes errors when driving and that for the errors that do occur when driving he tends to place the blame on the other driver, more often than not. His self-rating as a driver is that of being very good to good. The typical MA driver feels that his driving judgement is of an excellent to good standard and that he can always or often make quick and accurate decisions in the driving situation.

Disregard of traffic rules and disregard of others were prime causes of inciting angry feelings in the typical MA driver in respect of the behaviour of other drivers. Other items of behaviour of other drivers that made him feel angry were speed, both fast and slow, no proper indications, not dipping headlights at night and general inconsiderateness.

Behaviour of other drivers that made the typical MA driver feel anxious primarily was erratic and unpredictable driving and drivers.

Also included in this list of behavioural factors of other drivers that made the typical MA driver feel anxious were poor driving skills, incompetent drivers, lack of road courtesy, risky/dangerous overtaking and traffic officers.

The typical MA driver when given the opportunity to give any other comments, views, opinions etc., concerning driving and the driving situation felt that there should be a periodic driving licence re-test and a compulsory defensive driving course. He felt that there should be stiffer penalties for such offences as drinking and driving although he tended to feel that prevention was better than cure. As regards male and female drivers, the typical MA driver felt that they were of equal driving ability.

Overall, the typical MA driver is relatively free from tension, worry and anxiety, being a somewhat cheerful, dominant, assertive, tough, competitive, outgoing and even pugnacious individual. Situational anxiety in respect of attitudes towards driving and other drivers was at a low level.

As regards aggressive attitudes in the motoring situation towards driving and other drivers, the typical MA driver has a relatively high level of aggression.

The typical MA driver rating his self-concept as a driver holds a fairly positive concept of himself in this capacity with relatively high ratings on the three semantic factors of evaluation, activity and potency.

Summary - Typical MA Driver Personality Profile

The typical personality profile of the MA driver shows a youthful, somewhat immature and emotionally unstable individual, lacking sufficient experience in the skilled art of driving.

As a driver he is confident to the point of over-confidence in his self-estimation of his driving abilities and capabilities with a fairly positive self-concept of himself in this role.

Ironically, the typical MA driver incurred accidents whilst driving reported to have been caused by such factors as alcohol, speed, inexperience etc., yet he considered that road traffic accidents for which the driver was most often responsible were caused by these same factors. He considered that road traffic accidents, in general, were most often caused by driver failure and alcohol, followed by road conditions and speed. The responses given for the causes of road traffic accidents by the typical MA driver may well have been prompted, consciously or unconsciously, by the influence of his own accident experience.

The typical MA driver is aggressive, competitive, dominant, tough, lacking in sensitivity and outgoing with a youthful exuberance and love of life.

However, in order to continue living he needs to settle down, especially when driving, although it has been found that this 'settling down' may take about 5 years before 'the first flush of youth' of the male driver becomes tarnished after he has obtained his licence to drive, granting, of course, that he has not come to grief and has been able to survive that long in order to progress to a more stable existence.

2) Typical FA Driver Personality Type

The typical FA driver, as found in this sample of licensed university automobile drivers, is aged 20 and under, single with U.E. (University Entrance) / H.S.C. (Higher School Certificate) or Bursary/ G.C.E. 'A' Level(s) (General Certificate of Education Advanced Level(s)), as her highest educational qualification. She is a full-time student in her first or second year of university study for a Bachelor's Degree in Arts including Humanities and Social Sciences.

Her hobbies are mainly homecraft including gardening, cookery, sewing, knitting etc., sport, literary and musical pursuits. The average number of other interests she has is 2.7 including a range of things such as the sea/beach in summer and beautiful days, young children, their education and the problems of young mothers, travel, people/talking to people, community service, philosophy, religion, languages and overseas students.

The vintage of car/vehicle normally driven by the typical FA driver is a 1966 or later model of up to 2000 c.c. engine capacity and covered by comprehensive insurance. In order of priority, the colour of automobile normally driven is blue/aqua, red, yellow/orange/gold or other colour (e.g. brown, grey). As an offshoot, her favourite colour, in order of priority, is blue/turquoise, green or no preference/other.

The health status of the typical driver is very good to good and she sometimes finds driving tiring.

The typical FA driver checks and maintains her vehicle regularly and nearly always wears a seat-belt when driving. Her usual reaction in a stressful situtation is that of self-control and after the experience of 'a near-miss' when driving the typical FA driver's usual reaction is to take extra care, emotional or physiological, respectively.

The FA driver does not usually smoke but if she does the average number of cigarettes smoked daily is 15.8. As far as her consumption of alcohol is concerned, the typical FA driver seldom drinks and is more likely to be a tee-totaller.

The typical FA driver when learning to drive usually received professional plus instruction of relatives and/or friends or just tuition from relatives and/or friends. She passed her driving test on the first time of taking it to gain her driving licence and feels that the driving test is adequate. The average number of years she has held a driving licence is 6.8 years.

The typical FA driver is a member of the AA (Automobile Association) or similar motoring organisation and has not usually attended a course in the art of defensive driving. She enjoys driving usually although not the thrills and risks of modern driving and sometimes prefers to have company when driving.

The driving licence of the typical FA driver has not been suspended and on the rare occasion that she commits a driving offence this is usually of speeding.

Her estimated mileage annually varies between 1,000 to 10,000 miles per annum driven mainly on a combination of rural and city roads.

The accidents that the typical FA driver incurs whilst driving are usually of a minor nature and, after the first experience, another such incident is not the general rule. Accidents sustained whilst driving were deemed mainly to have been preventable or avoidable had due care been taken. Some reported causes of accident whilst driving are being hit in the rear whilst stationary, misjudgement such as backing against a lamp-post, road/weather conditions, falling asleep and being followed too closely.

The typical FA driver considered that road accidents were most often caused by driver failure, speed, and alcohol, respectively. Accidents for which the driver was considered to be most often responsible were thought to be due to speed, disregard of traffic rules and poor driving skill, in order of priority.

The typical FA driver feels that she often or sometimes makes errors whilst driving and for errors that do occur when driving she does not tend to blame the other driver. She rates herself as having a good to average driving standard, with good to average judgement in the driving situation although she is not too certain of her ability of being able to make decisions quickly and accurately in the driving situation.

The behaviour of other drivers that makes the typical FA driver feel angry primarily is disregard of traffic rules and disregard of the safety of others. Also, included in this list of behavioural factors of other drivers that incites anger in the typical FA driver are alcohol and its effects when driving, being followed too close, not signalling and tooting the horn especially when there is no apparent reason to do so.

Erratic driving and unpredictable behaviour on the road of other drivers are the prime cause of anxiety for the typical FA driver. Other behavioural factors of other drivers that also cause her anxiety include speed, the influence of alcohol, not signalling, tooting the horn and seeing the possibility of an accident without being able to do anything about it.

In making comments about driving and the driving situation, the typical FA driver indicated that she felt that the driving licence should be periodically re-tested and that there should be more education such as in defensive driving skills and about the effects of drinking and driving. She thought that the minimum age level of being able to obtain a driving licence should be raised from 15 to at least 18 years of age or perhaps even to 20 years of age. She felt that there should be stiffer penalties

for drinking and driving offences. As regards male and female drivers, the typical FA driver considered that male drivers take far more risks than female drivers who usually tend to be more patient and law abiding when driving.

The overall anxiety and tension status of the typical FA driver is fairly high and she tends to be sensitive, dependent, submissive, non-defensive and unassertive. In the motoring situation, the indication is that attitudes of anxiety in relation to driving and other drivers are not pronounced.

The typical FA driver is a non-aggressive individual as indicated by both general and specific or situational personality measures of this trait.

Rating her self-concept as a driver, the typical FA driver does not demonstrate a very positive concept of herself in this role with fairly low mean scores being obtained on the three semantic factors of evaluation, activity and potency. In fact her self-concept in the capacity of her role as a driver is one displaying lack of confidence, lack of certainty, force or activity.

Summary - Typical FA Driver Personality Type

The typical FA driver is young with characteristic traits that indicate her to be rather hesitant, uncertain, lacking in self-confidence and unassertive. She tends to be submissive, dependent, sensitive, fairly high in anxiety although not to a disabling degree, reticent, not boisterous, fairly serious, sober and tender-minded besides being a non-aggressive individual.

As a driver, the typical FA driver tends to lack confidence in her abilities and capabilities in this role although research has shown that the female driver tends to improve right from the beginning of gaining her licence to drive.

The typical FA driver is concerned about driving, the driving situation and the safety of others involved in it. The characteristic qualities that she displays in her typical personality profile would, at least to some extent, help to account for this sensitive concern.

General Comment - Typical MA and FA
Driver Personality Type

The two foregoing profiles or pen pictures drawn from the data presented in Appendix G (P.332) of the typical personality type of the MA and FA driver, deduced and compiled from biographical attitudinal and personality data gathered from the sample of automobile drivers participating in this research, highlight variations and similarities found to occur between these two typical driver personality types.

The findings that emerged from this study are most interesting, especially in view of the fact that at the outset of this investigation only the difference between an accident and accident free driver personality was postulated. The subsequent discovery was made following the analysis of data that there was not just one but two typical accident driver personality types as well as one, possibly two, typical accident free driver personality types. In addition, similar personality trends and differences were found to occur between male/accident and female/accident free drivers.

In fact, this makes for a far more complex situation than was originally conceived concerning driver personality types, which were found to vary in this sample of licenced automobile drivers taken from a university population divided into groups on the basis of sex and accident category.

It is not possible to determine and predict with complete certainty whether an individual driver might fall into one particular category or another, that is whether he might be accident or accident free.

However, following an actuarial prediction procedure, it is possible to produce some indicators of the likelihood that an individual driver might be a member of one or other accident group.

The following table outlines and lists some of the main characteristics likely to be possessed by the typical MA and FA driver personality as opposed to the typical MAF and FAF driver personality.

Full details of the differences found to exist between the typical MA and MAF as well as between the typical FA and FAF driver personality are presented in Appendix I (P.346) where significant differences found to occur between the typical MA and MAF, FA and FAF, MA and FA and MAF and FAF driver personality have also been indicated.

Summary Table of the Main Identifying Differences Found Between the Typical MA/MAF and FA/FAF Driver Personality

In the table given below, the following symbols have been used to indicate significant differences found to occur between the typical MA/MAF and FA/FAF driver personalities:-

△ = Direction of significant difference found between the MA and MAF driver

—— = Direction of significant difference found between the FA and FAF driver

Measuring Instrument	MA Driver	MAF Driver	FA Driver	FAF Driver
Biographical Factors				
Biographic Questionnaire				
Age	25 years and under	20 years and under		
Item 26				
Smokers daily cigarette average number	10.18	13.83	15.75	10.6
Item 28				
Alcohol Consumption	Fairly frequent/ rarely tee-total	Sometimes	Seldom or tee-total	Seldom
Driving Experience				
Item 3				
Average number of years driving licence held	7.16 years	7.43 years	6.77 years	9.46 years
Item 15ii				
Enjoyment of thrills/risks of modern driving	Yes	Sometimes	Sometimes	Seldom

	MA Driver (Cont)	MAF Driver (Cont)	FA Driver (Cont)	FAF Driver (Cont)
Driving Record				
Item 7				
Conviction for driving offence	△ Yes	Yes		
Item 8				
Average number of driving offences committed	.48	.34	.23	.12
Exposure to Driving				
Item 10i				
Estimate of mileage driven per annum (p.a.)	3000 to over 10,000 miles p.a.	7501 to 10,000 miles p.a.	1000 to 10,000 miles p.a.	500 to 1000 and 3001 to 4000 miles p.a.
Item 24				
Self-rating of driving standard	Very good to good	Good		
Semantic Differential				
Rating self-concept as a driver				
Semantic Factor				
A (Activity)	△ High A Factor	Low to moderate A factor	Low A Factor	Low to moderate A factor
		Attitudinal Factors		
Parry's AG (Aggression) Scale				
Rating aggressive attitudes towards driving and other drivers	△ High Aggression	Moderate Aggression	Low Aggression	Fairly low Aggression

	MA Driver (Cont)	MAF Driver (Cont)	FA Driver (Cont)	FAF Driver (Cont)
		Personality Factors		
NSQ				
NSQ Total Anxiety Score	Low over all anxiety	Fairly low over-all anxiety		
NSQ I Component (Sensitivity-Tough)			High sensitivity	Fairly high Sensitivity
NSQ F Component (Cheerful-Depressed)	Rather Cheerful	Reasonably cheerful	Fairly cheerful	Tendency towards depression
NSQ E Component (Submission-Dominance)	Rather dominant	Fairly dominant	High submissive-ness	Very submissive
NSQ An Component (Anxious-Not Anxious)	Not parti-cularly anxious	Somewhat anxious	Moderately anxious	Not particularly anxious

In the table above outlining some of the predominant differences that are likely to distinguish an A from an AF driver personality type, where no entry has been made no difference was found to occur as, for example, between the typical FA and FAF driver where the typical age for both was 20 years and under, and for Item 24 regarding self-rating of driving standard which was good to average for both the typical FA and FAF driver.

From this table listing some of the main differences that were found to be likely to act as possible predictors in identifying an A from an AF driver personality type, it can be seen, for example, that the typical MA driver personality as opposed to the typical MAF driver personality rates high as regards aggressive attitudes towards driving and other drivers, drinks fairly frequently and is not likely to be a tee-totaller and is confident to the point of over-confidence in respect of his ability as a driver.

On the other hand, the typical FA driver personality as opposed to the typical FAF driver personality, for example, was found to be highly sensitive and submissive, to be fairly cheerful, to drink seldom or to be a tee-totaller and to have held a driving licence for an average of 6.77 years, and to drive , on average, more mileage per annum.

Thus, certain factors were found to act as distinguishing indicators and to be potentially predictive as regards whether a particular driver might belong to the accident or accident free category.

'If I could but spot a conclusion,
I should race to it.'

All, All Are Gone,

Ogden Nash

CHAPTER XXVIII

CONCLUDING COMMENTS

Disadvantages or Weak Points of the Present Study

1) Accident Criteria

The accident criterion is often the weak link in a study such as the present one and this is no exception to the rule. This is one reason why professional drivers are usually chosen for driver studies because more adequate controls are possible than for the ordinary motorist as regards, for example, the accuracy of accident records and exposure to the driving situation, type of vehicle driven, the time of day driving is carried out and the duration of driving undertaken etc.

In this study an 'accident' has been taken to be any confrontation reported as having occurred during the last 5 years of the subject's driving experience whilst he was driving, whether the incident resulted in damage to property or person, regardless of responsibility for the happening. Thus, with this method of subjective reporting the accuracy and honesty of each driver subject was a key factor and crucial as regards, for example, the actual admittance of the event of an accident, the estimation of its type classified as very serious, serious or minor and the reporting briefly of what was considered to have been the cause of the accident(s) sustained whilst driving.

Responsibility for an accident incurred by the driver subject during the last 5 years whilst he was driving was not considered although with the brief 'stated' cause of an accident reported, an arbitrary decision was made as to whether the confrontation experienced was deemed to have been preventable or non-preventable. In other words, was the accident considered to have been an avoidable or 'non-essential' occurrence had due care been taken or was it a non-preventable event even had due care been taken and one that could not have been avoided in view of the circumstances at the time.

2) Problem of Exposure

The problem of exposure to the driving situation is another difficult area in the field of accident research particularly when carrying out research with the method adopted in this study, that of using questionnaires and non-professional drivers with the consequent reliance on the accuracy of the subjective reports of the participants as regards, for example, the estimation of number of miles driven annually, how much driving is undertaken normally during the week, where drivng is mainly done etc.

However, it was found that the type of vehicle driven did not vary markedly, except for the few driver subjects who drove automobiles of over 3000 c.c. engine capacity. Those driver subjects taking part in this study drove saloon cars and not a special type of vehicle such as a bus or a tractor.

3) Questionnaire Technique

In a study such as the present one the questionnaire method was deemed to be the most suitable technique to use at the risk of the loss of some accuracy that might have been offset by the employment of more stringent methods. Of course, it is open to criticism that such a method is not sufficiently accurate , reliable or even valid. But, then, the whole object of the study has to be considered and weighed up and a decision made as to the best means of achieving the end sought.

Whilst some objectivity and accuracy with the reliance on subjective reports might have been diminished and lost by the questionnaire method, at the other end of the spectrum some other technique such as the use of interviews, especially if not structured, might be open to even more loss of accuracy and subjectivity of interpretation etc.

So, for this type of study, actually asking the motorist to give an account and information about certain aspects of himself in relation to driving in both an unstructured and structured way, as built into the composition of one of the three questionnaires administered with the other two being structured, seemed the best and most suitable means of approach towards achieving the ends of this particular study, that of obtaining a broader knowledge of 'the man behind the wheel'.

4) Scientific Method

In the strict scientific sense this study was not controlled in the same way as it might have been if using laboratory conditions. However, not everything can be meaningful studied in such a stringent fashion nor is it appropriate to do so. It was considered that this study came within the non-laboratory category and it was felt that the original purpose of it would probably have become blurred, if not lost, and altered by using such a strict 'unnatural' approach for this type of study.

The three conditions necessary for any scientific inquiry, these being objectivity, system and generality, have been adhered to and in this broad sense this study is 'scientific' and the approach adopted appropriate for the type and objective of the research undertaken in this instance.

5) Type of Sample

The type of sample differed from one that might have been drawn from the general population of drivers or from one that might have been taken from professional drivers.

The type of sample studied, that of licenced automobile drivers from a university population, needs to be remembered when interpreting results so that something is not made out to be what it is not meant to be or the pitfall of falling over the stumbling block of misinterpretation and overgeneralisation.

The sample of this study of licenced automobile drivers was mainly comprised of young university students but also included university staff besides more mature students so that there is a reasonable spread of age and representation in the various age groups. Presumably, those associated with a university are still subject to the human lot of emotions, tension, frustration etc., although their perception and reaction to the world, the driving one in this instance, might differ from an individual who has never set foot in a university or might differ from the professional driver.

6) Volunteer Sample

The volunteer basis of participation in this study of automobile drivers might be a further area of criticism. As long as individuals fulfilled the two basic criteria of (a) being a licenced automobile driver and (b) a university member either as staff or student, they were eligible and had the invitation offered to take part in this research. The choice was optional and rested in the subject's hands as to whether or not he wished to participate in such a study.

Of course, the issue of volunteers versus non-volunteers or why some people volunteer to participate whilst others do not, provided that they fulfil the basic criteria for entry and participation, is a whole area of exploration and study in itself, and this is borne in mind.

Driver subjects taking part in this study were doing so on what might be termed ' a random volunteer basis'. That is, the invitation to take part was extended and the subject's decision to take part or not following this invitation once he was aware of it was his own option. This might be termed as ' a process of self-selection by volunteering.'

On subsequent analysis of data having used the method of 'random volunteer' selection, driver subjects were divided into driver groups on the basis of sex and accident category.

In spite of some of the shortcomings indicated, it is felt that the present study of the automobile driver and accidents in relation to biographical, attitudinal and personality factors, does have commendable and favourable points in its defence. It is also felt that some advancement and improvements have been made in relation to some of the previous work undertaken in this particular area, a discussion of which follows.

Advancements Made in Relation to Previous Studies

1) Type of Sample

In many previous investigations professional drivers, for example, taxi drivers, bus/tram drivers, truck drivers, commercial drivers etc., have been studied.

The sample of automobile drivers in this present study whilst not in the professional driver category, nevertheless formed a somewhat special type of sample from one that might be drawn from the general population of drivers. Being associated with a university either as staff or student, would put this sample in a different category and the general calibre of the individual would vary, at least in some respects. This needs to be kept in mind when interpreting the results of this study and a rather apt comment on education by R.S. Peters would seem appropriate that 'education is not to have arrived, but to have travelled with a different view.'

The drivers studied are still, presumably, subject to the human lot of emotion (e.g. aggression, anxiety, etc.), pain, motivation, attitudes etc., although their perception of and reaction to the world might well differ had they not been associated with a university.

However, in spite of this, such a sample of drivers, in some ways at least, might be more aligned with one taken from the general population of drivers rather than one taken from professional drivers who, for example, drive full-time, depend on their driving for their livelihood, drive a special type of vehicle etc.

When interpreting results the pitfall of making unwarranted and erroneous generalisations needs to be avoided. Bearing this in mind, such a study as the present one might be considered an advancement on the study of professional drivers, bridging the mid-way position between that of a sample drawn from the general population of motorists and one taken from professional drivers.

2) Driver Groups

In this study of licenced university automobile drivers, subjects eligible to take part did so on what might be termed 'a random volunteer' basis, through a process of self-selection as to whether they took part or not. On subsequent analysis of data, driver subjects were divided into driver groups according to sex of driver and accident category.

Four basic driver groups were formed, namely MA, MAF, FAF and FA. From these four driver groups, further group combinations were made following the same principle of division according to sex of driver and accident categroy, namely F(A+AF), M(A+AF), A(M+F) and AF(M+F) driver groups. With the latter four driver group combinations, it was possible to look at, for example, accident (A) and accident free (AF) drivers or male (A+AF) and female (A+AF) drivers.

From this system of driver group formation,a complex situation was found to exist and emerge and it was possible, for example, to draw up typical driver personality profiles and to look at male and female driver characteristics.

The driver groups formed in this investigation would seem to be a progressive step from the majority of previous studies in this particular area of research where, for example, mainly male drivers and often professional ones at that, have been the focal point of study.

3) Two Levels of Measurement

Two levels of measuring instrument were used in this study. On subsequent analysis, it was found that these tied in with each other on certain variables and correlated significantly.

