21087

NATIONAL LIBRARY
OTTAWA

CANADA

BIBLIOTHÈQUE NATIONALE
OTTAWA

NAME OF AUTHOR. Dawn Evelyn Quinlan

TITLE OF THESIS. Personality, Perception and Alcoholism

UNIVERSITY. of Alberta, Edmonton, Alberta

DEGREE FOR WHICH THESIS WAS PRESENTED. M.Sc.

YEAR THIS DEGREE GRANTED. 1974

Permission is hereby granted to THE NATIONAL LIBRARY OF CANADA to microfilm this thesis and to lend or sell copies of the film.

The author reserves other publication rights, and neither the thesis nor extensive extracts from it may be printed or otherwise reproduced without the author's written permission.

(Signed) Dawn E. Quinlan

PERMANENT ADDRESS:

Ms Dawn Quinlan
Box 2141
Drumheller, Alberta

DATED October 31, 1973

NL-91 (10-68)

THE UNIVERSITY OF ALBERTA

PERSONALITY, PERCEPTION AND ALCOHOLISM

by

(C) DAWN EVELYN QUINLAN

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE

OF MASTER OF SCIENCE

DEPARTMENT OF PSYCHOLOGY

EDMONTON, ALBERTA

SPRING, 1974

THE UNIVERSITY OF ALBERTA

FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled "Personality, Perception, and Alcoholism" submitted by Dawn Evelyn Quinlan in partial fulfilment of the requirements for the degree of Master of Science.

Supervisor

Date 31/Oct./1973

To

my daughter

Judy.

Abstract

In the quest for an instrument to detect the type of alcoholic that is most dangerous on our highways two studies were conducted. In Study I three hundred and eleven male Ss served in four groups: Group ID-NA (Impaired drivers-non alcoholic), Group ID-A (Impaired drivers-Alcoholic), Group A (Alcoholics with a clean driving record) and Group C (Controls-non alcoholics with a clean driving record). Each S completed a personality test (Howarth Personality Questionnaire-HPQ), an interview instrument devised for the detection of alcoholism (Michigan Alcoholism Screening Test-MAST) and a biographical data questionnaire (Personal Information Questionnaire-PIQ). Impaired drivers were designated alcoholic or non alcoholic on the basis of the MAST.

Anova was computed on the personality factors of each group. Significant differences were evident between all groups except ID-NA and C. These two groups were combined to form a larger control group (combined control-CC) that more closely approximated the two alcoholic groups on demographic variables. In a second analysis (with groups ID-A, A and CC) two distinct alcoholic types became evident. Group A individuals were characterized as less sociable, more anxious and less well adjusted, more assertive, having greater feelings of inferiority and being less persistent in their life goals when compared to Group ID-A. A discriminant analysis was computed in the three groups and while it was statistically reliable it was felt that a more direct behavioral index of the high risk driver would correctly classify a

greater proportion of the Ss. The criterion for group membership was changed from the MAST to one of total arrests involving alcohol (including impaired driving charges). Discriminant analysis using this criterion resulted in a greater percentage of Ss being correctly classified. Another method of classification involving only the use of personality factor Adjustment-Emotionality was discussed.

In Study II sixty-three Ss that fulfilled the requirements for the first study were asked to volunteer for a short perceptual task involving the autokinetic illusion (AKI). Each of the four groups were represented. Perception of the AKI was expected to differ among the groups, however ANOVA revealed no significant differences.

Preface

This thesis focuses upon two social problems, alcoholism and highway safety.

National Safety Council figures report that alcohol is involved in approximately half of the fatal accidents recorded in the United States. This suggests that approximately 25,000 traffic deaths per year can be directly related to alcohol. More recently compiled evidence indicates that the majority of these accidents are related to alcoholism not social drinking. This raises a problem that is not easily resolved.

The attempt to generally legislate against the use of alcohol (prohibition) was a complete failure. However, since the greatest portion of the problem is a product of the alcoholic driver, the exclusion of all alcoholic drivers from our highways would considerably improve safety. This alternative also has disadvantages. First, one must achieve reliable identification of the alcoholic. Screening tests based on questions asked of drinking behavior have been devised and are found to discriminate alcoholics from non-alcoholics satisfactorily. Personality tests are also used to isolate the character structure of the "typical" alcoholic. These are less satisfactory and historically produce conflicting results. Second, one must be able to discriminate the "recovered" alcoholic from the drinking alcoholic. While such a discrimination seems straightforward enough, it presents the chronic problem of assessment in the field of alcoholism. Indeed some experts would say an alcoholic can never recover the ability to drink socially. Thus the "dry" alcoholic can be considered a safe driver

only to the degree that he maintains his sobriety.