Devising and structuring this study so that both general or free floating and specific or situational measures were used, meant that both general personality trends as well as personality trends in a specific situation could be traced, assessed and studied giving a two tier view of the characteristic tendencies of each driver group.

4) Clarification of Terms

It was felt that in order to be relatively clear about the terms being used in this study or found throughout the literature pertinent to this particular area of driver research, it would be wise to look at and explore the underlying meanings of some of the main terms and concepts used. For example, such terms as accident, aggression, anxiety, attitude, personality etc., have been explored and linked up with previous studies carried out where relevant in the discussion of the term in question.

The objective of such an exercise as this was to clarify meanings and clear the stage by painting a backdrop before the presentation of this study of the automobile driver in relation to road traffic accidents.

This aspect of clarification of terms has not always been treated likewise in some of the previous work carried out in this area in the studies reviewed or if so in a rather cursory fashion usually so that assumptions have to be made as regards what the researcher might have had in mind. Such assumptions might well be faulty or even worse, false, leading to misunderstanding and consequent misinterpretation.

5) Measuring Instruments

In this study of the automobile driver and accidents in relation to biographical, attitudinal and personality factors what might be termed as a three dimensional view has been taken of the driver.

The measuring instruments selected for use tapped the three areas of biographical, attitudinal and personality factors with particular attention and focus being played upon the variables of anxiety and aggression, forming an interlocking composite unit not only giving a three dimensional view of each automobile driver group or driver group combination, but also giving this on a two tier level, namely general and specific. This made a comprehensive unit, being both confirmatory and complementary.

General Comment

The pros and cons of the present research of the automobile driver and accidents in relation to biographical, attitudinal and personality factors, have been discussed. It is realised that such a study, as with any investigation, will have weak links. However, in spite of the weak links indicated, it is felt that some improvements and advancements have been made, at least in certain respects, in relation to previous work carried out in this particular area of driver research. Of course, there is still plenty of scope for more improvement.

What has been done and found in the present study of the automobile driver and accidents in relation to biographical, attitudinal and personality factors would seem to be only a beginning, a mere scratch at the surface of the problem or but a drop in the ocean. However, it might well be a significant scratch or drop.

Further research is called for to tackle not only after the event of a road accident, but also and probably more important although far more difficult, before the event taking a predictive and preventitive approach. It is possible to take an a priori approach to the road accident problem only it will take time, effort and foresight of the necessity of this in view of the increasing use and reliance upon the internal combustion engine, trailing in its wake a consequential toll of killed and maimed.

There is an urgent need for further research if the road toll is to suffer a decline and not to be accepted socially as being inevitable. The following writer remarks that:-

> 'We are too accustomed to attribute to a single cause that which is the product of several and the majority of our controversies come from that.'
>
> Baron Justus von Liebig

Also, another quotation that is of interest and perhaps relevant in the field of accident research is the following one from an Oriental source:-

> '.....the wise man looks into space, and does not regard the small as too little, nor the great as too big; for he knows that there is no limit to dimensions.'
>
> Lao-tse
>
> (Museum of Modern Art, 1955)

These two quotations above are pertinent to the road accident research situation. A traffic accident is not ususally the result of

a single cause but often of the interplay and interaction of a multiplicity of factors and forces with the most predominant one being that of human failure in the man/machine combinatory system. However, as Lao-tse states there is no limit to dimensions.

The engineer and ergonomic experts between them might build a well-nigh perfect internal combustion system whilst the road engineer ensures near perfect road conditions. But, then the crunching downfall of the system arrives, namely the man behind the wheel. The human operator is introduced into this perfect or near perfect system and it begins to crumble and break-down due to human error, failure or some other reason.

The break-down may be due to a host of factors such as lack of skill or skill fatigue, faulty coordination, lack of foresight and anticipation, emotional instability, mismatch between the driver and his machine, stimulus overload and so forth. In fact, a whole host of new, unpredictable, uncontrolled and, for the most part, uncontrollable factors enters into the driving scene when the human element is introduced into the system as machine operator.

Thus, this very complex and knotty problem of the human factor and road accidents needs further research to learn more about the whole complexity of the man/machine system, especially as the automobile or internal combustion engine is now such an intergral part of life, particularly in the 20th. Century Western World.

Future Research

Some suggestion and leadersfor possible future research in the area of driving and the driver include:-

1) Driver Education

Driver education includes the following three areas -

a) Adequate training to gain a driving licence initially with at least a minimum standard amount of professional driving instruction being received.

b) Re-training after a driving licence has been forfeited for some reason as the mere forfeiting of a driver's licence for a certain length of time does not guarantee that some miracle has occurred during the intervening period, before he regains his driving licence and is legally let loose on the road again.

c) The mass media and the whole possibility of an extension of the driver education campaign as is already being carried out, for example, in respect of drinking and driving and defensive driving skills and courses etc., with follow-up research studies to see how effective such campaigns are and how they can be made more effective.

It is realised that some exploration and research has been carried out in the areas mentioned. For example, the Salvation Army (Roundabout, Radio New Zealand, September 1976) is at present carrying out a driver re-education course for drinking and driving offenders referred by court order. There is the possibility of a follow-up study being done by the Ministry of Transport. Apparently, this course has shown that it is possible to change attitudes towards drinking and driving. If attitude change is possible in relation to drinking and driving, then it may also be in general attitude towards driving, other drivers and the driver situation. It has been found that initially there is a belligerent attitude of those undergoing this course run by the Salvation Army following loss of licence to drive owing to drinking offences, but by the end of the course each person claimed to have benefitted and became less hostile. This current work sounds hopeful.

However, further research by way of expansion and extension of what has already been done or of new areas is still possible. Such research as proposed here would be to find out the most effective methods of dealing with the three stages of driver education as follows:-

i) Education before a driving licence is gained

ii) Education when a current driving licence is held

iii) Education after a driving licence has been withdrawn for a specific reason and time period

The findings that emerge from the present study of the automobile driver and accidents suggest that driver education methods should be geared to meet the difference found to occur, for example, between male and female drivers as well as differentiation between drivers according to accident category. Such differences would necessitate a variation of approach in an effort to cater for and accommodate the differing needs of the driver personality type in question in the most effective way.

As Oliver Wendell Holmes states -

> '..... it seems that, at this time, we need education in the obvious more than an investigation of the obscure.'

2) Driving Licence

Further investigation of the age of being able to obtain a driving licence in an effort to find the optimum age of being able to do this, could form another area of research. For example, there could be liaison with experts in other fields concerning this such as human development, sociology, medicine etc.

This would form a long term or longitudinal study. Two research approaches could be made -

i) To follow up all those individuals who obtain their driving licence at a specified age, such as 15, 16, 17 or 18 etc., and follow their driving history for a certain specified period of time such as 5 years in order to ascertain what age might be the most and least vulnerable to incur road accidents as a starting point for their driving career.

ii) To administer some testing device or selection procedure to a group of drivers chosen according to age and to match each with a control who has not completed the testing device or been through the selection procedure with the ultimate objective of following up the subsequent driving records of both experimental and control groups of drivers to see if the screening device used had any powers of prediction as regards accident liability.

The age of eligibility for gaining a driving licence might be explored further as to whether it should remain at the present age of 15 or whether it should be raised to at least 18 or even 20 years of age as suggested by various driver subjects participating in the present study.

3) Driving Licence Re-Test

This could be a further area of investigation as regards the feasibility of introducing a scheme of periodic driving licence re-test whether for both the practical and theoretical parts of the driving test or for one or other of these parts whenever an application is submitted for licence renewal. An experimental group of drivers undergoing such re-test procedures could then be matched with a control group of drivers not undergoing such re-testing of the driving licence to see if any differences emerge in respect, for example, of improvement of driving standard and a reduction of accidents whilst driving.

4) Driving Test

Research into the adequacy of the present driving test and whether this could be improved, what kind of improvements could be made and how implemented. Such an investigation would pose such questions as -

a) Is the present driving test adequate for today's driving situation and the required abilities necessary to meet these conditions?

b) Does the present driving test need to be amended and revised to make it more comprehensive and include more driving contingencies that might be met with such as night driving, learning how to control a skid, a tyre blow-out etc. Also, other areas of knowledge that would seem useful to at least know elementary facts about include for example, elementary car maintenance, handling that might over-stress a vehicle, basic first aid techniques, etc?

5) Personal/Social Adjustment

Another area that could be investigated is the incorporation of some assessment of the individual's personality, emotional stability and social adjustment before a driving licence is obtained and if considered necessary for some reason (e.g. repeated traffic violations such as speeding, repeated accidents etc.) whilst a driving licence is held, or if it has been withdrawn some assessment made before it is re-issued.

Some means of being able to detect and predict an individual's potential accident liability would, indeed, be a great step forward. For this type of research, a testing measure devised to assess such factors as social adjustment, emotional instability, could be given when an application is initially made for a driving licence with a follow-up study being made of these individuals in order to assess their subsequent driving record against a control group not receiving the testing procedure. Also, such a procedure could be carried out for those drivers needing assessment for some reason whilst they hold a current licence or before it is re-issued if it has been withdrawn.

The ideas for further and future research briefly outlined above are just leaders and suggestions, but suggestions made following what has been gathered and learned during the process of the present study. Personality and social adjustment in relation to driving would seem to be a major area for research in order to try to make driving a safer venture for all concerned as the automobile is here to stay, and, therefore, a problem that will not go away but one which must be dealt with.

The tendency to accident is a hazard of living and the above suggestions are only some of the areas impinging on the the area of psychology that might be further explored and investigated. The potential scope of work to be done in this area is enormous if we seriously desire and intend to cut down the staggering loss of life and maiming by a vehicle of man's own invention and thereby his to control, rather than it controlling him. It is a question of values. If we value life, then we have ample opportunity of living up to and out our values of endeavouring to preserve its being taken on our highways and by-ways.

An interdisciplinary approach is necessary involving the expertise and knowledge of, for example, sociology, medecine, ergonomics, statistics, epidemiology, traffic and road engineering etc., as well as psychiatry and psychology. The reference in our vernacular to the phrase 'that nut behind the wheel' or that 'the other driver is either a fool or a madman' underscores the major role played by driver error in creating situations that are conducive to accidents (Roberts, 1971) regardless of how safe the vehicle and road conditions may be made for driving. The unknown quantity of the individual imposed on these conditions can make a situation that may be neither predictable nor controllable.

As with any other skill individuals differ as regards their ability to drive and this may be viewed on a continuum from the 'genius' or 'natural' or 'born' driver to the individual so lacking in the requisite 'road sense' attributes that he should never be permitted to switch on the ignition key.

In respect of the natural or born type of driver many great names come to mind as, for example, may be ascertained from Pritchard's (1970) book of the 'Motor Racing Year' for 1969 discussing motor races and motor racing drivers of that year. But, even born drivers are not insulated nor do they hold a passport for the avoidance of the occurrence of accidents whilst driving in spite of their superior driving ability and skill.

Jack Brabham (1960) the great Australian motor racing driver comments on accidents with particular reference to motor racing but also more widely applicable to the general motoring situation, that 'accidents do not happen, they are caused' and the subsequent question should be 'Am I contributing to that cause?'. As long as the accident is not due to some faulty mechanical workmanship, this is a more than reasonable question to pose following any road traffic accident incurred whilst driving.

Admittedly, motor racing differs from the ordinary daily driving situation but more in degree than process and by scaling the former down it can be seen that there are sililarities. In motor racing, man is pitting his skill against the frailty of his knowledge of metals and even gravity and to a lesser extent this also applies to the ordinary motoring situation where many or perhaps even the majority of individuals do not really understand how their vehicles work and how to treat them, or even if they do know, they do not care as other factors figure higher in their scale of values and priorities (e.g. speed, pride, asserting superiority, thrill seeking etc.) and,therefore,may seriously overtax their vehicles, some even beyond their limit of tolerance.

Brabham (1960) states that some drivers are 'naturals' but that they still have to learn and build up their skill and expertise as also applies to the ordinary motorist, except that 'natural' drivers such as motor racing drivers have the initial propensity and flair for becoming experts in this field of driving and develop their innate superior ability to a fair higher degree than the ordinary motorist because of their natural 'bent' in this direction coupled with the requisite motivated enthusiasm to develop this.

According to Brabham (1960) temperament will always prevent some potential drivers from becoming world champions as, for example, the late French driver Jean Behra who whilst he was forceful and at times an exceedingly fast driver, he was also extremely temperamental stressing his car to the point that it 'blew up' several times before his final demise on the motor racing track.

The qualities that go to make up a great motor racing driver, besides also being necessary for the ordinary driver, are balance and sense of feel or road sense and the ability to concentrate but not to the point of over-concentration as well as a suitable temperament. Jack Brabham (1960) feels that there would be less accidents on the public roads if more people knew exactly what was going on every time they pressed the starter button as well as possessing the necessary constellation of driver personality characteristics.

The late New Zealand motor racing driver Bruce McLaren (Young, 1971) felt that for success in motor racing or in any other sport that 'it must be the most important thing in your life' and enthusiasm must be not just mild, but burning. According to McLaren 'it is more a question of attitude of mind than anything else. The people who succeed in racing are those who would do so in any walk of life. First, comes the natural ability, and there are hundreds with it, but there must always be the dedication to want to apply it, continue applying it and keep improving it..... I feel that the combination of driver and car is important. I am sure Jack Brabham feels the same way.' (McLaren, 1964).

The comments made by these two great motor racing drivers are of interest and with some translation and dilution are applicable to the ordinary motorist as, for example, the fact that he should take the skilled art of driving seriously, concentrate on his driving and learning how to improve it by experience, that he should know something about his vehicle, have a suitable temperament for driving, balance and road sense or sense of feel. All these are important, if not essential, qualities for any driver whatever his aspirations in this particular line may be and it is of interest to have such attributes referred to and outlined by two great motor racing drivers of the world.

Other naturally talented drivers, both past and present, in the motor racing world include Juan Fangio, Donald Campbell, Jean Behra, Mike Hawthorn, Mike Hailwood, Jackie Stewart, Jackie Ickx, Graham Hill, Stirling Moss, Andrew Cowan, James Hunt and Nikki Lauda.

But, even such naturally great drivers as those mentioned and others not, are not insulated and invulnerable to accidents as their driving histories show. For example, Donald Campbell was killed in his bid to be the fastest man on wheels in the world. Ironically, Graham Hill was killed not in an accident whilst driving but when flying an aeroplane. Stirling Moss following his driving accident history has just attempted to make his debut into the world of motor racing again. Nikki Lauda of Austria, following his recent crash after which his life was feared for, has made a spectacular recovery and come-back into top level driving of the motor racing world. Commenting on this Lauda felt that he had to do this for his psychological well-being if he was to continue in the world of motor racing sport.

Some individuals seem to be born or natural drivers just as others are born teachers, scientists, philosophers, musicians, physicians etc., with the innate propensity towards becoming outstanding in their particular field of specialisation.

Following along the continuum of driving ability from 'natural' drivers come those who are talented to a greater or lesser extent, those who can be taught with more or less effort although without much innate flair for driving and, towards the end of the spectrum of driving ability, there are those who do not possess the requisite attributes and/or personality constellation to enable them to drive or even to learn sufficiently well to do so without coming to grief, their own or someone else's.

It would seem that some are born to be drivers or teachers etc., others may be taught whilst others just lack ingredient 'X' or the innate individual spark that would enable them to succeed in the role of driving in this instance, let alone excel in this particularly skilled art.

DeSilva (1942) drew up a safe/unsafe driver continuum and in the same way a continuum of driving ability may be construed from the naturally born and gifted driver through the scale to the worse than poor according to the differing abilities, aptitude, capacity, temperament, personality and propensities of each individual; in short, the personality constellation of each individual.

Making traffic accidents more predictable can ultimately make them more preventable (Selzer and Vinokur, 1974).

It is not a matter of learning a lesson but rather it is a matter of basic inherent personality characteristics that must change before the man would be a safe driver (Tillmann and Hobbs, 1949). It seems that we must wait until there is the conviction that road traffic accidents are not always chance happenings and that sometimes they reflect the individual's personality.

At this point, it is felt that sufficient words have been penned and that an apt way to wind up the foregoing would be on the poignant crest of two quotations embodying a pithy, pungent tang:

'Nothing ever is real until
it is experienced.'

Keats

and

'What is better than presence of
mind in a traffic accident?
Absence of body.'

Adapted from Punch, 1849

SECTION 8

APPENDICES

APPENDIX A

Statistical Data For Persons Killed and Injured In New Zealand, Australia, Great Britain and the United States

The following table gives statistical data for those persons killed and injured in road traffic accidents in New Zealand, Australia, Great Britain and the United States for 5 years from 1970 to 1974. This information allows an international comparison to be made with New Zealand's motor accident rate. Considering its density of population New Zealand experiences a high rate of accident involvement per 100,000 of population as regards those persons killed and injured in road traffic accidents.

Year	Country	Killed	Injured	Killed per 100,000	Injured per 100,000
1970	New Zealand	655	20,791	23.2	736.1
	Australia	3,676	91,373	30.0	734.0
	Gt. Britain	7,501	355,852	13.8	656.7
	U.S.A.	55,300	5,100,000	27.1	2409.1
1971	New Zealand	677	21,607	23.7	755.7
	Australia	3,590	90,650	27.9	703.7
	Gt. Britain	7,696	344,390	13.9	619.8
	U.S.A.	54,700	4,700,000	26.5	2220.1
1972	New Zealand	713	22,315	24.1	753.4
	Australia	3,423	89,815	26.3	690.9
	Gt. Britain	7,779	352,013	14.1	636.0
	U.S.A.	56,300	5,190,000	27.0	2451.6
1973	New Zealand	843	23,385	27.9	760.8
	Australia	3,675	95,077	27.9	721.0
	Gt. Britain	7,407	346,325	13.2	619.2
	U.S.A.	55,600	5,192,000	26.5	2,473.6
1974	New Zealand	676	20,829	21.8	673.0
	Australia	3,572	91,358	26.3	677.4
	Gt. Britain	6,886	318,082	12.3	568.3
	U.S.A.	*	*		

* Figures not available

Source of Statistical Data - Motor Accidents in New Zealand, Ministry of Transport, 1975.

Appendix A

Statistical Data For New Zealand of Persons Killed and Injured in Road Traffic Accidents

Data are presented below for motor accidents in New Zealand (Ministry of Transport, 1975) for 8 years giving an analysis of the number of traffic accidents, the number of persons killed and injured, the population number as well as the number of vehicles registered for that year.

From this table, it can be seen that the fatal traffic accident figure had decreased to the 1971 level in 1974 even though the population number and number of vehicles registered had actually increased. The number of persons injured had also nearly decreased to the 1970 level.

Year	Number of Accidents	Number Killed	Number Injured	Population (N.Z. at 31 Dec)	Number of VehiclesRegistered
1940	4,259	205	4,223	1,633,645	293,071
1950	4,647	232	6,314	1,927,629	402,203
1960	8,844	374	12,443	2,403,567	762,700
1970	13,300	655	20,791	2,857,862	1,208,715
1971	14,004	677	21,607	2,899,067	1,272,449
1972	14,654	713	22,315	2,961,869	1,349,140
1973	15,571	843	23,385	3,026,930	1,438,815
1974	14,109	676	20,829	3,094,900	1,515,345

Source of Statistical Data - Motor Accidents in New Zealand, Ministry of Transport, 1975

Note: The road toll for 1975 was 628 and for the calendar year 1976 was 606.

Appendix A

Factors Identified As Being Contributory To Road Traffic Accidents In New Zealand (1974)

Factors identified as being contributory to road traffic accidents in New Zealand, both fatal and injury accidents, are given in the following table with the source of statistical data being Motor Accidents in New Zealand, Ministry of Transport, 1975. The percentage of factors identified as contributing to traffic accidents includes both drivers and cyclists, but separate percentage calculations have also been made for motor drivers.

Many of the factors listed below as being contributory to road traffic accidents in New Zealand were cited as being a cause of accidents incurred whilst driving by the accident driver groups in the sample of automobile drivers in this study such as alcohol, inattention, vehicle failure and inexperience.