A recent series of studies may offer a resolution to some of these difficulties. Using personality inventories and multivariate statistical methods these studies show that there are two types of alcoholics and that only one of these types can be considered a greater risk on the highway. If this is so it would be unfair to legislate against all alcoholics as some may not be contributing to the carnage on our highways.

The problem now becomes one of identification of the high risk alcoholic with the intent of removing him from the road.

In Study I the use of a personality test as a method of differentiating between alcoholics that are a high risk and those that are not is examined. Previously this type of test has been used to differentiate between alcoholics and normals. The question most frequently asked of this kind of study is whether the types extracted are the product of ingestion of alcohol for prolonged lengths of time or characteristics which would predispose a person to alcoholism. This is not the issue here. Personality profiles extracted will be descriptive only and directed toward the identification of the high risk driver.

In Study II a perceptual task is employed to attempt to discriminate between alcoholics and non-alcoholics. It is well documented that continued use of alcohol damages brain cells and possibly leads to an impairment of function in some areas. The test employed in this study is expected to discriminate between the two groups on the basis of an impairment of function in that area dealing with perceptual

memory. It is expected to further define differences among alcoholics, specifically the potentially dangerous from the low risk driver in accordance with the degree of loss of function involved. Once again no effort will be made to explain the data in terms of physiological mechanisms.

"Nor have we one or two kinde of drunkards onely, but eight kindes. The first is ape drunk; and he leapes, and singes, and hollowes, and daunceth for the heavens: the second is lion drunk; and he flings the pots about the house, calls his hostess whore, breakes the glasse windowes with his dagger, and is apt to quarrell with any man that speaks to him: the third is swine drunk; heavie, lumpish, and sleepie, and cries for a little more drink, and a fewe more cloathes: the fourther is sheep drunk; wise in his own conceipt, when he cannot bring foorth a right word: the fifth is mawdlen drunke; when a fellowe will weep for kindness in the midst of his ale. . . .: the sixth is Martin drunke; when a man is drunke and drinkes himselfe sober ere he stirre: the seventh is goat drunke; when, in his drunkenness, he hath no minde but on lecherie: the eighth is fox drunke--when he is craftie drunke, as manie of the Dutchmen bee, that will never bargaine but when they are drunke. All these species, and more, have I seen practiced in one companie at one sitting, when I have been permitted to remayne sober amongst them, only to note their severall humours" (Nash, 1592).

Acknowledgement

My thanks to all those who made this thesis possible: to the staff of the Alberta Impaired Drivers' Program, the R.C.M.P., the Attorney General's Department, Henwood and to all of the subjects who served in the study.

To my advisor Dr. Paul F. Zelhart whose patience and tolerance far exceeded the requirements.

To my daughters who will, I hope, in some way benefit from this experience.

To my family and friends who encouraged me when the need arose and never doubted my ability to complete the task at hand.

To Dona for her assistance and encouragement.

To Bill who was always there when I needed support.

Table of Contents

Table of Contents (cont'd)

List of Tables

List of Tables (cont'd)

Page

List of Figures

Introduction to Study I

> Alcoholism and other forms of dependence on drugs, are complex personality manifestations. Certain personality features seem to enhance the likelihood of forming such habits, the drugs themselves have demonstrable personality effects on those who use them, and the consequences of such dependence upon other aspects of the users' lives may in turn cause additional emotional disturbance and upset (p. 322, Dahlstrom & Welsh, 1965).

The belief that the alcoholic has personality characteristics that will differentiate him from "normals" has prompted numerous studies. These studies utilize many and varied testing instruments and describe as many characteristics as there are tests. A brief survey of the primary literature should serve to illustrate this point.

Literature Review

Standard Inventories Used to Assess the "Alcoholic" Personality

Minnesota Multiphasic Personality Inventory (MMPI).--The single most common property that appears to be associated with the predisposition to alcoholism is the Pd scale (Psychopathic Deviate) (Harris and Ives, 1947; Hewitt, 1943; Hoyt and Sedlacek, 1958; MacAndrew and Geertsma 1963; Quaranta, 1949; Rohan, Tatro and Rotman, 1969; Rosen, 1960; Manson, 1949; Button, 1956; Hampton, 1951; Rubin, 1948) which is defined as "lack of social conformity or self control and a persistent tendency to get into scrapes (Dahlstrom and Welsh, 1965, p. 188)." In an effort to ascertain the "cause" for the persistent elevation of the Pd scale MacAndrew and Geertsma (1963) factor analysed the 50 items comprising the scale and extracted five factors. Of these five factors only "social deviance" and "remorseful intrapunitiveness"

successfully discriminated between alcoholics and controls. In a further attempt at clarification, the individual items of the two factors were analysed with results indicating three discriminating items. The items however proved to be obvious as they included such statements as "I have used alcohol excessively" (p. 36).

Rosen (1960) in a comparison of alcoholics and psychiatric patients found "the same or similar constellations of psychiatric symptoms" (p. 265) in both groups. A scale developed by MacAndrew (1966) showed similar clusters of traits for alcoholics and criminals (Finney, Smith, Skeeters and Auvenshine, 1971). They suggested that the alcoholics profile is probably intermediate to the profiles of criminals and psychiatric patients. Button's (1956) cluster analysis disclosed two groups of alcoholics with similar profiles excepting the F (response conformity) and K (personal defensiveness) scores. He suggested these groups be labelled "candid" and "defensive" indicating the manner in which they deal with their problem. On the whole he described the alcoholic pattern as revealing "bitter, unhappy, tense, hostile people who unlike sociopaths see themselves as blameworthy" (p. 280).

Gough Adjective Check List (GACL).--Using the GACL to determine self descriptions Connor (1962) found that alcoholics were inclined to score high on such adjectives as "forgiving" and "affectionate," indicating "a desire to be liked and accepted in primary group roles," while the same group tended to de-emphasize adjectives considered to be indicative of organization and integration (i.e., capable, responsible). This low self evaluation is not an unusual finding and was

suggested by Jellinek (1952) to be a consequence of alcoholism. However, Williams (1965) investigated college drinkers in an attempt to extract a prealcoholic measure and found a similar low self evaluation. He submits that the "personality characteristic precedes the development of alcoholism" (p. 592) and is not as Jellinek suggests a consequence of alcoholism.

Edwards Personal Preference Schedule (EPPS).--Fitzgerald, Pasework and Tanner (1967) found alcoholics scored low on Exhibition, Autonomy and Succorance while rating high on Deference and Endurance. Employing the same testing instrument Pryor and Distefano Jr. (1970) concurred with Fitzgerald et al. (1967) on only one dimension, Succorance. In addition they revealed that the alcoholic scored significantly lower on affiliation while scoring significantly higher on Achievement, Intraception, Abasement and Heterosexuality.

In an attempt to ascertain whether the EPPS would differentiate between heavy and light drinkers Reiter (1970) found that "heavy drinkers generally had higher scores especially on those scales measuring hostile aggressive fantasies" (p. 762).

Differential Personality Questionnaire (DPQ).--Partington and Johnson (1969) used the DPQ to extract five clearly distinct types from their alcoholic population. These types ranged from Type I described as "most aggressive and antisocial" (p. 29) through to Type V described as "roughly average compared with the other types, except for moderately low Thought Disorder component" (p. 31).

The preceding serves to indicate dimensions relevant to alcoholics as assessed by the more commonly used testing instruments. The majority

of these studies have not been replicated. The few that have, produced discordant results or as in the case of the MMPI where replication consistently revealed the same relevant factors the items responsible for the discrimination were found to be closely related to the disease.

The Question of the Alcoholic Personality

Sutherland, Schroeder and Tordella (1950) published a critique of studies searching for the "alcoholic personality." They concluded, after examination of the literature (and agree with Wexberg, 1949) that there is "no alcoholic personality prior to alcoholism" (p. 559). They further suggest that alcoholics have not been found to differ significantly from non-alcoholics in personality traits. Studies that do show a difference "are open to criticism in content or procedure and their results have not been corroborated" (p. 557). Syme (1957) supported the position of Sutherland et al. and published a critique of studies covering the years from 1950-1956. His conclusions were slightly less negative than Sutherland et al.