Factor	Fatal Accidents Drivers	Fatal Accidents Cyclists	Injury Accidents Drivers	Injury Accidents Cyclists	All Accidents (Driver only below total accidents)	% of Total Factors Identified
Drivers and Cyclists Faults						
Affected by alcohol or drugs	147	2	1,340	2	1,491 Driver Only 1,487	6.7% 6.7%
Travelling too fast	198	1	2,056	15	2,270 2,254	10.2% 10.1%
Failed to give way	62	8	2,969	190	3,229 3,031	14.5% 13.6%
Failed to keep left	81	-	843	31	955 924	4.3% 4.1%
Failed to signal	-	-	204	53	257 204	1.2% 0.9%
Overtaking	20	1	726	16	763 746	3.4% 3.3%
Lane Driving	2	-	113	18	133 115	0.6% 0.5%
In Line of traffic e.g. following too close, other	2	-	493	5	490 485	2.2% 2.2%
Did not stop e.g. at stop sign, at lights, other	17	1 -	391	14	423 408	1.9% 1.8%
Suddenly e.g. braked, turned, swerved, other	12	3	731	66	812 743	3.6% 3.3%

Factors Identified as Contributing to Traffic Accidents (Cont)

Factor	Fatal Accidents		Injury Accidents		All Accidents (Driver only below total accidents)	% of Total Factors Identified
	Drivers	Cyclists	Drivers	Cyclists		
Fault in handling	3	-	109	-	112 112	0.5% 0.5%
Showing off	7	-	63	5	75 70	0.3% 0.3%
Did not check e.g. before making 'U' turn, when reversing, when changing lanes	18	3	1,087	177	1,285 1,105	5.8% 4.9%
Inexperience or incompetence	56	4	1,426	39	1,525 1,482	6.8% 6.6%
Drowsy or tired	32	-	471	1	504 503	2.3% 2.3%
Attention diverted e.g. by passenger, by other traffic	49	4	1,925	75	2,053 1,974	9.2% 8.8%
Parked or stopped	8	-	144	5	157 152	0.7% 0.7%
Physical defect e.g. sudden illness, other	10	-	155	9	174 165	0.8% 0.7%
Specific cyclists faults	-	3	-	93	96	0.4%
Total drivers and cyclists factors	724	30	15,236	814	16,804 Driver only 15,960	75.4% 71.3%

Factors Identified as Contributing to Traffic Accidents (Cont)

Factor	Fatal Accidents	Injury Accidents	All Accidents	% of Total Factors Identified
Passenger Faults	14	150	164	0.7%
Total Passenger Factors	14	150	164	0.7%
Vehicle Faults e.g. dazzling headlights, other	5	184	189	0.8%
Vehicle Faults e.g. brakes, tyres, mechanical, etc.				
Total Vehicle Factors	24	689	713	3.2%
Pedestrian Faults e.g. walking along road, alcohol, drugs				
Total Pedestrian Factors	122	1944	2066	9.3%
Road Conditions e.g. street lighting, limited visibility, slippery				
Total Road Factors	60	1459	1519	6.8%

Factors Identified as Contributing To Traffic Accidents (Cont)

Factor	Fatal Accidents	Injury Accidents	All Accidents	% of Total Factors Identified
Miscellaneous e.g. weather conditions, animals, bicycle faults				
Total Miscellaneous Factors	41	728	769	3.4%
Unknown	20	80	100	0.4%
Total All Factors	1040	21,284	22,324	100.0%

Appendix A

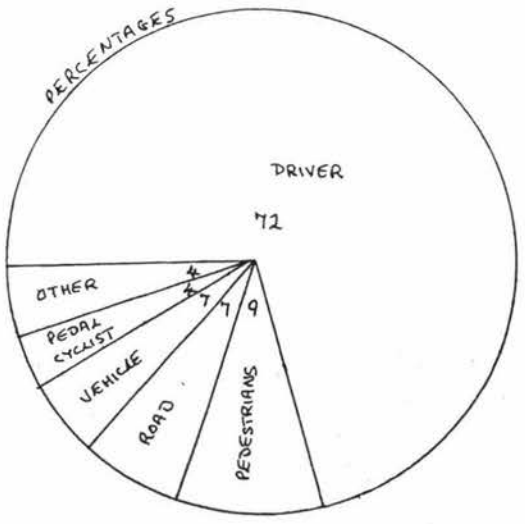
Pie Charts of Factors Identified as Contributing to Traffic Accidents in New Zealand

The pie charts below give proportions in percentagesof factors identified as contributing to motor accidents in New Zealand for all factors and driver factors as well as for all accidents and fatal traffic accidents (Source of data Motor Accidents in New Zealand, Ministry of Transport, 1975).

It can be seen that for all road traffic accidents that occurred in New Zealand 72 per cent are attributed to be primarily caused by driver factors for all accidents and 70 per cent for fatal accidents. Other major contributory factors to all accidents and fatal accidents on the road are going too fast, failure to keep left or give way and alcohol or drugs especially in fatal traffic accidents.

Factors - All Accidents

All Factors

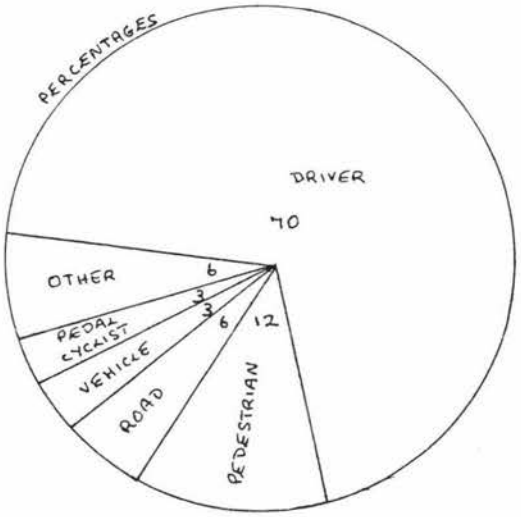


Driver Factors

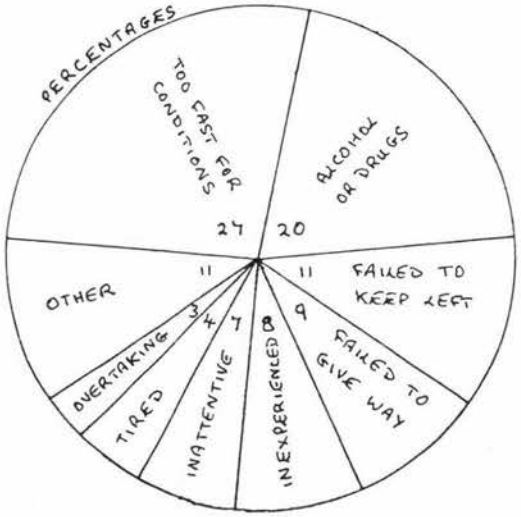
Appendix A

Factors - Fatal Accidents

All Factors



Driver Factors



Appendix A

Statistical Data of Persons Killed and Injured in Road Traffic Accidents in New Zealand According to Age Group

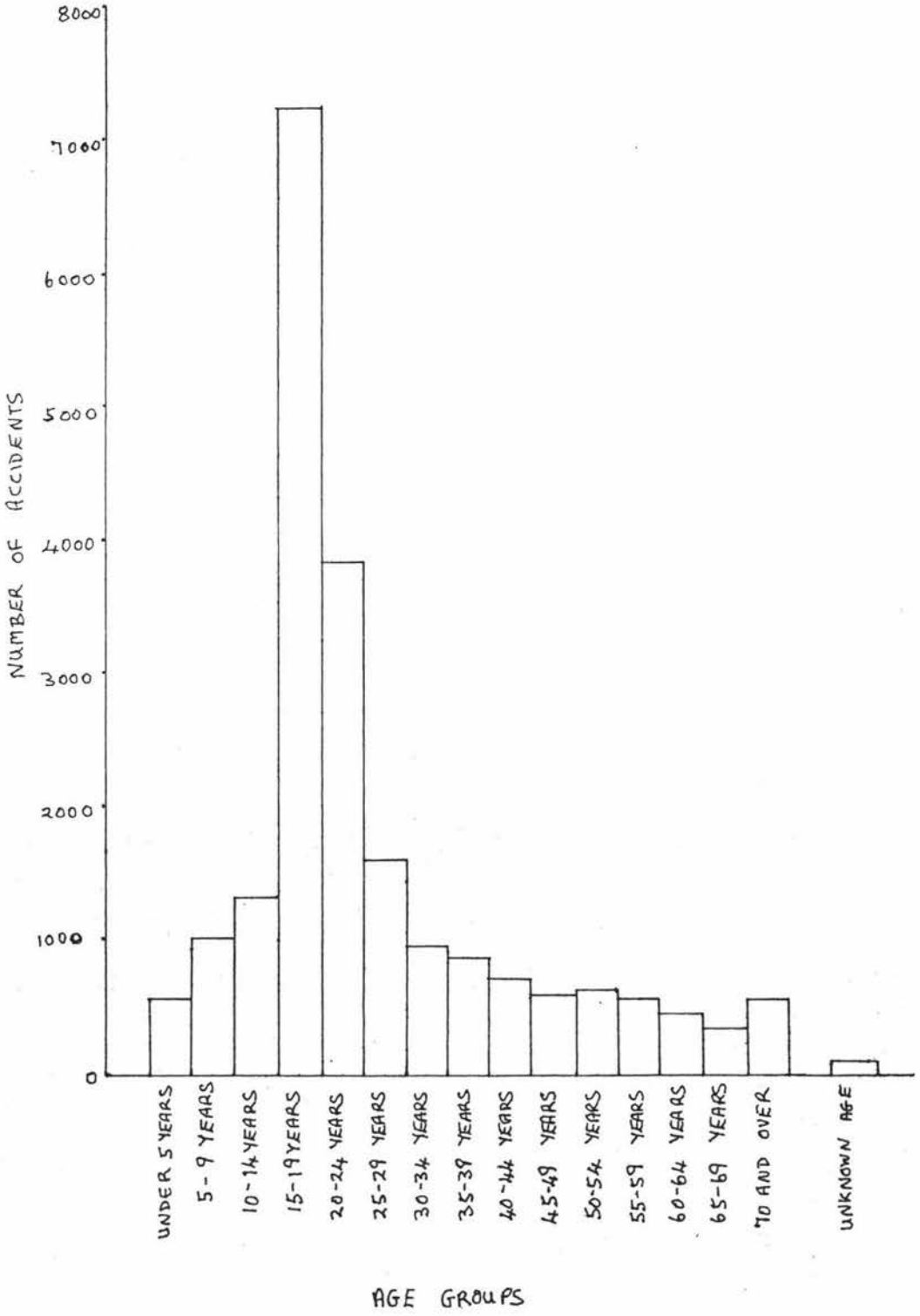
In the following table data are given for the number of persons killed and injured in road traffic accidents in New Zealand for the three calendar years of 1972, 1973, and 1974 classified according to age group (Source of Data - Motor Accidents in New Zealand, Ministry of Transport, 1975). These figures include pedestrians and cyclists as well as drivers but do show that the most vulnerable age groups are 15 to 19 and 20 to 24 years of age in relation to road traffic accidents in New Zealand.

Age Groups	Number Killed and Injured in Road Accidents 1972	1973	1974
Under 5 years	739	820	761
5-9 years	1,033	1,115	1,001
10-14 years	1,440	1,565	1,354
15-19 years	7,523	7,985	7,214
20-24 years	4,055	4,311	3,793
25-29 years	1,633	1,788	1,674
30-34 years	1,126	1,150	985
35-39 years	856	861	838
40-44 years	813	805	703
45-49 years	782	772	616
50-54 years	723	738	630
55-59 years	600	594	533
60-64 years	579	560	447
65-69 years	411	388	330
70 and over	626	689	557
Unknown age	89	87	69
Totals	23,028	24,228	21,505

The above data is given in graphical form below for the calendar year of 1974 for those persons killed and injured in road traffic accidents in New Zealand according to age group.

Appendix A

Graph Showing Age Group of Persons Killed and Injured in Road Accidents in New Zealand During 1974



APPENDIX B

Graph I

NSQ Total Anxiety Score -

Raw Score Frequency Distribution

Appendix B

Graph I

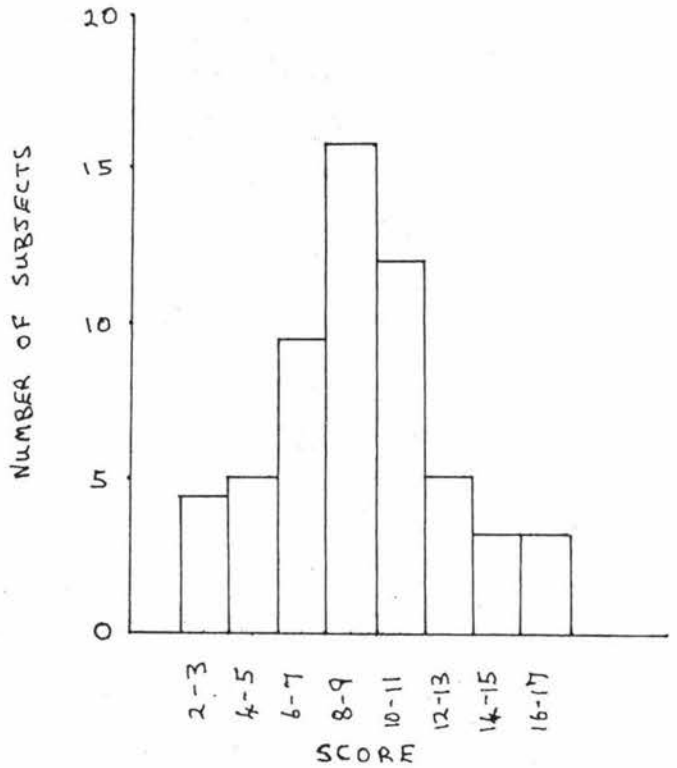
NSQ Total Anxiety Score -

Raw Score Frequency Distribution

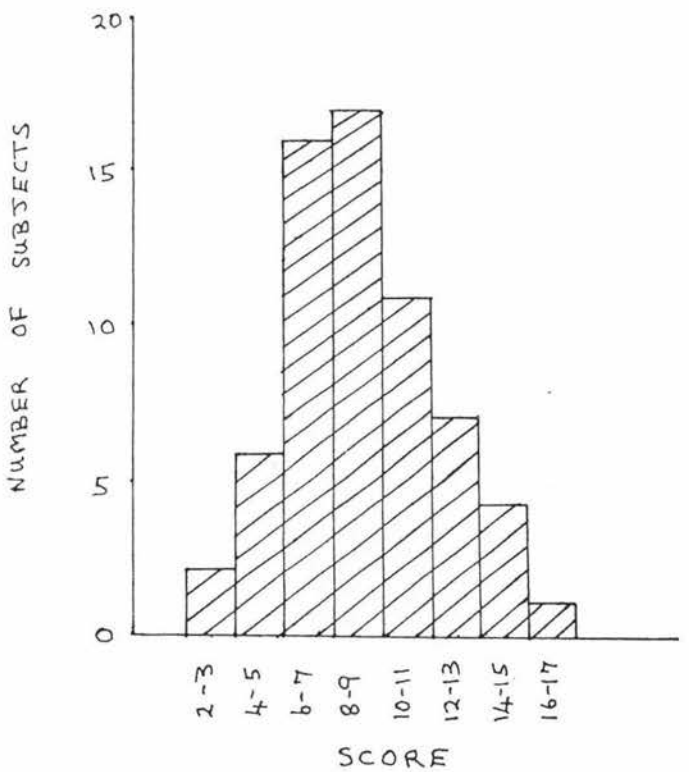
Graph II

NSQ I Component (Sensitive-Tough)-

Raw Score Frequency Distribution



MAF (n = 57)



MA (n = 64)

Graph II

NSQ I Component (Sensitive-Tough) -

Raw Score Frequency Distribution

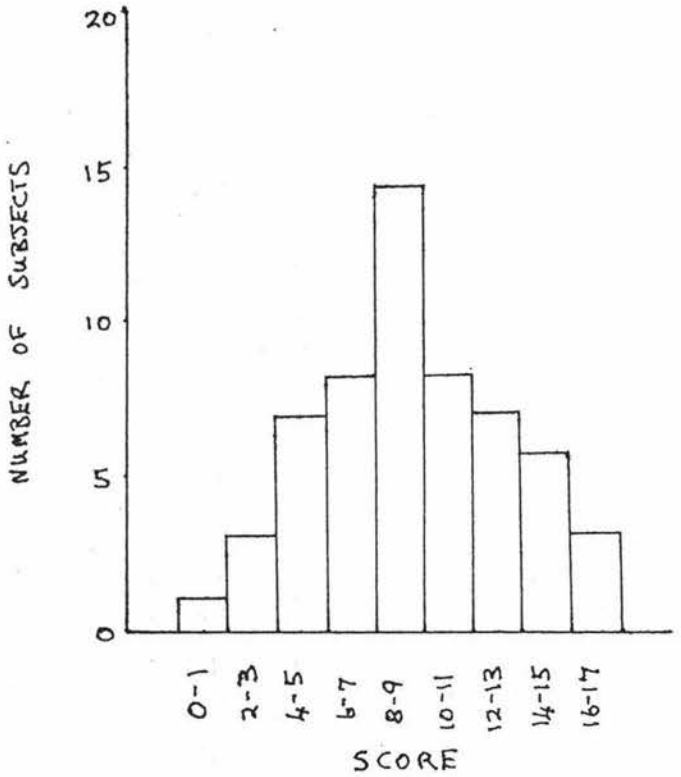
FAF (n = 58)

FA (n = 22)

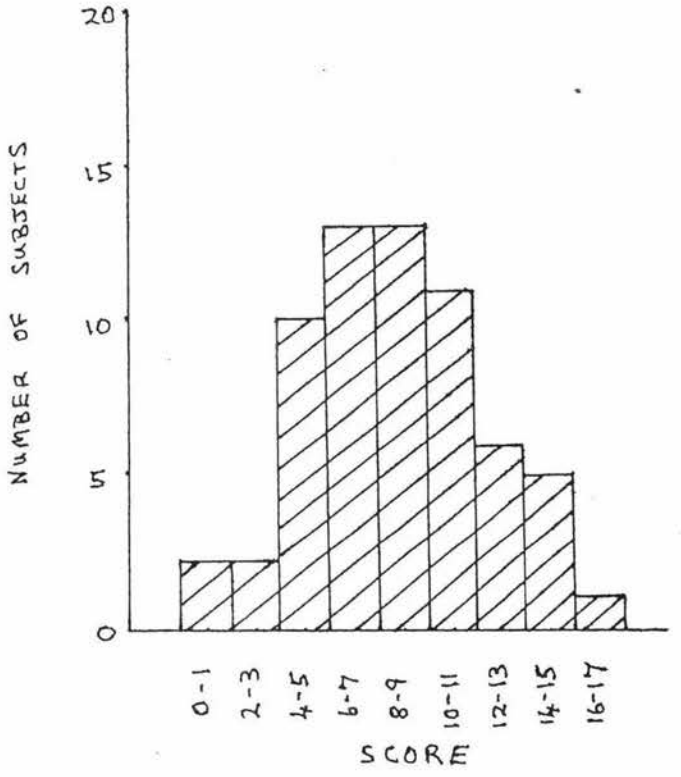
Graph III

NSQ F (Cheerful-Depressed) Component -

Raw Score Frequency Distribution



MAF (n = 57)

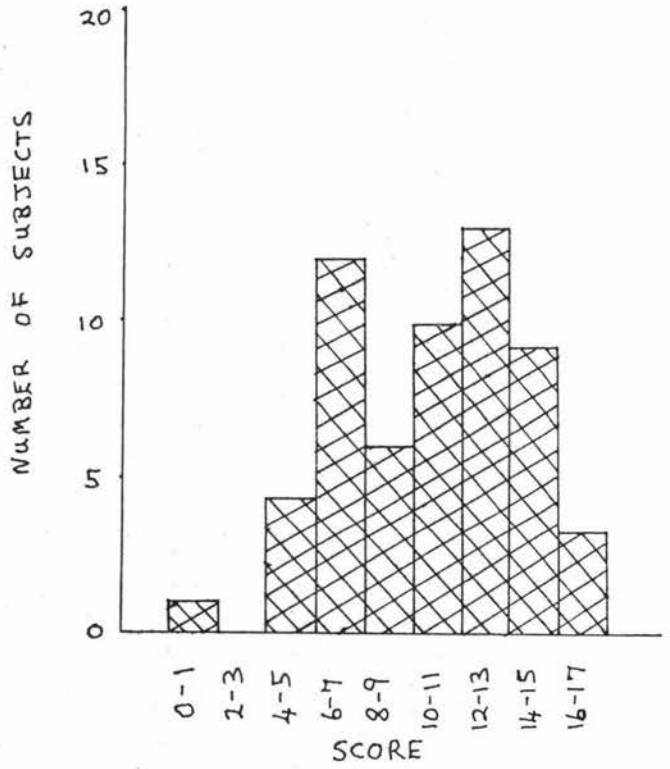


MA (n = 64)

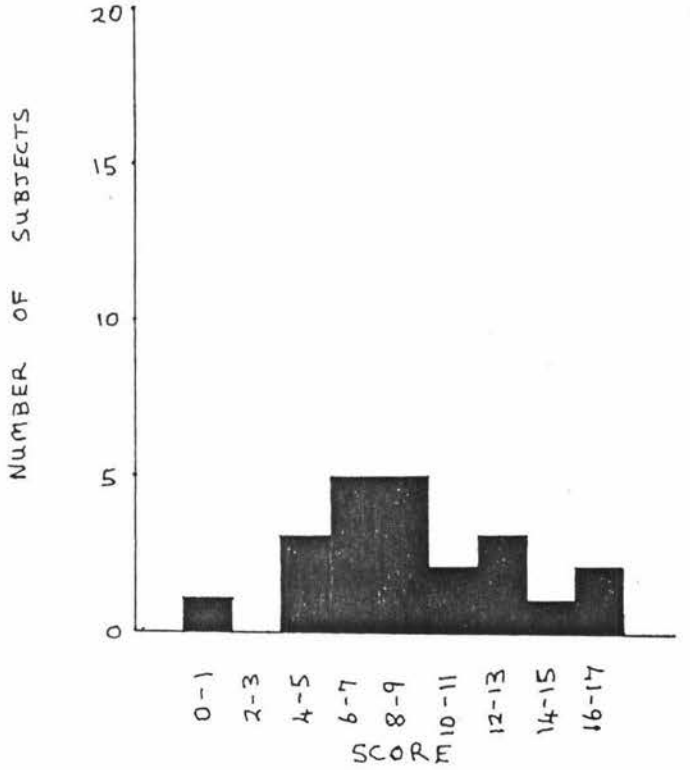
Graph III

NSQ F (Cheerful-Depressed) Component

Raw Score Frequency Distribution



FAF (n = 58)