> It is rather clear that on the basis of the evidence (all available relevant literature published from 1936 to 1956), there is no warrant for concluding that persons of one type are more likely to become alcoholics than persons of another type. Much further thought and research--with more awareness of methodological considerations and theoretical relevance--is yet needed before any extreme position can be justified in this area" (p. 301).

As a large number of the studies cited are dated after the two aforementioned critiques it is apparent that the quest for "the" alcoholic personality has continued.

As well as single testing instruments batteries of tests have been used by many to describe and explain the alcoholic personality, as have clinical observations.

Manson (1948) using a battery of tests in an attempt to develop an instrument for differentiating alcoholics from normals found statistically significant differences between alcoholics and non-alcoholics with alcoholics being high on anxiety, depressive fluctuations, emotional sensitivity, feelings of resentment, failure to complete social objectives, feelings of aloneness and poor interpersonal relations. They were also found to be more serious, irritable, depressive, hard boiled, subjective, lacking in emotional integration and strongly rhythmic (Thompson and Arms, 1948).

Alcoholics are said to have "deficient ego function" (Chodorkoff, 1964) and a "highly moralistic and punitive superego aspect of the self concept" (p. 247).

The personality structure is also found to change significantly with age as measured by the Personality Research Form (PRF). "Change, Dominance, Exhibition, Impulsivity and Play decreased with increasing age. Cognitive Structure, Harmavoidance and Order increased significantly with age. . . Achievement, Affiliation, Endurance, Nurturance, Understanding and Desireability. . . suggested a curvilinear trend by increasing for the middle ages and declining for the oldest age group" (Hoffman, 1970).

The investigation into the source of alcoholism has not been confined to the evaluation of traits as measured by tests. The observation that ordinal position of siblings has an effect on the emerging personality was first documented by Adler (Orgler, 1972). The area is controversial with studies both confirming and denying this possibility. For a review of this area refer to Schooler (1972).

Nevertheless it led to the study of ordinal position of alcoholics among siblings as a possible explanation for the aberrant personality. It has been found that alcoholics are only children more often than would be expected (Darrohn, 1939; Wall, 1936) or youngest children (Bakan, 1949; Darrohn, 1939) or in between children (Mowrer, 1941), or oldest sons (Darrohn, 1939). They are more apt to be a member of a small family (Wall, 1936) or a large family (7-12) (Bakan, 1949). Needless to say the evidence on family size or ordinal position is not conclusive. When looking at the early home environment of the alcoholic we find ". . . parental discord, alcoholism, want of discipline and lack of sensible direction in the environment of childhood" (Hart, 1930, p. 125) or "homes characterized by greater security, both emotional and economic" (Marshall, 1947, p. 289).

The one area of agreement concerning the alcoholic personality is that there appear to be two types of alcoholics. The fact that this dichotomy exists however is where the agreement ends as is indicated by the following. There are overcontrollers vs. undercontrollers (Button, 1956), Introverts vs. Extraverts (Hoch, 1940), Volunteers vs. Non Volunteers (Corotto, 1963), Symptomatic addict vs. Primary addict (third group mentioned but more heterogeneous group) (Fleeson and Gildea, 1942), Primary type vs. Secondary type (Jellinek, 1952), Internal vs. External (Goss and Morosko, 1970), Essential vs. Reactive (Knight, 1937), debilitated indifferent and course persons vs. psychopaths (Lewis, 1940) and "inhibited or maladaptive frustrated individuals" vs. "unsocialized aggressive persons" (third group not consistent) (Lawlis and Rubin, 1971).

At this junction there are two avenues of thought one might investigate. Either as Sutherland et al. (1950) suggest, there is no alcoholic personality prior to alcoholism, or as the previous studies indicate there is more than one personality type (i.e., two) represented in the literature. It is to the latter theory that I will address my attention.

Of the aforementioned studies dealing with a personality dichotomy in alcoholics the study by Lawlis and Rubin appears to be the most promising. Their research as well as producing a significant separation of types was replicated on three separate occasions. The second replication involved patients at the same hospital (Benton State in Arkansas) which confirmed the initial results. The third replication selected alcoholics from another state (Wisconsin Rehabilitation Service) with the results correlating positively with the previous two studies. Because of the diverse populations being dealt with the implications are that the factors are stable across populations of alcoholics.

More specifically Lawlis and Rubin used the 16PF (Cattell and Stice, 1957) and employed a type of cluster analysis designed to measure similar factor dimensions of the personality profiles of the Subjects (Ss) involved. The data indicated three personality profiles which were labelled "X", "Y" and "Z". Subjects in group "X" were described as "inhibited or maladaptive frustrated individuals," in group "Y" as having a "lack of social interaction personality" and group "Z" was indicative of "unsocialized aggressive persons." This study indicated three distinct personality types evident in persons pre-

viously diagnosed as alcoholic. The results were replicated twice with both replications drawing out three distinct personality profiles. To ascertain whether the groups of the first study were identical to the groups of the second and third replication they computed a correlation between the profiles of the separate groups. Group X and Z cor elated significantly with the corresponding group profiles in the two subsequent replications however group Y did not. Groups X and Z therefore, appear to be stable personality profiles which can be identified by the 16PF. (This study however can be faulted for the lack of a control group.)

Studies of the above nature investigating personality profiles of any group of persons (alcoholics included) are best substantiated by a behavioral index. An obvious index that is readily available is the driving behavior of the two types of alcoholics.

Zelhart (1972) used the same subjects that Lawlis and Rubin employed in their first replication in an effort to determine to what extent driving habits are influenced by personality types. Utilizing official citation records and personal interviews Zelhart reported significantly "lower frequency of citations in group X and a higher frequency in group Z" (p. 812). He further stated that "the group classified as unsocialized and aggressive [Z] had the worst driving records" (p. 812). The finding of such disparity between the two groups with regard to driving suggests that "not all alcoholic drivers may be equally dangerous" (p. 813).

This leads to the supposition that the driving behavior of alcoholics could prove to be a fruitful area for testing notions about the

alcoholic personality, in other words a valid behavioral index.

Rationale

There appear to be two reliable types of alcoholics easily differentiated by either a psychometric instrument or a behavioral index. The type defined as X by Lawlis and Rubin and found by Zelhart to have a lower frequency of citations than would be expected by chance should predominate in a group of alcoholics who have unmarked drivers licenses. Likewise the type defined as Z by Lawlis and Rubin and found by Zelhart to have a higher frequency of citations than would be expected by chance should be more prevalent in a group of alcoholics currently cited for impaired driving. Persons selected as controls should show a distinctly different personality profile from either of the alcoholic groups.

Hypotheses

1. There are two distinct personality types present in a population classified as alcoholics.

2. Of the two types of alcoholics there will be a greater number of alcoholics described as type Z (Lawlis and Rubin) in a group of persons charged with driving while impaired (DWI) or drunken driving (DD).

3. The type of alcoholic defined as type X will predominate in a population of alcoholics with unmarked driving records.

4. Persons charged with DD or DWI who are not classified as alcoholic will have a personality profile similar to that of the general population or control group and different from either type of alcoholic.

Introduction to Study II

Nelson and his colleagues have had considerable success using the autokinetic phenomenon as a behavioral measure of alcoholism. Study II investigates the efficiency of autokinetic phenomena as a measure differentiating alcoholics from non-alcoholics and between the two personality types postulated in alcoholics.

The autokinetic phenomenon can be defined as "apparent movement of a bright point observed continuously in darkness" (Drever, 1967). The illusion was first observed by Von Humbolt in 1799 when he noticed the apparent movement of stars. It has since been investigated by many, including Aubert who called it Autokinetische Empfindung or autokinetic sensation. Sherif (1958) in his description of the phenomenon stated:

> The experimental production of the Autokinetic effect is very easy and works without any exception, provided, of course, that the person does not use special devices to destroy the effect. For in a completely dark room a single point of light cannot be localized definitely, because there is nothing in reference to which you can locate it. The effect takes place even when the person knows perfectly well that the light is not moving. These are facts which are not subject to controversy; anyone can easily test them for himself (p. 220).