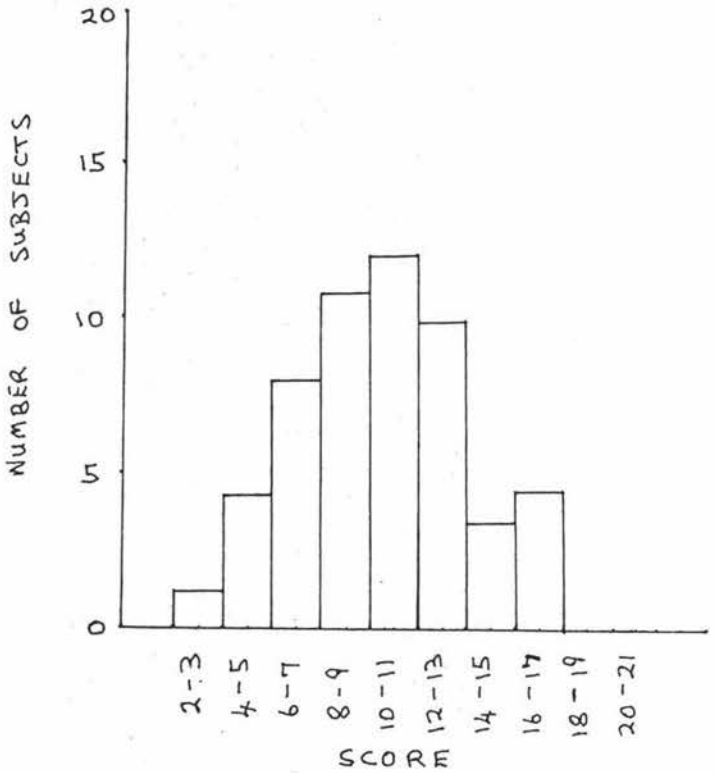


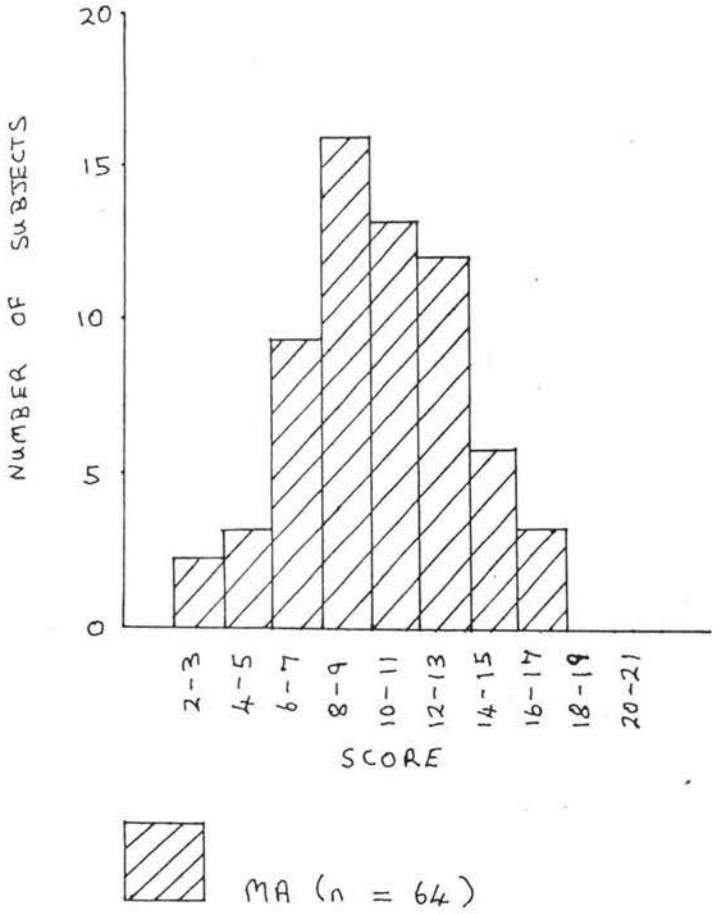
FA (n = 22)

Graph IV

NSQ E (Submission-Dominance) Component

Raw Score Frequency Distribution

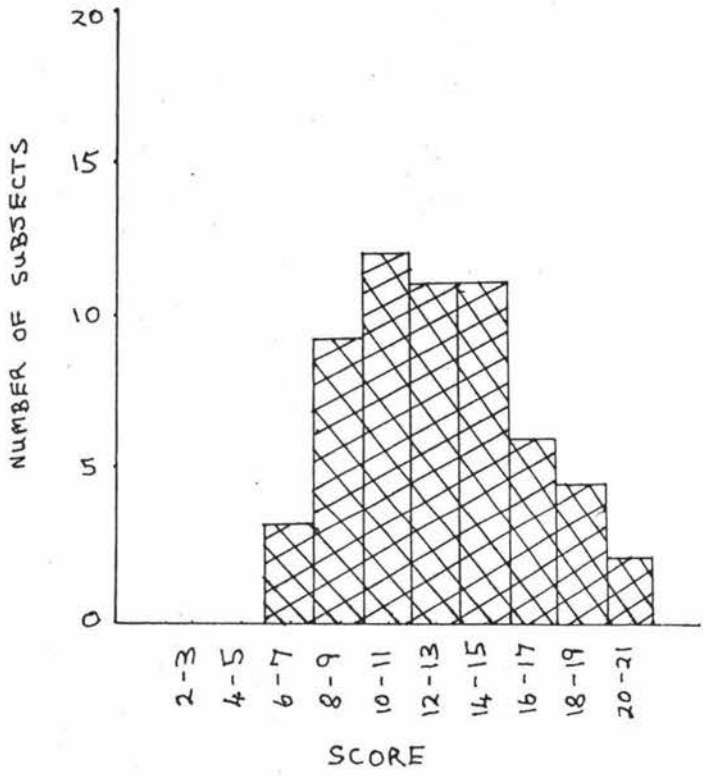




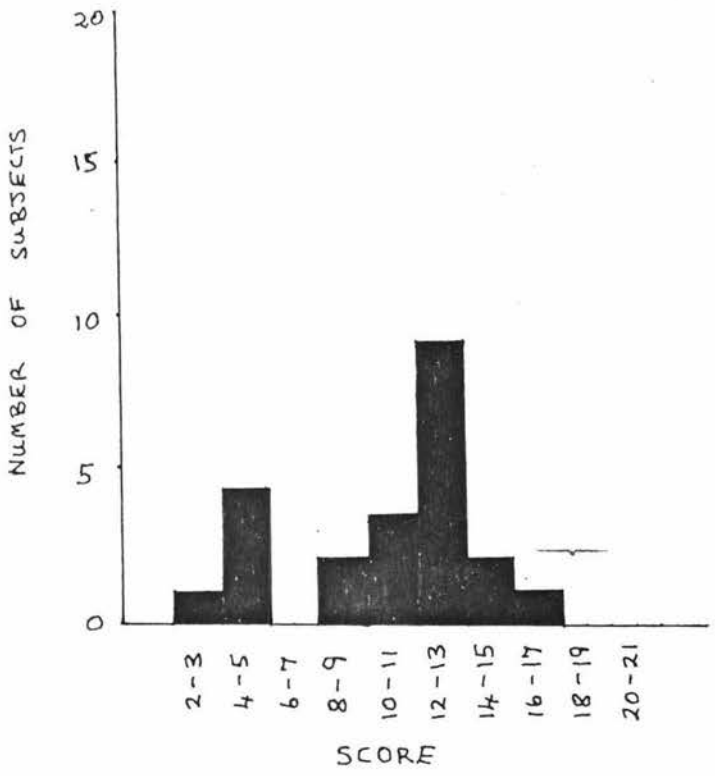
Graph IV

NSQ E (Submission-Dominance) Component

Raw Score Frequency Distribution



FAF (n = 58)

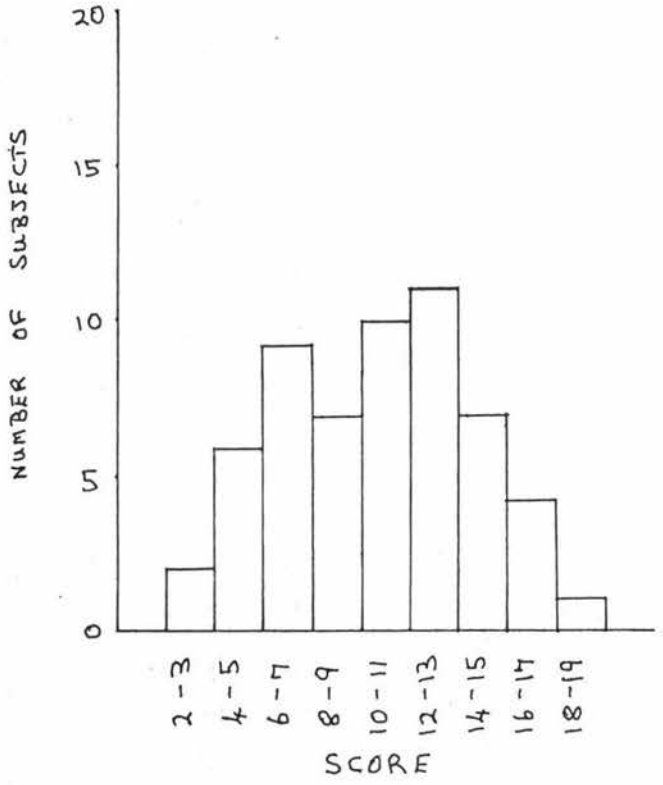


FA (n = 22)

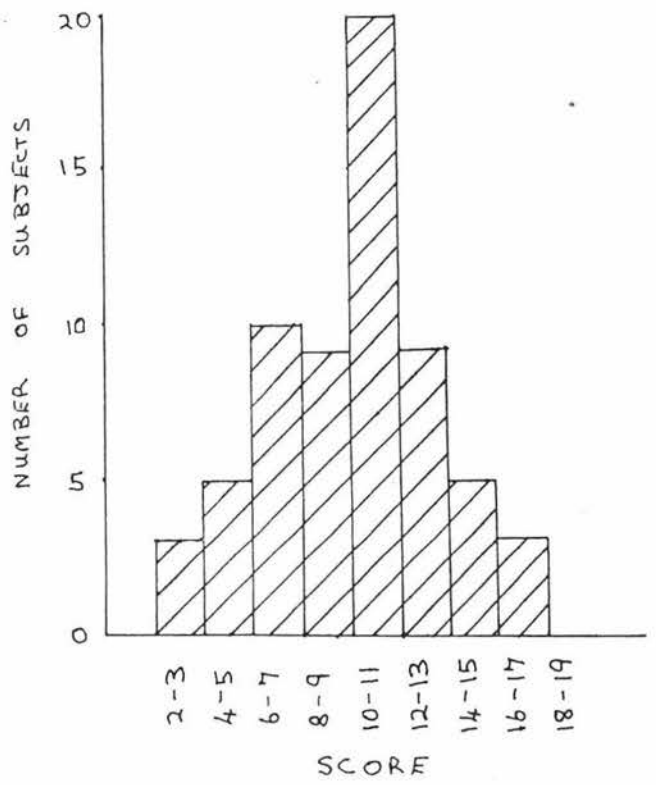
Graph V

NSQ An (Anxious-Not Anxious) Component

Raw Score Frquency Distribution



MAF (n = 57)



MA (n = 64)

Graph V

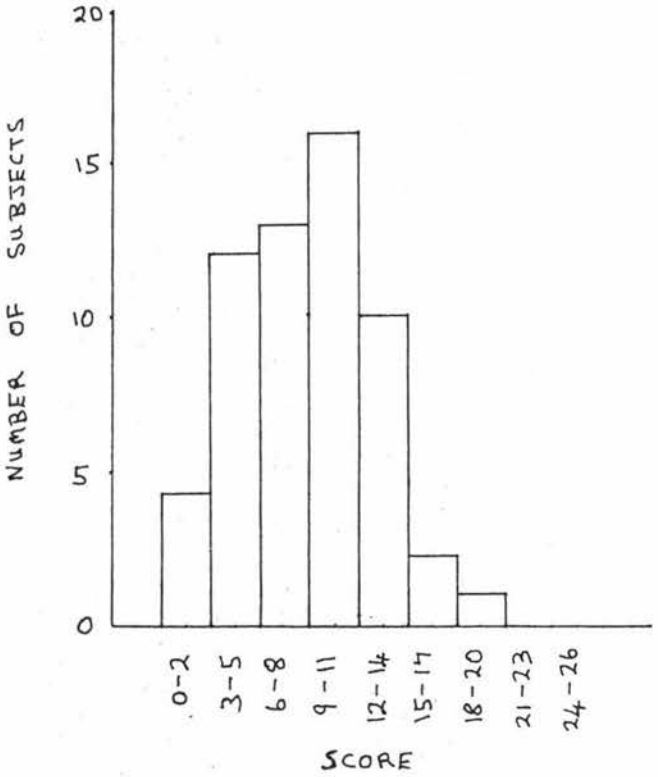
NSQ An (Anxious-Not Anxious) Component

Raw Score Frequency Distribution

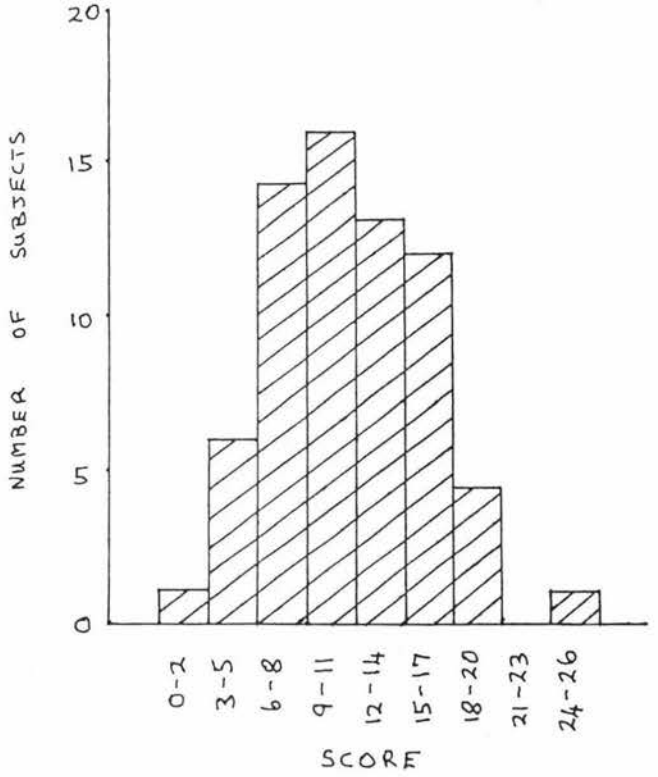
Graph VI

Parry's AG (Aggression) Scale

Raw Score Frequency Distribution



MAF (n = 58)

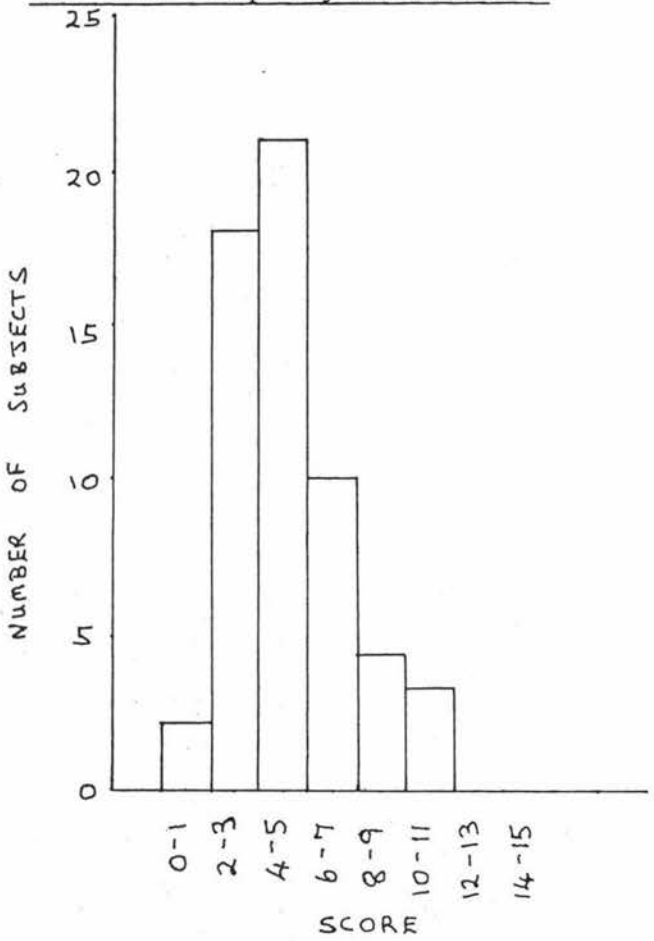


MA (n = 67)

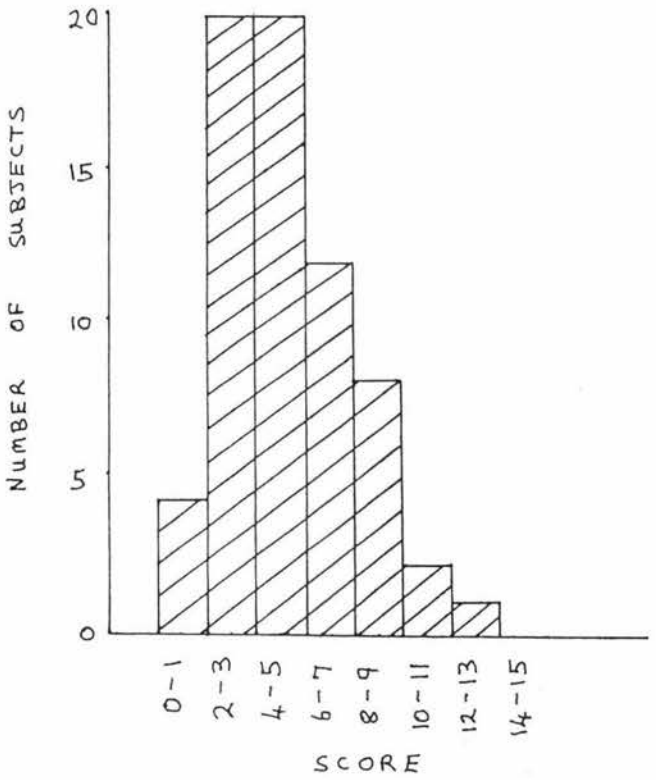
Appendix B

Graph VI
Parry's AG (Aggression) Scale
Raw Score Frequency Distribution

Graph VII
Parry's AN (Anxiety) Scale
Raw Score Frequency Distribution



MAF (n = 58)



MA (n = 64)

Appendix B

Graph VII
Parry's AN (Anxiety) Scale
Raw Score Frequency Distribution

APPENDIX C

Parry's AG(Aggression) Scale

Parry's AG(Aggression) Scale items are given below together with the frequency of response for each item given as an actual frequency count and as a percentage of response for each driver group for that particular item. Separate tables are presented for the two following groups of drivers:

1) MAF, MA, FAF and FA driver groups
2) M(A +AF), F(A+AF), A(M+F), and AF(M+F) driver groups

——— = Item scores that differ from responses made by other driver groups by about 7 per cent or more or that differ in degree of aggression of response

n = Number

1) MA, MAF, FAF and FA Driver Groups

No.	Parry's AG(Aggression) Scale Items	MAF n = 58	FAF n = 59	MA n = 67	FA n = 22
1	There are far too many zebra crossings on the road today	3 5.2%	1 1.7%	1 1.5%	0 0%
2	I am easily provoked when driving	7 12.1%	10 16.9%	17 25.4%	5 22.7%
3	I lose my temper when another driver does something silly	22 37.9%	27 45.8%	33 49.3%	11 50%
4	I have been in a fight with another driver	1 1.7%	0 0%	3 4.5%	0 0%
5	I get annoyed if the traffic lights change to red as I approach them	25 43.1%	21 35.6%	29 43.3%	4 18.2%
6	It annoys me to see stickers and suchlike in people's car windows	9 15.5%	10 16.9%	7 10.4%	0 0%
7	On occasion I have tried to edge another car off the road	2 3.4%	2 3.4%	11 16.4%	0 0%
8	I would not mind being a racing driver	22 37.9%	16 27.1%	42 62.7%	6 27.3%
9	I like driving fast	38 65.5%	31 52.5%	55 82.1%	12 54.5%
10	I use the horn a great deal	4 6.9%	2 3.4%	9 13.4%	1 4.5%
11	I do not like being overtaken	4 6.9%	6 10.2%	7 10.4%	1 4.5%
12	I make rude signs at other motorists when I am provoked	24 41.4%	7 11.9%	37 55.2%	3 13.6%
13	I drive faster when I am alone	20 34.5%	24 40.7%	36 53.7%	4 18.2%