It has since been demonstrated that the illusion can be modified by many factors. In a study conducted by Cautela and Vitro (1964), four of the 25 naive Ss reported movement while 22 of 25 Ss instructed to expect movement reported the illusion. Corteen (1970) confirmed the findings when only 33.5% of naive Ss reported movement in contrast to 96% of Ss with an expectancy set. Chaplin's (1955) results indicated that "females showed greater resistance to autokinesis

than males as revealed by their longer latent periods and also perceived shorter excursions of movement as reported verbally in inches" (p. 155). Rethlingshafer and Sherrer (1961) found that practice effect increased perception of movement in naive Ss while social and sensory deprivation (Walters and Quinn, 1960) shortened latency time. Battersby, Kahn, Pollack and Bender (1956) showed "a significant shift in perceived movement in the direction opposing that of deviation" (p. 409) when Ss had both head and trunk turned to the same side. From this evidence the authors suggest an "influence of body tonus in determining visuospatial perception" (p. 409). Body orientation was found by Brosgole and Hansen (1969) to determine the direction of apparent motion. When S was upright North or upward responses predominated, when rotated 90° to left Westward and 90° to right Eastward responses predominated.

The physical properties of the light to a large degree determine the extent of movement observed. Edwards (1954a) found that the "latency of movement increased and amount decreased as size, and to a lesser degree, as brightness increased" (p. 398). He concluded that "stimuli as large as 7 1/2° and as bright as 174 ft.-L. showed good autokinetic movement" (p. 398). An array of lights is also subject to the illusory movement depending on the number (Royce, Stayton and Kinkade, 1962) or pattern (Royce et al., 1962; Edwards, 1954b, 1959) of the lights. Not only the light itself but the illumination of the visual field is influential. Luchins (1954a) reports that as illumination of the visual field increases the phenomenon decreases. Worthy and Kahn (1968) investigated the position of the light in relation to

the S and found that the height significantly effected the direction of the vertical movement perceived. Color of the light does not effect the extent of (Reeves, Cogan and Cogan, 1970) or the latency of (Marone, Coutu, 1969) movement. However, in the latter study four Ss gave no movement response to the color red. The eye also becomes a variable. Greater movement is described when the light is viewed peripherally as opposed to centrally (Luchins, 1954b). Karwaski, Redner and Wood (1948) report that "similar retinal angles at different distances are not equivalent in autokinetic effects" (p. 36). Even though the stimulus at a greater distance subtends the same retinal angle as at the smaller distance the light appears larger and therefore has increased latency and decreased amount of movement. Sadler, Mefferd and Wieland, (1966) found that the addition of one light presented with the AK stimulus on the fovea can alter both movement and latency depending on its placement.

Although physical characteristics influence the illusion, studies have indicated that psychological factors can also be important. Worthy and Kahn (1968) report that more upward movement was observed following what was designated a failure experience than following a success. In an active vs. passive mental set Ss assuming the active role witnessed movement of the light more frequently than Ss in the passive role (Haggard and Rose, 1944). Fisher (1961) using the Thematic Apperception Test (TAT) as a reference found Ss with low achievement orientation more often reported initial movement to the right than Ss with high need for achievement. The rod and frame test was used to divide Ss into field dependent (FD) and field inde-

pendent (FI) with the results indicating that FI's were significantly quicker to respond than FD's (Vaught and Hunter, 1967).

This dichotomy of personality types is further substantiated by Voth (1963) who postulates two types i.e., ego close individuals who see very little or no autokinesis described as "more reality bound" as opposed to ego-distant individuals who experience extensive autokinetic movement and are described as less reality bound. Sexton (1945) refers to Voth's study and suggests the dichotomy should more properly be called "extraverts and introverts." Carr (1910) at the beginning of the century suggested two distinct types of autokinetic perception. One employs no appropriate eye movements and is relatively smooth with a flowing continuous motion as contrasted with a second type which is accompanied by appropriate eye movements and is described as a slower, jerky and discontinuous movement.

With all the above noted human diversities it becomes apparent that the phenomenon can be used to categorize individual differences. Voth (1941) in a study of this nature reports there were "a few implications pointed out for a possible study of group dynamics" (p. 322). In a subsequent study of mental patients (Voth, 1947) using the autokinetic phenomenon as a projective measure of personality structure he found he could, on the basis of greater or lesser movement, differentiate diagnostic categories. Alcoholics were isolated on the basis of their tendencies toward seeing lesser or no movement. Using the foregoing as a foundation this study was followed by another (Voth, 1965) which dealt exclusively with autokinesis and alcoholism in the hopes of isolating "a personality variable characteristic of alcoholics"

(p. 421). The outcome confirmed the initial study and indicated that "the alcoholics had significantly lower autokinetic scores than normals" (p. 421). Further in relation to personality variables Voth reports:

> It is suggested that these scores reflect basic ego-structure differences. Persons with high autokinetic perception have been shown to exhibit greater ego autonomy, while those with low scores seem to share some characteristics with alcoholics: more suggestible, responsive to external stimuli, exhibitionistic, socially active, emotionally labile and impulsive (p. 421).