Appendix C

No.	Parry AG(Aggression) Scale Items	MAF n = 58	FAF n = 59	MA n = 67	FA n = 22
14	There are too many rules and regulations in regard to driving	23 39.7%	15 25.4%	36 53.7%	9 40.9%
15	I have driven at another vehicle in anger	3 5.2%	2 13.4%	10 14.9%	0 0%
16	I am an aggressive driver	9 15.5%	5 8.5%	32 47.8%	1 4.5%
17	If another driver makes a rude sign at me I do something about it	16 27.6%	12 20.3%	20 29.9%	4 18.2%
18	At times I have felt that I could gladly kill another driver	8 13.8%	4 6.8%	10 14.9%	2 9.1%
19	I find it difficult to control my temper when driving	2 3.4%	2 3.4%	7 10.4%	2 9.1%
20	I swear out loud at other drivers	21 36.2%	29 49.2%	37 55.2%	8 36.4%
21	On occasion I have come near to blows with another driver	2 3.4%	3 5.1%	7 10.4%	2 9.1%
22	I have given chase to a driver who has annoyed me	8 13.8%	2 3.4%	14 20.9%	0 0%
23	I swear under my breath at other drivers	45 77.6%	41 69.5%	56 83.6%	14 63.5%
24	Sometimes I take a risk when driving for the sake of it (the risk)	14 24.1%	3 5.1%	27 40.3%	3 13.6%
25	If the driver behind has his lights shining in my mirror I pay him back in some way	15 25.9%	9 15.3%	30 44.8%	2 9.1%
26	I dislike drivers in certain types of cars	14 24.1%	6 10.2%	20 29.9%	1 4.5%
27	Most drivers are worse drivers than I am	40 69.0%	35 59.3%	52 77.6%	11 50.0%
28	If I find myself in the wrong lane I cut across regardless of traffic conditions	3 5.2%	5 8.5%	1 1.5%	0 0%
29	I have been known to flash my car lights at others in anger	28 48.3%	16 27.1%	39 58.2%	6 27.2%
30	At night I flash my car lights when others have their head-lamps on	45 77.6%	38 64.4%	56 83.6%	15 68.2%

Appendix C

Parry's AG (Aggression) Scale

Parry's AG Scale items are given below together with the frequency of response for each item as an actual frequency count and as a percentage of response for each driver group for that particular item for the following driver groups:-

M(A+AF), F(A+AF), A(M+F) and AF(M+F)

——— = Item scores that differ from responses made by other driver groups by about 7 per cent or more or that differ in degree of aggression of response

n = Number

2) M(A+AF), F(A+AF), A(M+F) and AF(M+F) Driver Groups

No.	Parry AG(Aggression) Scale Items	M(A+AF) n = 125	F(A+AF) n = 81	A(M+F) n = 89	AF(M+F) n = 117
1	There are far too many zebra crossings on the road today	4 3.2%	1 1.2%	1 1.1%	4 3.4%
2	I am easily provoked when driving	24 19.2%	15 18.5%	22 24.7%	17 14.5%
3	I lose my temper when another driver does something silly	55 44.0%	38 46.9%	44 49.4%	49 41.9%
4	I have been in a fight with another driver	4 3.2%	0 0%	3 3.4%	1 0.9%
5	I get annoyed if the traffic lights change to red as I approach them	54 43.2%	5 6.2%	33 37.1%	46 39.3%
6	It annoys me to see stickers and suchlike in people's car windows	16 12.8%	10 12.3%	7 7.9%	19 16.2%
7	On occasion I have tried to edge another car off the road	13 10.4%	2 2.5%	11 12.4%	4 3.4%
8	I would not mind being a racing driver	64 51.2%	22 27.2%	48 53.9%	38 32.5%
9	I like driving fast	93 74.4%	43 53.1%	67 75.3%	69 59.0%
10	I use the horn a great deal	13 10.4%	3 3.7%	10 11.2%	6 5.1%
11	I do not like being overtaken	11 8.8%	7 8.6%	8 9.0%	10 8.5%

Appendix C

No.	Parry AG (Aggression) Scale Items	M(A+AF) n = 125	F(A+AF) n = 81	A(M+F) n = 89	AF(M+F) n = 117
12	I make rude signs at other motorists when I am provoked	61 48.8%	10 12.3%	40 44.9%	31 26.5%
13	I drive faster when I am alone	56 44.8%	28 34.6%	40 44.9%	44 37.6%
14	There are too many rules and regulations in regard to driving	59 47.2%	24 29.6%	45 50.6%	38 32.5%
15	I have driven at another vehicle in anger	13 10.4%	2 2.5%	10 11.2%	5 4.3%
16	I am an aggressive driver	41 32.8%	6 7.4%	33 37.1%	14 12.0%
17	If another driver makes a rude sign at me I do something about it	36 28.8%	16 19.8%	24 27.0%	28 23.9%
18	At times I have felt that I could gladly kill another driver	18 14.4%	6 7.4%	12 13.5%	12 10.3%
19	I find it difficult to control my temper when driving	9 7.2%	4 4.9%	9 10.1%	4 3.4%
20	I swear out loud at other drivers	58 46.4%	37 45.7%	45 50.6%	50 42.7%
21	On occasion I have come near to blows with another driver	9 7.2%	5 6.2%	9 10.1%	5 4.3%
22	I have given chase to a driver who has annoyed me	22 17.6%	2 2.5%	14 15.7%	10 8.5%
23	I swear under my breath at other drivers	101 80.8%	55 67.9%	70 78.7%	86 73.5%
24	Sometimes I take a risk when driving for the sake of it (the risk)	41 32.8%	6 7.4%	30 33.7%	17 14.5%
25	If the driver behind has his lights shining in my mirror I pay him back in some way	45 36.0%	11 13.6%	32 36.0%	24 20.5%
26	I dislike drivers in certain types of cars	34 27.2%	7 8.6%	21 23.6%	20 17.1%
27	Most drivers are worse drivers than I am	92 73.6%	46 56.8%	63 70.8%	75 64.1%
28	If I find myself in the wrong lane I cut across regardless of traffic conditions	4 3.2%	5 6.2%	1 1.1%	8 6.8%
29	I have been known to flash my car lights at others in anger	67 53.6%	22 27.2%	45 50.6%	44 37.6%

Appendix C

No.	Parry AG (Aggression) Scale Items	M(A+AF) n = 125	F(A+AF) n =81	A(M+F) n = 89	AF(M+F) n = 117
30	At night I flash my car lights when others have their headlamps on	101 80.8%	53 65.4%	71 79.8%	83 70.9%

APPENDIX D

Parry's AN (Anxiety) Scale

Parry's AN (Anxiety) Scale items are given below together with the frequency of response for each item given as an actual frequency count and as a percentage of response for each driver group for that particular item. Separate tables are presented for the two following groups of drivers:-

1) MAF, MA, FAF, and FA driver groups

2) M(A+AF), F(A+AF), A(M+F) and AF(M+F) driver groups

——— = Item scores that differ from responses made by other driver groups by about 7 per cent or that differ in degree of anxiety of response

n = Number

1) MAF, MA, FAF, and FA Driver Groups

No.	Parry An (Anxiety) Scale Items	MAF n = 58	FAF n = 59	MA n = 67	FA n = 22
1	I persistently look at the fuel gauge while driving	36 62.1%	31 52.4%	44 65.7%	15 68.2%
2	I worry about getting lost when driving	10 17.2%	14 23.7%	7 10.8%	5 22.7%
3	I become nervous if others use their horns at me	15 25.9%	22 37.3%	6 9.0%	7 31.8%
4	L-drivers make me nervous	7 12.1%	6 10.2%	15 22.4%	6 27.3%
5	Night driving scares me	4 6.9%	5 8.5%	4 6.0%	4 18.2%
6	I feel anxious about large vehicles when I am driving	13 22.4%	21 35.6%	22 32.8%	8 36.4%
7	Sometimes I feel I am going to lose control of the car	17 29.3%	21 35.6%	23 34.3%	4 18.2%
8	I use the brakes more than is necessary	12 20.7%	26 44.1%	18 26.9%	6 27.3%
9	Quite often I have thoughts of and picture myself in an accident	30 51.7%	29 49.2%	41 61.2%	12 54.5%
10	I worry about doing the wrong thing when driving	35 60.3%	32 54.2%	35 52.2%	10 45.4%
11	If I am suddenly overtaken I get a bit jumpy	16 27.6%	25 42.4%	17 25.4%	7 31.8%
12	I worry about the brakes failing	16 27.6%	17 28.8%	21 31.3%	6 27.3%

Appendix D

No.	Parry AN (Anxiety) Scale Items	MAF n = 58	FAF n = 59	MA n = 67	FA n = 22
13	I feel a little apprehensive when I notice a police car about or following behind me	42 72.4%	44 74.6%	55 82.1%	13 59.0%
14	I feel more confident when I have others in the car with me	0 0%	1 1.7%	2 3.0%	1 4.5%
15	I get quite tense when driving	8 13.8%	16 27.1%	3 4.5%	9 41.0%

Appendix D

Parry's AN (Anxiety) Scale

Parry's AN (Anxiety) Scale items are given below together with the frequency of response for each item given as an actual frequency count and as a percentage of response for each driver group for that particular item, for the following driver groups:-

M(A+AF), F(A+AF), A(M+F) and AF(M+F)

——— = Item scores that differ from responses made by other driver groups by about 7 per cent or that differ in degree of anxiety of response

n = Number

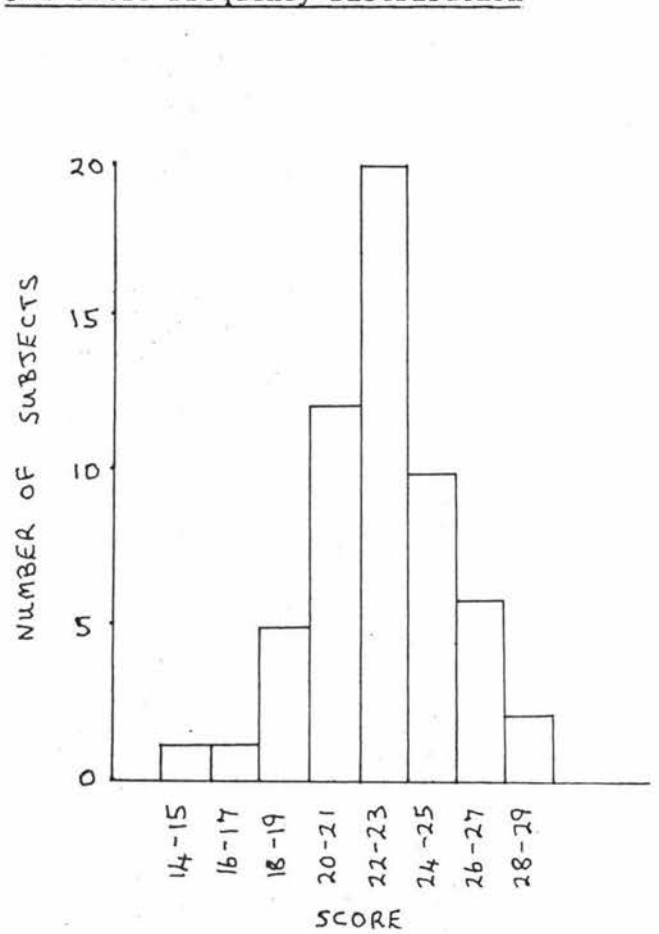
2) M(A+AF), F(A+AF), A(M+F) and AF(M+F) Driver Groups

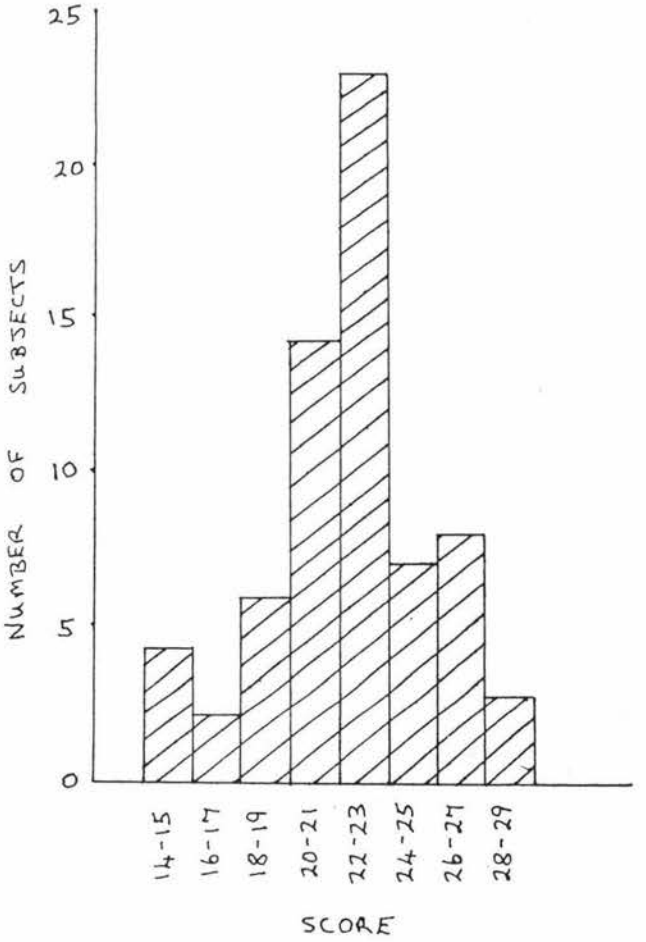
No.	Parry AN (Anxiety) Scale Items	M(A+AF) n = 125	F(A+AF) n = 81	A(M+F) n = 89	AF(M+F) n = 117
1	I persistently look at the fuel gauge while driving	80 68.4%	46 56.8%	59 66.3%	67 57.3%
2	I worry about getting lost when driving	17 13.6%	19 23.5%	12 13.5%	24 20.5%
3	I become nervous if others use their horns at me	21 16.8%	29 35.8%	13 14.6%	37 31.6%
4	L-Drivers make me nervous	22 17.6%	12 14.8%	21 23.6%	13 11.1%
5	Night driving scares me	8 6.4%	9 11.1%	8 9%	9 7.7%
6	I feel anxious about large vehicles when I am driving	35 28.0%	28 34.6%	30 33.7%	34 29.1%
7	Sometimes I feel I am going to lose control of the car	40 32.0%	25 30.9%	27 30.3%	38 32.5%
8	I use the brakes more than is necessary	30 24.0%	32 39.5%	24 27.0%	38 32.5%
9	Quite often I have thoughts of and picture myself in an accident	71 56.8%	41 50.6%	53 59.6%	59 50.4%
10	I worry about doing the wrong thing when driving	70 56.0%	42 51.9%	45 50.6%	67 57.3%
11	If I am suddenly overtaken I get a bit jumpy	33 26.4%	32 39.5%	24 27.0%	41 35.0%
12	I worry about the brakes failing	37 29.6%	23 28.4%	27 30.3%	33 28.2%

Appendix D

No.	Parry AN (Anxiety) Scale Items	M(A+AF) n = 125	F(A+AF) n = 81	A(M+F) n = 89	AF(M+F) n = 117
13	I feel a little apprehensive when I notice a police car about or following behind me	97 77.6%	57 70.4%	68 76.4%	86 73.5%
14	I feel more confident when I have others in the car with me	2 1.6%	2 2.5%	3 3.4%	1 0.9%
15	I get quite tense when driving	11 8.8%	25 30.9%	12 13.5%	24 20.5%

Graph VIII
Semantic Differential E (Evaluation) Factor
Raw Score Frequency Distribution



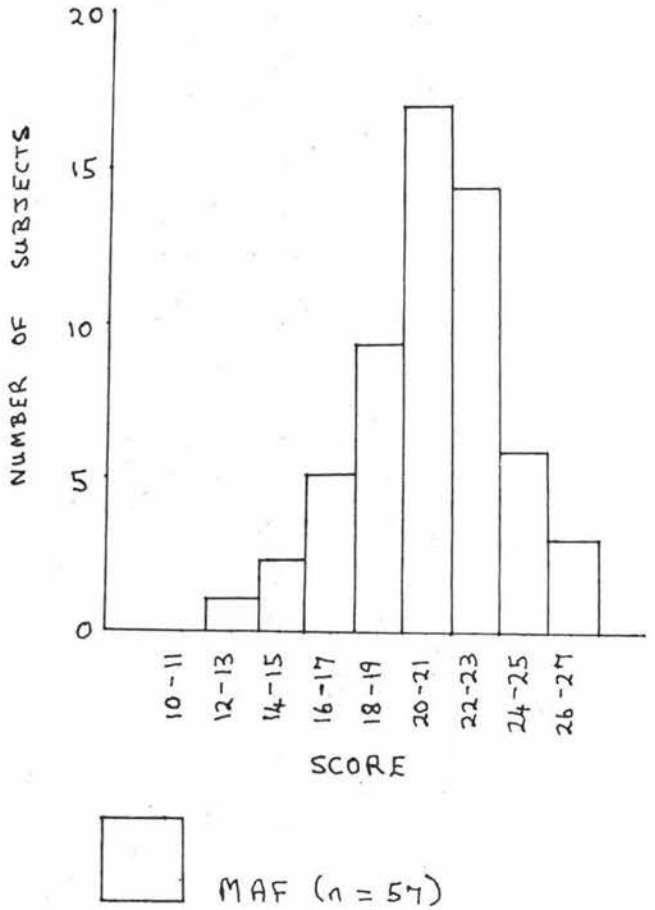


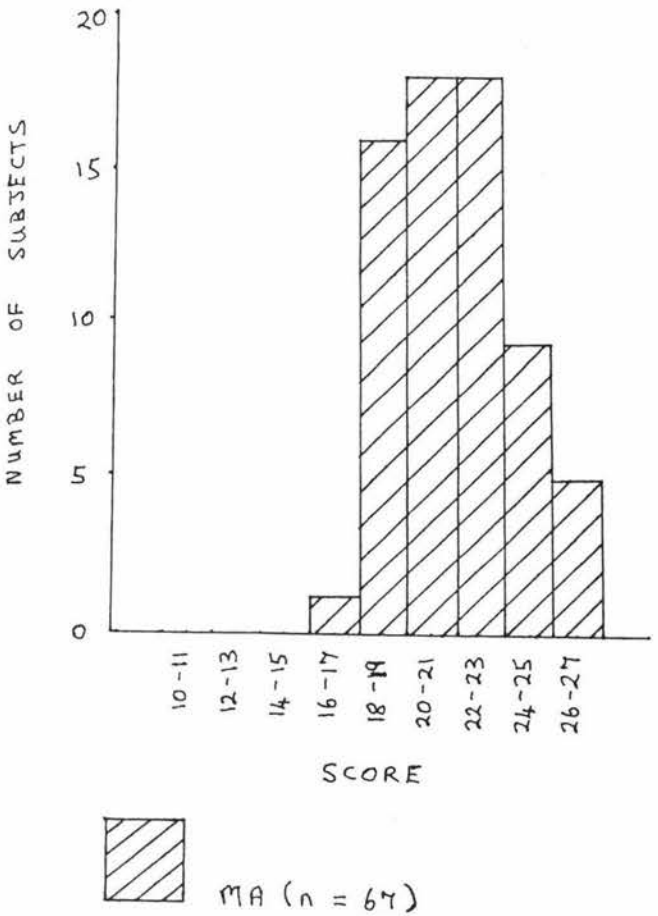
Graph VIII
Semantic Differential E (Evaluation) Factor
Raw Score Frequency Distribution

Graph IX
Semantic Differential A (Activity) Factor
Raw Score Frequency Distribution

Graph IX
Semantic Differential A (Activity) Factor
Raw Score Frequency Distribution

Graph X
Semantic Differential P (Potency) Factor
Raw Score Frequency Distribution





Appendix E

Graph X
Semantic Differential P (Potency) Factor
Raw Score Frequency Distribution

APPENDIX F

BIOGRAPHIC QUESTIONNAIRE

1)

PART 1

Please make sure that you answer all the questions as they apply to you and circle answers appropriate to you.

CODE NUMBER:

AGE:

20 and under 21-25 26-30 31-40 41-50 41-60 61+

SEX: Male Female

MARITAL STATUS: Single Married Divorced Widowed

NUMBER OF CHILDREN:

PRESENT OCCUPATION:

a) Student

b) Other (please specify)

EDUCATION:

a) Highest educational qualification gained.....

b) University Course and Year of Study.....

.....

HOBBIES:

OTHER INTERESTS:

Appendix F

DETAILS OF CAR OR VEHICLE NORMALLY DRIVEN:

Year of make Make c.c.Power(approximate) Colour

TYPE OF MOTOR INSURANCE HELD:

a) Third Party Insurance

b) Comprehensive Insurance

* * * * * * * * * * *

PART II

1) Are you a member of the Automobile Association or similar motoring organisation? Yes/No

2) Have you attended a defensive driving course? Yes/No

3) For how long have you held a driving licence? .....

4) How many times did you take a driving test before passing? .....

5) Do you think that the present driving test is adequate? Yes/No

6) Has your driving licence ever been suspended? Yes/No

7) Have you ever been convicted for a driving offence? Yes/No

8) If you have been convicted for a motoring offence:-

i) How many times .....

ii) What kind of driving offence

a) .....

b) .....

c) .....

9) Do you maintain and check your car or vehicle -

Regularly Often Sometimes Seldom Never

10i) How many miles do you normally drive -

a) In a day .....
b) In a week .....
c) In a year .....

10ii) Is your driving done mainly on -

a) Rural roads

b) City roads

c) Both rural and city roads

Appendix F

11) When learning to drive did you

a) Have professional instruction

b) Learn from relatives and/or friends

c) Learn from both (a) and (b)

d) State any other method of learning to drive if not the above .....

12) When driving do you wear a seat belt

Always Often Sometimes Seldom Never

13) How often do you normally drive

a) Every day

b) Several times a week

c) Rarely

14) Place the following in order of importance what, in your opinion, road traffic accidents are most often caused by.
For example, place the number 1 besides the cause which you think most important. Place 2 besides what you think second most important and so on.

..... Pedestrians

..... Conditions of road

..... Driver failure

..... Other causes (please specify)

.....

.....

15i) Do you enjoy driving

Always Often Sometimes Seldom Never

15ii) Do you enjoy the thrills and risks of modern driving

Always Often Sometimes Seldom Never

16) Do you feel that you make errors whilst driving

Always Often Sometimes Seldom Never

17) When errors occur whilst driving do you blame the other driver

Always Often Sometimes Seldom Never

Appendix F

18) Place the following in order of importance what, in your opinion, are the causes of accidents for which drivers are most often responsible.
For example, place the number 1 besides the cause which you think most important. Place 2 besides what you think second most important and so on.

..... Disregard of traffic rules
..... Poor driving skill
..... Excessive speed
..... Driver fatigue
..... Deficient knowledge of traffic rules
..... Other causes (please specify)
.....
.....

19) Is your health normally

Very good Good Satisfactory Fair Poor

20) Do you prefer to have company when driving

Always Often Sometimes Seldom Never

21) Does driving tire you

Always Often Sometimes Seldom Never

22) In a stressful situation do you usually

a) Maintain self-control
b) Panic and go to pieces
c) Other behaviour (please specify) .....
.....

23) What behaviour of other drivers makes you feel

a) Angry .....
.....
.....
b) Anxious .....
.....
.....

Appendix F

24) Do you feel that your driving is

Very Good Good Average Fair Poor

25) Do you smoke? Yes/No

26) If you smoke on average how may cigarettes a day? .....

27) What is your favourite colour? .....

28) Do you drink alcohol

Regularly Often Sometimes Seldom Never

29) If you have had an accident (or accidents) in the last five years whilst driving, please give the following details placing a tick in one of the columns for each accident and briefly state what you feel was the cause of the accident:-

Accident Date	Type of Accident			Cause of Accident
	Very Serious	Serious	Minor	
1).....	.....	.....	.....	.....
2).....	.....	.....	.....	.....
3).....	.....	.....	.....	.....
4).....	.....	.....	.....	.....
5).....	.....	.....	.....	.....
6).....	.....	.....	.....	.....

30) Can you make decisions quickly and accurately when driving

Always Often Sometimes Seldom Never

31) In the driving situation do you consider that your judgement is

Excellent Good Average Fair Poor

32) If you experience a 'near miss' whilst driving what usually is your reaction after this experience .....

.....

.....

.....

.....

.....

.....

.....

Appendix F

33) Any comments and views you may wish to add, for example, on the causes and prevention of road traffic accidents, male and female drivers, road safety etc.

34) Please complete the following on the next page to show how you feel as a driver.

For example:

a) Happy ___:___:___:_X_:___:___:___ Sad

A cross on this line would show that you feel neither happy no sad when driving

b) Happy ___:___:___:___:___:_X_:___ Sad

A cross on this line would show that you feel quite sad when driving

c) Happy _X_:___:___:___:___:___:___ Sad

A cross on this line would show that you feel very happy when driving

Appendix F

MEASUREMENT OF MEANING

Semantic Differential

NAME OR CODE NUMBER .....

CONCEPT ..... Self-concept as a driver .....

.....

.....

FAST	___:___:___:___:___:___:___	SLOW
VALUABLE	___:___:___:___:___:___:___	WORTHLESS
STRONG	___:___:___:___:___:___:___	WEAK
UNCERTAIN	___:___:___:___:___:___:___	DEFINITE
DULL	___:___:___:___:___:___:___	SHARP
PLEASANT	___:___:___:___:___:___:___	UNPLEASANT
INSECURE	___:___:___:___:___:___:___	SECURE
GOOD	___:___:___:___:___:___:___	BAD
COLD	___:___:___:___:___:___:___	HOT
DELICATE	___:___:___:___:___:___:___	RUGGED
PASSIVE	___:___:___:___:___:___:___	ACTIVE
FAIR	___:___:___:___:___:___:___	UNFAIR

Appendix F

2) NSQ

Please indicate your answers and give only one answer for each question.

		Put Answers Below		
1)	In school, what I liked best was: a) English c) Arithmetic or Mathematics	A ___	Undecided ___	C ___
2)	Every now and then I really like to engage in a tough physical activity	Yes ___	In-Between ___	No ___
3)	I strongly enjoy the slap-stick humour of the usual television comedy show	Yes ___	In-Between ___	No ___
4)	I would rather read: a) A realistic description of military battles c) An imaginative and sensitive novel	A ___	Undecided ___	C ___
5)	If somebody interrupts me when I am talking, I forget what I am talking about a) Yes, often (b) Sometimes (c) Hardly ever	A ___	B ___	C ___
6)	I enjoy more an evening: a) At a lively party with friends c) With a good hobby of my own	A ___	Undecided ___	C ___
7)	I prefer to dress: a) Very quietly, correctly and conservatively b) In an average way c) With some definite style that people can see	A ___	B ___	C ___
8)	I like to go out to a show or entertainment: a) Less than once a week (less than average) b) About once a week (average) c) More than once a week (more than average)	A ___	B ___	C ___
9)	I can tell a complete lie with a straight face: a) Whenever it is right to do so b) With a little difficulty c) Never under any circumstances	A ___	B ___	C ___

Appendix F

10) I greatly like to play practical jokes	Yes ___	In-Between ___	No ___
11) I like it when I know so well what the group has to do that I naturally become the one in command	Yes ___	In-Between ___	No ___
12) In my spare time, I would rather join: a) A hiking and exploring club c) A community service organisation	A ___	Undecided ___	C ___
13) I believe it is right to be modest and understate how good I am at something, when people ask	Yes ___	In-Between ___	No ___
14) If I think a person is wrong in a discussion, I tell him so: a) Only if it can be done politely b) Sometimes c) Almost always	A ___	B ___	C ___
15) The use of dirty or foul language disgusts me (even if there are only people of my own sex present)	Yes ___	In-Between ___	No ___
16) I find it upsetting to have to move all my belongings to a new place	Yes ___	In-Between ___	No ___
17) I would rather listen to: a) A brass band c) A good church choir	A ___	Undecided ___	C ___
18) When annoyed, I may say things that hurt people's feelings: a) Never b) Rarely c) Sometimes	A ___	B ___	C ___
19) I often feel quite tired when I get up in the morning	Yes ___	In-Between ___	No ___
20) I need to have things "just so" in order to concentrate on my work	Yes ___	In-Between ___	No ___

Appendix F

21)	I would rather be: a) A guidance worker with young people seeking careers c) A manager in a technical manufacturing company	A ___	Undecided ___	C ___
22)	In school, what I liked best was: a) Handwork and crafts b) Each about the same c) Music	A ___	B ___	C ___
23)	I would rather spend my vacations: a) In places in my own country, where I know I will have a good time c) In foreign lands that are colourful and "different"	A ___	Undecided ___	C ___
24)	The newspaper headline that would interest me more is: a) Latest Improvements in Production and Marketing c) Religious Leaders Discuss a Unified Religion	A ___	Undecided ___	C ___
25)	I think I am more sensitive than most people to the artistic quality of my surroundings	Yes ___	In-Between ___	No ___
26)	I have a tendency to be: a) A rather reckless optimist (too sure things will go well) c) An overcautious pessimist (too sure things will go wrong)	A ___	Undecided ___	C ___
27)	I have a hard time putting work out of my mind and relaxing	Yes ___	In-Between ___	No ___
28)	I like to crack jokes and tell funny stories: a) Hardly ever b) Sometimes c) Often	A ___	B ___	C ___
29)	I would rather be: a) An actor c) A house builder	A ___	Undecided ___	C ___

Appendix F

30)	I enjoy acting on impulses of the moment (even if they do sometimes land me in a few difficulties later)	Yes ___	In-Between ___	No ___
31)	I feel it is more important to: a) Get my own ideas put into practice c) Get along smoothly with others	A ___	Undecided ___	C ___
32)	When I need immediately the use of something belonging to a friend, but he is out, I think it is all right to borrow it without his permission	Yes ___	In-Between ___	No ___
33)	It is more important to me: a) To enjoy my life quietly in my own way c) To be admired and respected for what I have done	A ___	Undecided ___	C ___
34)	If I had a loaded gun in my hand, I would feel nervous until it was unloaded	Yes ___	In-Between ___	No ___
35)	I never try to ask help of people I know only slightly	True ___	In-Between ___	False ___
36)	Sometimes I let small things get on my nerves too much	Yes ___	In-Between ___	No ___
37)	Worrying keeps me awake at night	Never ___	Sometimes ___	Often ___
38)	I feel well-adjusted to life and its demands: a) All of the time b) Most of the time c) Less than half the time	A ___	B ___	C ___
39)	I feel that people are not as considerate of me as my good intentions deserve	True ___	In-Between ___	False ___
40)	I sometimes get tense and upset as I think back on the day's happenings	Yes ___	In-Between ___	No ___

Appendix F

3) PARRY's AG/AN SCALE

NAME OR CODE NUMBER .....

Instructions:

Your cooperation in answering all questions will be greatly appreciated. The aim of this research is to understand more about the driver's attitude to motoring.

Listed below are items/statements relating to the behaviour of drivers. Would you please read down the list and indicate that statement or item which is nearest to your own opinion.

Example:

Most drivers wash their cars regularly	..X..	Most drivers hardly ever wash their cars

Please read each item carefully before deciding. If you feel that neither statement is entirely true, then still choose the one that is nearest the truth for you. Please do not leave any items undone as this makes the whole questionnaire useless.

I hardly ever look at the fuel gauge while driving	..... 1	I persistently look at the fuel guage while driving
I am never anxious when approaching roundabouts	..... 2	I feel a little anxious when approaching roundabouts
There are far too many zebra crossings on the roads today	..... 3	The number of zebra crossings on the roads today is necessary
I am not easily provoked when driving	..... 4	I am easily provoked when driving
I never worry about getting lost when driving	..... 5	I worry about getting lost when driving
I never lose my temper when another driver does something silly	..... 6	I lose my temper when another driver does something silly

Appendix F

There are more bad drivers than good drivers on the roads today	..... 7	There are more good drivers than bad drivers on the roads today
I have been in a fight with another driver	..... 8	I have never been in a fight with another driver
Ifother drivers use their horns at me it does not make me nervous	..... 9	I become nervous if other drivers use their horns at me
I become distracted if someone talks to me while I am driving	.....10	I am not distracted if someone talks to me while I am driving
Non-aggressive driving means better driving	.....11	Aggressive driving means better driving
Hitch-hikers can be trusted	.....12	Hitch-hikers cannot be trusted
Penalties for driving convictions are too severe	.....13	Penalties for driving convictions are not severe enough
I never cut in and out of traffic	.....14	I sometimes cut in and out of traffic
Most drivers are inconsiderate	.....15	Most drivers are considerate
I am usually patient during the rush hour	.....16	I am usually impatient during the rush hour
My driving is worse if I am in a bad mood	.....17	My mood does not affect my driving
I get annoyed if the traffic lights change to red as I approach them	.....18	I do not get annoyed if the traffic lights change to red as I approach them
I have never argued with drivers	.....19	I have argued with other drivers
I does not annoy me to see stickers and suchlike in people's car windows	.....20	It annoys me to see stickers and suchlike in people's car windows
I am never apprehensive when changing lanes in traffic	.....21	I am usually apprehensive when changing lanes in traffic

Appendix F

I did not pass the driving test at my first attempt	..... 22	I passed the driving test at my first attempt
On occasion I have tried to edge another car off the road	..... 23	I have never tried to edge another car off the road
If I notice someone in a tight spot I mind my own business	..... 24	If I notice someone in a tight spot I stop and offer to help
I do not fancy being a racing driver	..... 25	I would not mind being a racing driver
I like driving fast	..... 26	I do not like driving fast
I very seldom use the horn	..... 27	I use the horn a great deal
I do not like being over-taken	..... 28	I do not mind being over-taken
If my car is not working properly I worry a great deal	..... 29	If my car is not working properly it does not worry me
I never make rude signs at other motorists when provoked	..... 30	I make rude signs at other motorists when I am provoked
L-drivers have no influence on me	..... 31	L-drivers make me nervous
Most people are good drivers	..... 32	Most people are bad drivers
I drive at the same speed whether I am alone or not	..... 33	I drive faster when I am alone
I am usually quite patient at traffic lights	..... 34	I am usually impatient at traffic lights
It is too much bother to stop for someone to pull out, I rarely do so	..... 35	I usually stop for someone to pull out
L-drivers are usually no nuisance to other drivers	..... 36	L-drivers are usually a nuisance to other drivers
There ought to more rules and regulations in regard to driving	..... 37	There are too many rules and regulations in regard to driving

Appendix F

I have never driven at another vehicle in anger	..... 38	I have driven at another vehicle in anger
I am not an aggressive driver	..... 39	I am an aggressive driver
Night driving scares me	..... 40	Night driving does not scare me
I feel anxious about large vehicles when I am driving	..... 41	I am not anxious about large vehicles when I am driving
I feel less confident in bad weather conditions	..... 42	I am always confident regardless of weather conditions
Pedestrians are usually no bother	..... 43	Pedestrians are usually a nuisance
If another driver makes a rude sign at me I do something about it!	..... 44	If another driver makes a rude sign at me I let it pass
I have never felt like killing another driver	..... 45	At times, I have felt I could gladly kill another driver
I do not find it difficult to control my temper when driving	..... 46	I find it difficult to control my temper when driving
If someone turns without signalling suddenly, I do not get annoyed	..... 47	If someone suddenly turns without signalling, I get annoyed
I become anxious when committing even a small traffic offence	..... 48	I never become anxious when committing a traffic offence
I never feel I am going to lose control of the car	..... 49	Sometimes I feel I am going to lose control of the car
I never worry about skidding	..... 50	Sometimes I worry about skidding
I swear out loud at other drivers	..... 51	I never swear out loud at other drivers
I use the brakes more than is necessary	..... 52	I use the brakes only when absolutely necessary

Appendix F

On occasion I have come near to blows with another driver	..... 53	I have never come near to blows with another driver
I have given chase to a driver who has annoyed me	..... 54	I have never given chase to a driver who has annoyed me
I swear under my breath at other drivers	..... 55	I never swear at other drivers
I never take any unnecessary risks when driving	..... 56	Sometimes I take a risk when driving, for the sake of it (the risk)
I never have thoughts of, or picture myself in, an accident	..... 57	Quite often I have thoughts of and picture myself in, an accident
If the driver behind has his lights shining in my mirror I do not retaliate	..... 58	If the driver behind has his lights shining in my mirror I pay him back in some way
I never worry about doing the wrong thing when driving	..... 59	I worry about doing the wrong thing when driving
Most people do not keep implicitly to all traffic regulations	..... 60	Most people keep implicitly to all traffic regulations
If I am suddenly overtaken I get a bit jumpy	..... 61	If I am suddenly overtaken it does not affect me
I never worry about the brakes failing	..... 62	I worry about the brakes failing
I worry that I may knock down pedestrians who step into the road	..... 63	I never worry that I may knock down pedestrians who step into the road
Women drivers are no more nervous than men drivers	..... 64	Women drivers are more nervous than men drivers
The type of car a person drives does not affect me	..... 65	I dislike drivers in certain types of cars
If my car is not working properly it makes me short-tempered	..... 66	If my car is not working properly I do not become short-tempered
I never feel apprehensive when I notice a police car about or following behind me	..... 67	I feel a little apprehensive when I notice a police car about or following behind me

Appendix F

Most people are worse drivers than I am	..... 68	Most people are better drivers than I am
Women drivers are not as good as men drivers	..... 69	Women drivers are as good as men drivers
I feel as confident driving whether I am carrying passengers or not	..... 70	I feel more confident driving when I have others in the car with me
Bad drivers are usually caught	..... 71	Bad drivers usually get away with it
If I find myself in the wrong lane of traffic I stay put	..... 72	If I find myself in the wrong lane I cut across, regardless of traffic conditions
I am always relaxed when driving	..... 73	I get quite tense when driving
I have been known to flash my car lights at others, in anger	..... 74	I have never flashed my car lights at others, in anger
At night I flash my car lights when others have their head-lamps on	..... 75	I never flash my car lights when others have their head-lamps on

APPENDIX G

SUMMARY TABLE OF TYPICAL MA AND FA DRIVER PERSONALITY PROFILES

In the following table -

O = Direction of significant difference found to occur between the typical MA and FA driver personality

Measuring Instrument	Typical MA Driver	Typical FA Driver
Biographical	Biographical Factors	
Biographic Questionnaire Part I and II		
Age	25 years and under	20 years and under
Marital Status	Single	Single
University Course	Bachelor's Degree in Science	Bachelor's Degree in Arts
Year of Study	First or second	First or second
Occupation	Full-time student	Full-time student
Highest Educational Qualification	U.E. or H.S.C.	U.E./H.S.C., or Bursary/G.C.E. 'A' Level(s)
Hobbies	Sport, technical, musical, respectively	Homecraft, sport, literary, respectively
Other Interests	Average 1.83	Average 2.66
Automobile Normally Driven	Vintage from 1961-	Vintage from 1966-
Motor Insurance Held	Comprehensive	Comprehensive
Automobile c.c. power	1001 to 2000 c.c.	Up to 2000 c.c.
Automobile colour	White/Cream, Blue/ Aqua, Green, respectively	Blue/Aqua, Red, Yellow/Orange/ Gold, respectively
Item 27		
Favourite Colour	Blue/Turquoise,	Blue/Turquoise,

Appendix G

Biographical (Cont)	Typical MA Driver (Cont)	Typical FA Driver (Cont)
	Green, Yellow/ Orange/Gold, Red, respectively	Green, Other e.g. grey, brown, respectively
Health Status		
Item 19		
Health Status	Very Good	Very Good
Item 21		
If driving found to be tiring	Seldom	Sometimes
Behaviour Patterns		
Item 9		
Vehicle Maintenance	Regular	Regular
Item 12		
Seat Belt Worn	Nearly always	Nearly always
Item 22		
Usual reaction in stressful situation	Self-control	Self-control
Item 32		
Reaction after 'near miss' experience	Educational, physiological emotional, relief, respectively	Extra-care and emotional, physiological, respectively
Item 25		
Whether smoke	No	No
Item 26		
Smokers' average daily cigarette number smoked	10.18	15.75
Item 28		
Alcohol Consumption	Fairly frequent. Not likely to be tee-total	Seldom or tee-total
Driving Experience		
Item 11		
Method of learning to drive	Relatives/Friends Instruction	Professional + Relatives/Friends Instruction

Appendix G

Biographical (Cont)	Typical MA Driver (Cont)	Typical FA Driver (Cont)
Item 4		
Times Driving Test taken before passing it	Once	Once
Item 3		
Average number of years driving licence held	7.16 years	6.77 years
Item 5		
Adequacy of Driving Test	No	Yes
Item 1		
Automobile Association (AA) Membership	Yes	Yes
Item 2		
Defensive Driving Course Attendance	No	No
Item 15i		
Enjoyment of driving	Yes	Usually yes
Item 15ii		
Enjoyment of the thrills and risks of modern driving	Yes	Sometimes
Item 20		
Company preferred when driving	Usually yes	Sometimes
Driving Record		
Item 6		
Suspension of Driving Licence	Yes	No
Item 7		
Conviction for driving offence	Yes	No
Item 8		
Type of driving offence committed	Speeding mainly, general carelessness	Speeding mainly
Average number of driving offences committed	.48	.23

Appendix G

Biographical (Cont)	Typical MA Driver (Cont)	Typical FA Driver (Cont)
Exposure to Driving		
Item 10ii		
Estimate of mileage driven per annum (p.a.)	3000 to over 10,000 miles p.a.	1000 to 10,000 miles p.a.
Item 10ii		
Roads where driving mainly done	On combination of rural and city roads	On combination of rural and city roads
Accident Record		
Item 29		
Accident Type	Very serious or Serious	Minor
	Preventable	Preventable
Average number of accidents incurred during last 5 years whilst driving	1.6	1.4
'Reported' accident cause	Inattention, alcohol, inexperience, carelessness, speed, stock on road, respectively	Hit in rear whilst stationary, misjudgement, road/weather conditions, respectively
Considered Causes of Accidents		
Item 14		
What road accidents considered to be 'most often caused by'	Driver failure, Alcohol, Road Conditions, Speed, respectively	Driver failure Speed, Alcohol, Road Conditions, respectively
Item 18		
Accident causes for which driver considered most often to be responsible	Alcohol, Poor Driving Skill, Disregard of Traffic Rules, Speed, respectively	Alcohol, Speed, Disregard of Traffic Rules, respectively

Appendix G

Biographical (Cont)	Typical MA Driver (Cont)	Typical FA Driver (Cont)
Estimation of Driving Ability		
Item 16		
Driving errors made	Sometimes or seldom	Often or sometimes
Item 17		
Other driver blame for driving erros that occur	Often or sometimes	Sometimes or seldom
Item 24		
Self-rating of driving standard	Very good to good	Good to average
Item 30		
Ability to make decisions quickly/accurately when driving	Always to often	Often
Item 31		
Judgement in driving situation	Excellent to good	Good to average
Attitudes		
Item 23		
a) Behaviour of other drivers that makes you angry	Disregard of traffic rules/Disregard of others, Speed, Fast/ Slow drivers, No indications, Not dipping headlights, Inconsiderateness, respectively	Disregard of traffic rules/Disregard of others, Alcohol, Not signalling, Following too close, Tooting the horn, Inconsiderateness, respectively
Item 23		
b) Behaviour of other drivers that makes you feel anxious	Erratic/Unpredictable drivers and driving, Poor driving/incompetent drivers, Lack of road courtesy, Risky/Dangerous overtaking, Traffic Officers, respectively	Erratic drivers and driving, Speed, Influence of alcohol, Not signalling, Seeing possible accident and being unable to do anything about it, Being tooted at with horn, respectively

Appendix G

Biographical (Cont)	Typical MA Driver (Cont)	Typical FA Driver (Cont)
Item 33 Any other comments, views etc.	Periodic driving license re-test, Compulsory defensive driving course, Stiffer penalties for driving offences e.g. drinking and driving Male and female drivers thought to be of equal driving ability	Periodic driving license re-test, More driver education e.g. in defensive driving skills, Raising age of being able to gain driving license, Provisional driving license scheme, Stiffer penalties for drinking and driving Male drivers thought to take more risks than female drivers
Semantic Differential		
Rating self-concept as a driver		
Semantic Factors		
E (Evaluation)	High E Factor	Moderate E Factor
A (Activity)	High A Factor	Low A Factor
P (Potency)	High P Factor	Low P Factor
Attitudinal	Attitudinal Factors	
Parry's AG (Aggression) Scale		
Rating aggressive attitudes towards driving and other drivers	High aggression	Low aggression
Parry's AN (Anxiety) Scale		
Rating attitudes of anxiety towards driving and other drivers	Low anxiety	Low anxiety

Appendix G

Personality	Typical MA Driver (Cont)	Typical FA Driver (Cont)
Personality	Personality Factors	
NSQ or Neuroticism Scale Questionnaire		
Total NSQ Anxiety Score	Low overall anxiety	Moderate to high anxiety
NSQ I Component (Sensitive-Tough)	Fairly low sensitivity	High sensitivity
NSQ F Component (Cheerful-Depressed)	Rather cheerful	Fairly cheerful
NSQ F Component (Submission-Dominance)	Somewhat dominant	High submissiveness
NSQ An Component (Anxious-Not Anxious)	Not particularly anxious	Moderately anxious

APPENDIX H

SUMMARY TABLE OF TYPICAL MAF AND FAF DRIVER PERSONALITY PROFILES

X = Direction of significant difference found to occur between the typical MAF and FAF driver personality.

Measuring Instrument	Typical MAF Driver	Typical FAF Driver
Biographical	Biographical Factors	
Biographic Questionnaire Part I and II		
Age	20 years and under	20 years and under
Marital Status	Single	Single
University Course	Bachelor's Degree in Science	Bachelor's Degree in Arts
Year of Study	First or second or no course being taken	First or second or no course being taken
Occupation	Full-time student	Full-time student
Highest Educational Qualification	Bursary or G.C.E. 'A' Level(s)	U.E./H.S.C. or Bursary/G.C.E. 'A' Level(s)
Hobbies	Sport, musical, technical, literary, respectively	Homecraft, sport literary, musical, respectively
Other Interests	Average 2.21	Average 2.11
Automobile Normally Driven	Vintage from 1966 -	Vintage from 1971 -
Motor Insurance Held	Comprehensive	Comprehensive
Automobile c.c. Power	1001 to 1500 c.c.	1001 to 1500 c.c.
Automobile Colour	White/Cream, Blue/ Aqua, Yellow/Orange/ Gold, respectively	White/Cream, Blue/ Aqua, Yellow/Orange/ Gold, respectively
Item 27		
Favourite Colour	Blue/Turquoise, Yellow/Orange/ Gold, Green, respectively	Blue/Turquoise, Red and Yellow/Orange/ Gold, Green, respectively

Appendix H

Biographical (Cont)	Typical MAF Driver (Cont)	Typical FAF Driver (Cont)
Health Status		
Item 19		
Health Status	Very Good	Very Good
Item 21		
If driving found to be tiring	Sometimes or seldom	Seldom or sometimes
Behaviour Patterns		
Item 9		
Vehicle Maintenance	Regular	Regular
Item 12		
Seat Belt worn	Nearly always	Nearly always
Item 22		
Usual reaction in stressful situation	Self-control	Self-control
Item 32		
Reaction after 'near miss' experience	Extra-care or physiological, educational, relief, respectively	Extra-care, physiological, relief, emotional or educational, respectively
Item 25		
Whether smoke	No	No
Item 26		
Smokers' average daily cigarette number smoked	13.83	10.6
Item 28		
Alcohol Consumption	Sometimes	Seldom
Driving Experience		
Item 11		
Method of learning to drive	Instruction from Relatives/Friends	Instruction from Relatives/Friends
Item 4		
Times Driving Test taken before passing	Once	Once

Appendix H

Biographical (Cont)	Typical MAF Driver (Cont)	Typical FAF Driver (Cont)
Item 3		
Average number of years driving licence held	7.43 years	9.46 years
Item 5		
Adequacy of Driving Test	No	Yes
Item 1		
Automobile Association (AA) Membership	Yes	No
Item 2		
Defensive Driving Course Attendance	No	No
Item 15i		
Enjoyment of Driving	Always or often	Always or often
Item 15ii		
Enjoyment of the thrills and risks of modern driving	Sometimes	Seldom
Item 20		
Company preferred when driving	Often or sometimes	Sometimes
Driving Record		
Item 6		
Suspension of Driving Licence	No	No
Item 7		
Conviction for driving offence	No	No
Item 8		
Type of driving offence committed	Mainly speeding	Mainly speeding
Average number of driving offences committed	.34	.12

Appendix H

Biographical (Cont)	Typical MAF Driver (Cont)	Typical FAF Driver (Cont)
Exposure to Driving		
Item 10i		
Estimate of mileage driven per annum (p.a.)	7501 to 10,000 miles p.a.	501 to 1000 and 3001 to 4000 miles p.a.
Item 10ii		
Roads where driving mainly done	On combination of rural and city roads	On combination of rural and city roads
Accident Record	Reported as having been accident free during the last 5 years of driving history	Reported as having been accident free during the last 5 years of driving history
Considered Causes of Accidents		
Item 14		
What road accidents considered to be 'most often caused by'	Driver Failure, Alcohol, Road Conditions, respectively	Driver Failure, Alcohol, Speed, respectively
Item 18		
Accident causes for which driver considered most often to be responsible	Speed and Alcohol, Poor Driving Skill, Disregard of Traffic Rules, respectively	Speed, Other e.g. Selfishness/ aggressive driving, incapacity, impatience, respectively
Estimation of Driving Ability		
Item 16		
Driving errors made	Sometimes	Sometimes
Item 17		
Other driver blame for driving errors that occur	Sometimes	Sometimes or seldom

Appendix H

Biographical (Cont)	Typical MAF Driver (Cont)	Typical FAF Driver (Cont)
Item 24		
Self-rating of driving standard	Good	Good to average
Item 30		
Ability to make decisions quickly/ accurately when driving	Often	Often
Item 31		
Judgement in driving situation	Excellent to good	Good to average
Attitudes		
Item 23		
a) Behaviour of other drivers that makes you feel angry	Disregard of traffic rules and Disregard of others, Inconsider-ateness, Selfishness, Alcohol, Following too close, Queue jumping, respectively	Disregard of traffic rules and Disregard of others, Inconsider-ateness, Speed, Thoughtlessness, Not signalling + Faulty indication, 'Smart Alecing', Acts of Aggression, respectively
Item 23		
b) Behaviour of other drivers that makes you feel anxious	Erratic/Unpredictable driving and drivers, Driving beyond capabil-ities, Poor car control, Recklessness, Speed, Following too close, Hesitant driving, Showing off, respectively	Erratic/Unpredictable driving, Inattention, Following too close, Excessive speed for bad weather conditions, Loss of vehicle control e.g. through drink or drugs, Overtaking when dangerous/ risky, Braking suddenly, Speed (Fast and slow), respectively

Appendix H

Biographical (Cont)	Typical MAF Driver (Cont)	Typical FAF Driver (Cont)
Item 33		
Any other comments, views etc	Periodic driving licence re-test, Adequate professional driving instruction, More comprehensive driving test, Compulsory defensive driving course, Stiffer penalties for road offences Personality/Aptitude test before gaining driving licence, Traffic Officers time not always put to best use, Female drivers as good as, if not better than, male drivers	Periodic driving licence re-test, More rigorous driving test, Raise driving age, More control of cyclists/young children, Traffic Officers only seem to apprehend minor road offenders, Female drivers more nervous but more courteous than male drivers, Drivers have more responsibilities than rights
Semantic Differential		
Rating self-concept as a driver		
Semantic Factors		
E (Evaluation)	High E Factor	High E Factor
A (Activity)	Low to moderate A Factor	Low to moderate A Factor
P (Potency)	Moderate P Factor	Low to moderate P Factor
Attitudinal		Attitudinal Factors
Parry's AG (Aggression) Scale		
Rating aggressive attitudes towards driving and other drivers	Moderate aggression	Fairly low aggression

Appendix H

Attitudinal (Cont)	Typical MAF Driver (Cont)	Typical FAF Driver (Cont)
Parry's AN (Anxiety) Scale		
Rating attitudes of anxiety towards driving and other drivers	Low Anxiety	Fairly low anxiety
Personality	Personality Factors	
NSQ or Neuroticism Scale Questionnaire		
Total NSQ Anxiety Score	Fairly low overall anxiety	Moderate to high overall anxiety
NSQ I Component (Sensitive-Tough)	Fairly low sensitivity	Fairly high sensitivity
NSQ F Component (Cheerful-Depressed)	Reasonably cheerful	Tendency towards depression
NSQ E Component (Submission-Dominance)	Fairly dominant	Very submissive
NSQ An Component (Anxious-Not Anxious)	Somewhat anxious	Not particularly anxious

APPENDIX I

Summary Table of Differences Found Between the Typical MA/MAF and FA/FAF Driver Personality

The following table outlines distinguishing differences found to occur, some at a significant level as indicated, between the typical MA and MAF driver personality and between the typical FA and FAF driver personality. Also, in the table significant differences found to exist between the typical MA and FA driver and between the typical MAF and FAF driver personality have been indicated.

Where lists are given, such as for favourite colour, automobile colour or reaction after the experience of a 'near miss', responses are given in order of priority.

In the table where no entry has been made no difference was found to occur. For example, the typical FA and FAF driver were both aged 20 years and under and for Parry's AN (Anxiety) Scale, rating attitudes of anxiety towards driving and other motorists, the typical MA and MAF driver were both found to have low anxiety in this respect.

Appendix I

In the table given below the following symbols have been used to indicate significant differences found to occur between the typical A and AF driver personalities:-

△ = Direction of significant difference found between the typical MA and MAF driver

— = Direction of significant difference found between the typical FA and FAF driver

○ = Direction of significant difference found between the typical MA and FA driver

× = Direction of significant difference found between the typical MAFand FAF driver

Measuring Instrument	Typical MA Driver	Typical MAF Driver	Typical FA Driver	Typical FAF Driver
Biographic Questionnaire Part I and II		Biographical Factors		
Biographical				
Age	25 years and under	20 years and under		
Average number of Other Interests	1.83	2.21	2.66	2.11

Appendix I

	Typical MA Driver	Typical MAF Driver	Typical FA Driver	Typical FAF Driver
Automobile Vintage	From 1961 -	From 1966 -	From 1966 -	From 1971 -
Automobile c.c. Power	1001 - 2000 c.c.	1001-1500 c.c.	Up to 2000 c.c.	1001-1500 c.c.
Automobile Colour	Blue/Turquoise, Green, Yellow/ Orange/Gold, Red	White/Cream, Blue/Aqua, Yellow/Orange/ Gold	Blue/Aqua, Red, Yellow/ Orange/Gold	White/Cream, Blue/Aqua, Yellow/Orange/ Gold
Item 27				
Favourite Colour	Blue/Turquoise, Green, Yellow/ Orange/Gold, Red	Blue/Turquoise, Yellow/Orange/ Gold, Green	Blue/Turquoise, Green, Other e.g. grey, brown	Blue/Turquoise, Red and Yellow/ Orange/Gold, Green
Behaviour Patterns				
Item 32				
Reaction After 'Near Miss' Experience	Educational, Physiological, Emotional, Relief	Extra-care or Physiological, Educational, Relief	Extra-care and Emotional, Physiological,	Extra-care, Physiological, Relief, Emotional or Educational

Appendix I

	Typical MA Driver	Typical MAF Driver	Typical FA Driver	Typical FAF Driver
Item 26				
Smokers Average Daily Cigarette Number	10.18	13.83	15.75	10.6
Item 28				
Alcohol Consumption	Fairly frequent. Not usually tee-total	Sometimes	Seldom or tee-total	Seldom
Driving Experience				
Item 3				
Average Number of years driving licence held	7.16 years	7.43 years	6.77 years	9.46 years
Item 15ii				
Enjoyment of Driving	Usually yes	Always or often	Usually yes	Always or often
Item 15ii				
Enjoyment of Thrills/Risks of Modern Driving	Yes	Sometimes	Sometimes	Seldom

Appendix I

	Typical MA Driver	Typical MAF Driver	Typical FA Driver	Typical FAF Driver
Item 20				
Company Preferred when Driving	Usually yes	Often/Sometimes		
Item 11				
Method of Learning to Drive			Professional + Relatives/ Friends Instruction	Relatives/ Friends Instruction
Driving Record				
Item 6				
Driving Licence Suspension	Yes	No		
Item 7				
Conviction for Driving Offence	Yes	Yes		
Item 8				
Average Number of Driving Offences Committed	.48	.34	.23	.12

Appendix I

	Typical MA Driver	Typical MAF Driver	Typical FA Driver	Typical FAF Driver
Exposure to Driving				
Item 10i				
Estimate of Annual Mileage Driven	3000 to over 10,000 miles per annum	7501 to 10,000 miles per annum	1000 to 10,000 miles per annum	500 to 1000 and 3001 to 4000 miles per annum
Accident Record				
Item 29				
Accident Type	Very serious or serious Preventable	Reported to be accident free during last 5 years of driving experience	Minor Preventable	Reported to be accident free during last 5 years of driving experience
Average number of Accidents	1.6		1.4	
Reported Accident Cause	Inattention, alcohol, inexperience, carelessness		Hit in rear shilst stationary, misjudgement, road/weather conditions	

Appendix I

	Typical MA Driver	Typical MAF Driver	Typical FA Driver	Typical FAF Driver
Estimation of Driving Ability				
Item 16				
Driving Errors made	Sometimes or seldom	Sometimes	Often or sometimes	Sometimes
Item 17				
Other Driver Blame for Driving Errors that Occur	Often or sometimes	Sometimes		
Item 24				
Self-rating of Driving Standard	Very Good to Good	Good		
Item 30				
Ability to Make Decisions Quickly and Accurately When Driving	Always or Often	Often		
Item 31				
Judgement in Driving Situation	Excellent to Good		Good to Average	

Appendix I

	Typical MA Driver	Typical MAF Driver	Typical FA Driver	Typical FAF Driver
Semantic Differenctial				
Rating Self-concept as a driver				
Semantic Factors				
E (Evaluation)	High E Factor	High E Factor	Moderate E Factor	High E Factor
A (Activity)	△ ○ High A Factor	Low to moderate A Factor	Low A Factor	Low to moderate A Factor
P (Potency)	○ High P Factor	Moderate P Factor	Low P Factor	Low to moderate P Pactor
Attitudinal		Attitudinal Factors		
Parry's AG (Aggression) Scale				
Rating aggressive attitudes towards driving and other drivers	△ ○ High aggression	× Moderate aggression	Low aggression	Fairly low aggression

Appendix I

	Typical MA Driver	Typical MAF Driver	Typical FA Driver	Typical FAF Driver
Parry's AN (Anxiety) Scale				
Rating Attitudes of anxiety towards driving and other drivers			Low anxiety	Fairly low anxiety
Personality		Personality Factors		
NSQ or Neuroticism Scale Questionnaire				
Total NSQ Anxiety Score	Low overall anxiety	Fairly low overall anxiety		
NSQ I Component (Sensitive-Tough)			High sensitivity	Fairly high sensivity
NSQ F Component (Cheerful-Depressed)	Rather cheerful	Reasonably cheerful	Fairly cheerful	Tendency towards depression
NSQ E Component (Submission-Dominance)	Somewhat dominant	Fairly dominant	High submissiveness	Very submissive
NSQ An Component (Anxious-Not Anxious)	Not particularly anxious	Somewhat anxious	Moderately anxious	Not particularly anxious

SECTION 9

BIBLIOGRAPHY

BIBLIOGRAPHY

AGAN, R.J. (1950)
A comparison of attitude scores made on the Conover Attitude Inventory before and after a course in driving. Proceedings of the Iowa Academy of Science, 57, 357 - 359.

ALEXANDER, C. (1953)
Psychological tests for drivers at the McLean Trucking Company. Traff. Quart., 7(2), 186 - 197.

ALEXANDER, F. (1949)
The accident-prone individual. Pub. Health Rep., 64(12): 357 - 362.

ALLPORT, G.W. (1935)
Attitudes. In C. Murchison (Ed), Handbook of social psychology. Clark University Press, Worcester, Massachusetts, 798 - 884.

ARBOUS, A.G. and KERRICH, J.E. (1951)
Accident statistics and the concept of accident proneness. Biometrics, 7, 340-432.

AUTOMOTIVE SAFETY FOUNDATION (1963)
Traffic control and roadway elements: their relationship to highway safety. Traffic Safety Res. Rev., 7:9.

BARRY, H. (1973)
Motivational and cognitive effects of alcohol. J. of Safety Research, Vol. 5(3), 200-201.

BECK, A.T. (1972)
Cognition, anxiety and psychophysiological disorders. In C.S. Spielberger (Ed), Anxiety - current trends in theory and research - Vol. II. Ch. 9, P. 343 - 353. Academic Press, New York, 1972.

BERKOWITZ, L. (1962)
Aggression. McGraw-Hill, New York.

BOHNERT (Oct. 1969)
Postgraduate Medecine, P. 32. In H.J. Roberts, The causes, ecology and prevention of traffic accidents. Charles C. Thomas, Publisher, Springfield, Illinois, 1971. P. 51 and P. 68.

BORKENSTEIN, R.F. (Oct. 1967)
A realistic approach to drinking and driving. Traffic Safety. Vol. 67, No. 10, P. 10 - 11 and P. 35.

BRANDALEONE, H. ET AL. (Nov. 1972)
Study of the relationship of health impairments and motor vehicle accidents. J. Occup. Medecine, Vol. 14, No. 11, 854 - 859.

BRENNER, B. and SELZER, M.L. (April 23, 1969)
Risk of causing a fatal accident associated with alcoholism, psychopathology and stress: further analysis of previous data. Research Report.

BRODY, L. (1957)
Personal characteristics of chronic violators and accident repeaters. Bull. Highw. Res. Bd., 152, 1-2.

BROWN, J.F. and MENNINGER, K.A. (1940)
The psychodynamics of abnormal behaviour. McGraw-Hill, New York.

BROWN, S.L. ET AL. (1968)
Alcohol safety study. 'Drivers who die.' U.S. Department of Commerce, PB 182 900.

BURNER, M. (1973)
Psychological aspects of traffic accidents. (French) Psychologie Médicale, Vol. 5(8), 1363 - 1373.

BUSS, A.H. (1961)
The psychology of aggression. John Wiley and Sons, Inc., New York.

BUSS, A.H. (1971)
Aggression pays. In J.L. Singer (Ed), The controlling of aggression and violence. Academic Press, New York.

BUTTIGLIERI, H.W. and GUENNETTE, Marie. (1967)
Temporal relationship between autombile accidents and psychiatric hospitalization. Perc. Mot. Skills, 24, 1327 - 1332.

CANTY, A. (1956)
Problem drivers and criminal offenders: a diagnostic comparison. Canad. Services Med. J., 12, 137 - 143.

CARLSON, W.L. (Dec. 1973)
Age, exposure and alcohol involvement in night crashes. J. of Safety Research, Vol. 5(4), 247 - 259.

CARNEY, T.F. (1972)
Content analysis - a technique for systematic inference from communications. University of Manitoba Press, Winnipeg, Canada.

CASE, H.W. and STEWART, R.G. (1956)
Driving attitudes. Traff. Quart., X, 364 - 376.

CASE, H.W. and STEWART, R.G. (1958)
Development of a driving attitude scale. Bull. Highw. Res. Bd., 172, 30 - 35.

CATTELL, R.B. and EBER, H.W. (1957)
Handbook for the 16 Personality Factor Questionnaire (The 16 PF). The Institute for Personality and Ability Testing (with 1964 supplementation), Champaign, Illinois.

CATTELL, R.B. and SCHEIER, I.H. (1961)
The meaning and measurement of neuroticism and anxiety. Ronald Press, New York.

CATTELL, R.B. and SCHEIER, I.H. (1963)
Handbook for the IPAT Anxiety Scale (2nd. Edition). The Institute for Personality and Ability Testing, Champaign, Illinois.

CHANOIT, P.F. (May 1, 1969)
Cited by the Medical Tribune, P. 16. In H.J. Roberts, The causes, ecology and prevention of traffic accidents. Charles C. Thomas, Publisher, Springfield, Illinois, 1971, P. 68.

CLARK, B. (1949)
The drivers who have accidents. War Office, A.M.D.7., London (unpublished).

CLARK, D.W. and MacMAHON, B. (Eds) (1967)
Preventitive medecine. Little Brown and Company, Boston.

COHEN, J. and PRESTON, Barbara. (1968)
Causes and prevention of road accidents. Faber and Faber, London.

COMMENTS (March 27, 1971)
The young driver. Medical J. of Australia, Vol. 1, No. 13, 667 - 668.

CONGER, J.J. ET AL. (June 1957)
Personal and interpersonal factors in motor vehicle accidents. Accident Research Project, University of Colorado School of Medecine and Fitzsimons Army Hospital, Denver, Colorado, 1069 - 1074.

CONGER, J.J.ET AL. (April 1959)
Psychological and psychophysiological factors in motor vehicle accidents. J. of the American Medical Assoc., (JAMA), Vol. 169, No. 14, 1581 - 1587.

CONOVER, D.W. (1947)
Development of certain techniques for the measurement of driver attitudes. Unpublished Master's Thesis, Iowa State College, Ames, Iowa.

CORNWALL, C.J. (1962)
The accident experience of London bus drivers. Ann. Occup. Hyg., 5, 69 - 82.

CRESSWELL, W.L. and FROGGATT, P. (1963)
The causation of bus driver accidents. Oxford University Press, London.

CRONBACH, L.J. (1970)
Essentials of psychological testing (3rd. Edition). Harper and Row, Publishers, London.

DAVIS, D.R. (1958)
Accident proneness. Med. Press, 239 (6192), 27 - 30.

DAVIS, D. and CORLEY, P.A. (1959)
Accident proneness in motor vehicle drivers. Ergonomics, 2:239 - 246.

DE SILVA, H.R. (1938)
Age and highway accidents. Scient. Monthly, 17, 536.

DE SILVA, H. R. (1942)
Why we have automobile accidents. John Wiley and Sons, Inc., New York.

DEMOGRAPHIC YEARBOOK. (1967)
United Nations, New York. In H.J. Roberts, The causes, ecology and prevention of traffic accidents. Charles C. Thomas, Publisher, Springfield, Illinois, 1971, P. 36.

DOOB, L. (1947)
The behaviour of attitudes. Psychological Review, 54, 135 - 156.

D.S.R. (1963)
Research on road safety. Road Research Laboratory, Department of Scientific Research (D.S.R.), H.M.S.O., London, P. 105 - 141.

DUNBAR, Flanders.(Dec. 1942)
The relationship between anxiety states and organic desease. Clinics, Vol. 1, No. 4, 879 - 908.

DUNBAR, Flanders. (1944)
Susceptibility to accidents. M. Clin. North America, 28 (3), 653 - 662.

DUNN, W. (1973)
Smoking behaviour. Winston, Washington, D.C.

DUSINBERRE, R.K.Y. (1969)
A backseat driver's guide: Women's role and responsibility in the traffic mortality problem. Magee Publishing Company, Bordentown.

ENGLISH, H.B. and ENGLISH, Ava, C. (1958)
A comprehensive dictionary of psychological and psychoanalytical terms. Longmans, London.

EYSENCK, H.J. (July 7, 1960)
Psychology and the prevention of road accidents. The New Scientist, Vol. 8, No. 190, P. 18-20.

EYSENCK, H.J. (1973)
Personality and the maintenance of the smoking habit. In W. Dunn, Smoking behaviour, Winston, Washington, D.C.

FACTS. (1955)
Connecticut Department of Motor Vehicles, Hartford, Connecticut.

FARMER, E. (1945)
Accident proneness on the road. Practitioner, 154:221.

FARMER, E. and CHAMBERS, E.G. (1939)
A study of accident proneness among motor drivers. Medical Research Council. Industrial Health Research Board Report, No. 84, H.M.S.O., London.

FESHBACH, S. (1964)
The function of aggression and the regulation of aggressive driving. Psychol. Rev., 71, 257 - 272.

FESHBACH, S. (1970)
Aggression. In P.H. Mussen (Ed), Carmichael's Manual of Child Psychology, Vol. II, Wiley, New York.

FESHBACH, S. (1971)
Dynamics of morality of violence and aggression: some psychological considerations. Amer. Psychol., 26, 281 - 291.

FINE, B.J. (1963)
Introversion - extraversion and motor vehicle driver behaviour. Perceptual and Motor Skills, 12, 95 - 100.

FORBES, T.W. (1939)
The normal automobile driver as a traffic problem. The J. of Gen. Psychol., 20, 471 - 474.

FOREMAN, J.B. (Gen. Ed) (1967)
Collins gem dictionary of quotations. Collins, London.

FOWLER, F.G. and FOWLER, H.W. (1957)
The Pocket Oxford Dictionary of current English (4th. Edition). Oxford University Press, London.

FRANZMEIER, S.A. (Oct. 1969)
Driving under the influence of emotion. Today's Health, P. 41.

FREEDMAN, S.J., CARLSMITH, J.M. and SEARS, D.O. (1970)
Social psychology. Prentice-Hall Inc., Englewood Cliffs, New Jersey.

FRIEDMAN, H. (1972)
Introduction to statistics. Random House, New York.

GARRETT, H.E. (1958)
Statistics in psychology and education (5th. Edition). Longmans Green and Company Ltd., London.

GIBSON, J.J. (1961)
The contribution of experimental psychology through the formulation of the problem of safety - a brief for basic research. In Behavioural approaches to accident research, Association for the Aid of Crippled Children, New York, P. 77

GOLDSTEIN, L.G. and MOSEL, J.N. (1958)
A factor study of drivers' attitudes with further study on driver aggression. Bull. Highw. Res. Bd., No. 172, P. 9 - 29.

GREENSHIELDS, B.D. (Jan. 1959)
Attitudes, emotions, accidents. Traff. Quart., Vol. 13, P. 221 - 235.

GUILFORD, J.P. (1954)
Psychometric methods - Chapter 8, P. 178. McGraw-Hill Book Company, New York.

HADDON, W. ET AL. (1964)
Accident research. Harper and Row, Publishers, New York.

HAKKINEN, S. (1958)
Traffic accidents and driver characteristics - a statistical and psychological study. Finland's Institute of Technology, Scientific Researches No. 13, Helsinki, Finland.

HARANO, R.M. ET AL. (March 1975)
The prediction of accident liability through biographical data and psychometric tests. J. of Safety Research, Vol. 7 (1), 16 - 52.

HAYSLETT, H.T. and MURPHY, P. (1968)
Statistics made simple. W.H. Allen and Company, London

HEATH, E.D. (1959)
Characteristics of vehicle operators. Bull. Highw. Res. Bd., No. 212, P. 16 - 20

HENDERSON, M. (Oct. 30, 1971)
The accident prone car driver - does he exist? The Medical J. of Australia, 2:909 - 912.

HIRSCHFIELD, A.H. and BEHAN, B.C. (1966)
The accident process: III Disability: Acceptable and unacceptable. J. American Medical Assoc. (JAMA), 197:85.

HÖFNER, K.J. (1973)
Seat belts from psychological viewpoints. (German) Kuratorium für Verkehrssicherheit, No. 3, P. 19.

HOLSTI, O.R. (1969)
Content analysis for the social sciences and humanities. Addison-Wesley Publishing Company, London.

HUSBAND, R.W. ET AL. (1951)
Some measured personality traits of accident prone industrial workers. Abstracted Programme of the 59th. Annual Meeting of the American Psychological Assoc., Amer. Psychologist, 6(7): 352.

IRWIN, J.O. (1964)
The personal factor in accidents - a review article. JR Statis. Soc., A, 127, 438 - 451.

JOHNSON, H.M. (1937)
Detection of accident prone drivers. Proc. Ann. Meet. Highway Res. Bd., 17, 444.

JOHNSON, R.N. (1972)
Aggression in man and animals. W.B. Saunders Company, London.

KUZMA, J.W. ET AL. (1973)
Non-fatal traffic accidents in relation to biographical, psychological and religious factors. Accid. Anal. and Prev., Vol. 5, 55 - 65, Pergamon Press, London.

LANCET (1966)
Editorial, 2:213. In H.J. Roberts, The causes, ecology and prevention of traffic accidents. Charles C. Thomas, Publisher, Springfield, Illinois, 1971, P. 50.

LAO TSE (1955)
The family of man. The Museum of Modern Art. Published by Mace Magazine Corporation, New York, P. 124.

LAUER, A.R. (1952)
Age and sex in relation to accidents. Bull. Highw. Res. Bd., No. 60, P. 25 - 35.

LAUER, A.R. (1954)
Characteristics of the driving population with respect to age, sex, driving habits and accident involvement. Iowa Academy of Science, Vol. 61, P. 89-98.

LAUER, A.R. (1960)
The psychology of driving - factors in accident enforcement. Charles C. Thomas, Publisher, Springfield, Illinois.

LAZARUS, R.S. and AVERILL, J.R. (1972)
Emotion and cognition: with special reference to anxiety, In C.D. Spielberger (Ed), Anxiety: current trends in theory and research - Vol. 11., Academic Press, New York, 1972, Chapter 7, P. 242 - 279.

LEEMING, J.J. (1969)
Road accidents - prevent or punish. Cassell and Company Ltd., London.

LEVITT, E.E. (1968)
The psychology of anxiety. Staples Press Limited., London.

LITTLE A.D. Inc., (1970)
The state of the art of traffic safety. Praeger Publications, New York.

LORENZ, K. (1966)
On aggression. Methuen, London.

MacIVER, J. (1961)
Safety and human behaviour. In Behavioural approaches to accident research. Association for the Aid of Crippled Children, New York, P. 59.

McCALL, R.B. (1970)
Fundamental statistics for psychology. Harcourt Brace and World Inc., New York.

McFARLAND, R.A. (1952)
Human factors in highway transport safety. Bull. Highw. Res. Bd., No. 60, P. 36 - 43.

McFARLAND, R.A. (Jan. 26, 1957)
Psychological and psychiatric aspects of highway safety. J. of the American Medical Assoc. (JAMA), Vol. 163, No. 4, P.233 - 237.

McFARLAND, R. (May 30, 1969)
The epidemiology of motor vehicle accidents in industrialized areas of the world. Address, Third Triennial Congress on Medical and Related Aspects of Motor Vehicle Accidents, New York.

McFARLAND, R.A. and MOORE, R.C. (1960)
Youth and the automobile. Golden Anniversary White House Conference on Children and Youth Inc.

McFARLAND, R.A. and MOSELEY, A.L. (1954)
Human factors in highway transport safety. Harvard School of Public Health, Boston, Massachusetts, P. 3-4 and P. 25 - 72.

McLAREN, B. (1964)
From the cockpit. Frederick Muller Ltd., London.

McLEAN, A.A. and De REAMER, R. (1961)
The accident repeater: psychiatric and statistical considerations. Postgraduate Medecine, 29: 563.

McNEMAR, Q. (1946)
Opinion-Attitude methodology. Psychological Bulletin, 43, P. 289 - 374.

MD MAGAZINE (March, 1968)
Automotivation. University of Michigan Study, P. 186. In H.J. Roberts, The causes, ecology and prevention of traffic accidents. Charles C. Thomas, Publisher, Springfield, Illinois, 1971, P. 49.

MEDICAL J. OF AUSTRALIA (Sept. 7, 1968)
Comments and abstracts - driving and the demon drink. Vol. 2, No. 10, P. 443.

MINISTRY OF TRANSPORT (1975)
Motor accidents in New Zealand - statistical statement - calendar year 1974. Ministry of Transport, Wellington.

MISCHEL, W. (1971)
Introduction to personality. Holt, Rinehart and Winston Inc., New York.

MOFFIE, D.J. ET AL. (1952)
The influence of personal and psychological characteristics on the accident experiences of tractor-trailer drivers. North Carolina State College, Department of Psychology Report 1, Raleigh.

MORGAN, J.N. (1967)
Who uses seat belts? Behav. Sci., 12:463 - 465.

MULAIK, S.A. (1964)
Are personality factors raters' conceptual factors? J. of Consulting Psychology, 28 (6), P. 506 - 511.

MUNDEN, J.M. (Winter, 1966)
The accident rates of car drivers by age. International Road Safety and Traffic Review. Vol. XIV, No. 1, P. 28 - 29.

MUNDEN, J.M. (1967)
The relation between a driver's speed and his accident rate. Road Research Laboratory, Ministry of Transport, London.

NAGEL, D.A. ET AL. (May, 1973)
Motor vehicle accidents: human causes and injuries sustained. Clinical Orthopaedics and Related Research. No. 92, P. 239 - 250.

NORMAN, L.G. (1960)
Medical aspects of road safety. Lancet 1, P. 989 - 994 and P. 1039 - 1044.

NUNALLY, J.C. (1970)
Introduction to psychological measurement. McGraw-Hill Book Company, New York.

OSGOOD, C.E. ET AL. (1957)
The measurement of meaning. University of Illinois Press, Chicago.

PARRY, M.H. (1968)
Aggression on the road. Tavistock Publications, London.

PELZ, D.C. ET AL. (July, 1975)
Drinking - driving behaviour of young men in relation to accidents. J. of Studies on Alcohol, Vol. 36 (7), P. 956 - 972.

PERCHONOK, K. (July, 1972)
Accident cause analysis. Prepared for National Highway Traffic Safety Administration, U.S. Department of Transportation, Washington, D.C.

PLANEK, T.W. ET AL. (Dec. 1974)
An evaluation of the National Safety Council's defensive driving course in various states. Accident Analysis and Prevention, Vol. 6(3-4), P. 271 - 297.

PLUMMER, Lynette S. and DAS, S.S. (1973)
A study of dichotomous thought processes in accident prone drivers. Brit. J. Psychiat., 122, 289 - 294.

PRITCHARD, A. (1970)
The motor racing year (1969). Pelham Books Ltd., London.

RACHMAN, S.J. and PHILIPS, Clare. (1975)
Psychology and medecine. Maurice Temple Smith Ltd., London.

RAINEY, R.V. ET AL. (1959)
An investigation of the role of psychological factors in motor vehicle accidents. Bull. Highw. Res. Bd., No. 212, P. 11 - 15.

ROBERTS, H.J. (1971)
The causes, ecology and prevention of traffic accidents - with emphasis upon traffic medecine, epidemiology, sociology and logistics. Charles C. Thomas, Publisher, Springfield, Illinois.

ROSE, A.M. (Ed) (1955)
Mental health and mental disorder. Norton, New York.

ROSS, H.L. (1960)
Traffic law violation: a folk crime. Social Problems, 8, P. 231 - 241.

ROUNDABOUT (Sept. 27, 1976)
Radio New Zealand programme. Philip Liner interviewing Major Noel Manson about the Salvation Army re-education course for drinking and driving offenders.

ROWAN, T.C. (1954)
Some developments in multidimensional scaling applied to semantic relationships. Unpublished doctor's dissertation, University of Illinois.

RUEBUSH, B.K. (1963)
Anxiety. In H.W. Stevenson, J. Kagan and C. Spiker (Eds), Child psychology. 62nd. Year Book of the National Society for the Study of Education. University of Chicago Press, Chicago.

RUNYON, R.P. and HABER, Audrey. (1971)
Fundamentals of behavioural statistics. Addison-Wesley Publishing Company, London.

SACHS, B.C. (1962)
Psychosomatic aspects of accidents. Industr. Med. Surg., 31, P. 525 - 532.

SACHS, B.C. (1964)
Psychosomatic aspects of accidents. Brit. Columbia Med. J., 6 P. 188 - 192

SCHEIER, I.H. and CATTELL, R.B. (1961)
Handbook for the NSQ. Institute for Personality and Ability Testing, Champaign, Illinois.

SCHMIDT, C.W.Jr., ET AL (Dec. 1972)
Characteristics of drivers involved in single car accidents. Arch. Gen. Psychiat., Vol. 27, P. 800 - 803.

SCIENCES (Jan. 1970)
P. 5. In H.J. Roberts, The causes, ecology and prevention of traffic accidents. Charles C. Thomas, Publisher, Springfield, Illinois, 1971, P. 68.

SELZER, M.L. (1969)
Alcoholism, mental illness and stress in 96 drivers causing fatal accidents. Behav. Sci., 14:1 - 10.

SELZER, M.L. ET AL. (1968)
The role of psychopathology, social stress and acute disturbance. Am. J. Psychiatry, 124:1028 - 1036.

SELZER, M.L. and VINOKUR, A. (Aug. 1974)
Life events, subjective stress and traffic accidents. Am. J. of Psychiatry, Vol. 131, No. 8, P. 903 - 906.

SEVERY, D.M. ET AL. (Oct. 1968)
Vehicle design for passenger protection from high speed rear-end collisions. In Proceedings of the 12th. Stapp Car Crash Conference, Detroit, Society of Automotive Engineers Inc., New York.

SHAFFER, J.W. ET AL. (April, 1974)
Social adjustment profiles of fatally injured drivers: a replication and extension. Arch. Gen. Psychiatry, 30:508 - 511.

SHAW, Lynette, S. (Winter, 1966)
The practical use of personality tests as accident predictors. International Road Safety and Traffic Review, Vol. XIV, No. 1, P. 30 - 37.

SHAW, Lynette, S. and SICHEL, H.S. (1971)
Accident proneness - research in the occurrence, causation and prevention of road accidents. Pergamon Press, Oxford.

SIEBRECHT, E.B. (1941)
Measuring driver attitudes. Research Contributions to Safety Education, Vol. II, No. 3.

SIEBRECHT, E.B. (1954)
Driver attitudes - techniques of study and results obtained. Paper presented at Meeting of Midwestern Psychological Association.

SIGNORI, E.I. and BOWMAN, R.G. (June, 1974)
On the study of personality factors in research on driving behaviour. Perceptual and Motor Skills. Vol. 38 (3, Part 2,), P. 1067 - 1076.

SKILLMAN, T.S. (1965)
Road safety - how to reduce road accidents. The Re-appraisal Society, London.

SMITH, A. (1968)
The body. George Allen and Unwin Ltd., London.

SMITH, G.M. (1970)
A simplified guide to statistics for psychology and education (4th. Edition). Holt, Rinehart and Winston Inc., New York.

SNIDER, J.G. and OSGOOD, C.E. (1969)
Semantic differential technique - a source book. Aldine Publishing Company, Chicago.

SPIELBERGER, C.D. (Ed) (1972)
Anxiety - current trends in theory and research - Vol. II., Academic Press, New York.

STATISTICAL BULLETIN (1969)
Metropolitan Life Insurance Company. In H.J. Roberts, The causes, ecology and prevention of traffic accidents. Charles C. Thomas, Publisher, Springfield, Illinois, 1971, P. 36.

STEWART, R.G. (1958)
Can psychologists measure driving attitudes? Educational and Psychological Measurement, Vol. XVIII, No. 1, P. 63 - 73.

STONE, P.J. ET AL. (1966)
The general inquirer: a computer approach to content analysis in the behavioural sciences. M.I.T. Press, Cambridge, Massachusetts.

TAKALA, M. ET AL. (1957)
The effects of distilled and brewed beverages. The Finnish Found. Alcohol Studies, Vol. 4, Helsinki.

THORNDIKE, R.L. (Feb., 1951)
The human factor in accidents with special reference to aircraft accidents. Project 21-30-001, Rept. 1 (Final Report), U.S. Air Force, School of Aviation Medecine, Randolph, Texas.

TILLMANN, W.A. (1948)
The psychiatric and social approach to the detection of accident prone drivers. M.Sc. Thesis, University of Western Ontario, London, Ontario, Canada.

TILLMANN, W.A. and HOBBS, G.E. (Nov., 1949)
The accident prone automobile driver. Amer. J. Psychiatry, Vol. 106(5), P. 321 - 331.

TRIANDIS, H.C. (1971)
Attitude and attitude change. John Wiley and Sons Inc., New York.

UNITED STATES CONGRESS
Motor vehicle traffic conditions in the United States. The accident prone driver. House Document, No. 462, Part VI, Washington, D.C., Government Printing Office. In W.A. Tillmann and G.E. Hobbs, The accident prone autombile driver. Amer. J. Psychiatry, Vol. 106 (5), P. 321 - 331, Nov., 1949, P. 322.

VERNON, P.E. (1964)
Personality assessment: a critical survey. Wiley, New York.

WALLACH, M.A. and KOGAN, N. (1965)
Modes of thinking in young children. Holt, Rinehart and Winston Inc., New York.

WALLER, J.A. and GOO, J.P. (1969)
Highway crash and citation as patterns and chronic medical conditions. J. Safety Res., 1:13.

WARREN, H.C. (Ed) (1934)
Dictionary of psychology. Houghton Mifflin Company, Cambridge, Massachusetts.

WEISS, A.P. and LAUER, A.R. (1931)
Psychological principles in automotive driving. National Research Council, Ohio State University, Columbus.

WHITLOCK, F.A. (1971)
Death on the road - a study in social violence. Tavistock Publications, London.

WHITLOCK, J.B. and CRANNELL, C.W. (1949)
An analysis of certain factors in serious accidents in a large steel plant. J. Appl. Psychol., 33, 494 - 498.

WILDE, G.J.S. and GRANT, A.C. (Jan., 1970)
Psychological aspects of road research - a study of the literature - 1959 to 1968. Queen's University, Psychology Department, Kingston, Ontario, Canada.

WILKENING, H.E. (1973)
The psychology almanac - a handbook for students. Wadsworth Publishing Company Inc., Belmont, California.

WILLIAMS, C.L. ET AL. (July, 1974)
An epidemiological study of serious traffic offenders. Social Psychiatry, Vol. 9 (3), P. 99 - 109.

WILLIAMS, A.F. and O'NEILL, B. (Dec., 1974)
On the road driving records of licenced race drivers. Accident Analysis and Prevention, Vol. 6(3-4), P. 263 - 270.

WOLMAN, B.B. (Ed) (1973)
Dictionary of behavioural science. Van Nostrand Reinhold Company, London.

WORLD ROAD STATISTICS (1967)
International Road Federation, Washington, D.C. In H.J. Roberts, The causes, ecology and prevention of traffic accidents. Charles C. Thomas, Publisher, Springfield, Illinois, 1971, P. 36.

YOUNG, E.S. (1971
Bruce McLaren - the man and his racing team. Hicks, Smith and Sons Ltd., Wellington.

'No man is an island, intire of itselfe.....
any man's death diminishes me, because I am
involved in Mankinde; And therefore never
send to know for whom the bell tolls; it
tolls for thee.'

John Donne

'Whenever I prepare for a journey I prepare
as though for death.'

Katherine Mansfield


M-E1
WHAM