Clement (1968) could not replicate Voth's findings. He found significantly greater rate of movement and much more erratic perception for alcoholics as compared with normals. This has since been replicated by Clement (1969), Sveen (1969), Miller and Nelson (1972), Adby and Nelson (1972). Clement attempted to explain this disparity by examination of the type of patients used, and the procedures utilized to produce and evaluate the response. These explanations seem plausible particularly the difference in Ss (in-patients vs. out-patients) and is somewhat confirmed in their comparison in the study by Adby and Nelson (1972). An alternate solution that might be entertained is that Voth in his study was measuring two "types" of alcoholics which is alluded to in the following passages.

> Most of the alcoholics in the present study tended to have little or no autokinetic perception, and demonstrated overt, outgoing, syntonic behavior. A minority, however, did perceive more extensive autokinesis and, in terms of the theoretical grounds of this study, should be expected to display some personality characteristics differing from the majority of the group (p. 420).

and

> Alcoholics with lower autokinetic scores (0-50) were more likely than those with higher scores (over 50) to elope from

> the hospital and also to be readmitted to the hospital for further treatment. This may reflect the more independent, nonconforming attitudes of the high scorers (p. 421).

As the basic tenet of my hypothesis will state that alcoholics are comprised of more than one personality type, the preceding dichotomies could serve to substantiate the hypothesis.

Hypotheses

1. There are two distinct types of autokinetic responses present in a population classified as alcoholics. More specifically one type will perceive little or no autokinetic movement while the other group will perceive a greater rate of movement and more erratic perception.

2. Of these two types of alcoholics one type will be disproportionately represented in the group of persons charged with DD or DWI as opposed to the other type which will predominate in the group of persons with unmarked driving records.

3. Persons charged with DD or DWI who are not classified as alcoholics will have a response pattern similar to that of the general population or control group and different from either type of alcoholic response.

Method--Study I

Design

Four groups were employed in this study. The first group consisted of motorists convicted of a drinking while driving offense that were not, according to criterion, alcoholic (Group ID-NA). Although this group of persons drove while drinking they were not considered a high risk group. The second group consisted of motorists convicted of a drinking while driving offense that were alcoholic, according to criterion (Group ID-A). This group was considered to be a "high risk" group. They were no longer in control of their drinking behavior and it was hypothesized that they were of a personality type that would not be inclined to exercise necessary precautions while driving. The third group was made up of persons with a history of alcoholism that had unmarked driving records (Group A). These drivers had also lost control of their drinking but for some reason either did not drive while drinking or did not attract the attention of the police and were therefore considered to be a low risk group. The fourth group (Group C) included persons that drank but were not alcoholic, according to criterion, and that had unmarked driving records.

Subjects

Three hundred and eleven male Ss served in this study.

Subjects for Groups ID-NA and ID-A were recruited from the Impaired Drivers Program (I.D.P.) where they had been assigned by the court for violating drinking while driving statutes. The first one hundred and ninety four Ss that completed the necessary requirements for participation were selected. They were later divided into two groups

on the basis of the Michigan Alcohol Screening Test (MAST) which was to differentiate alcoholics from non-alcoholics. On the basis of the differentiation they were defined as Impaired Drivers-Non-Alcoholic (ID-NA) and Impaired Drivers-Alcoholic (ID-A).

Fifty-seven volunteers from Henwood (a rehabilitation center for alcoholics) served as Ss for Group A. This group was designated as the low risk alcoholic group. They were required to meet two criteria i.e., to have a valid Alberta drivers license, and to have an unmarked driving record (no accident for which they were responsible in the preceding two years as well as to have never been charged with an impaired driving offense). The number of Ss in this group was limited by the difficulties encountered in recruiting Ss. The strict criteria necessitated rejection of a large proportion of the volunteers.

Fifty-six volunteers from the Attorney General's Department and Royal Canadian Mounted Police (R.C.M.P.) served as the "normal" control group. As well as meeting the criterion of having unmarked driving records these Ss were also required to be free of any drinking problem as defined by the MAST.

Materials

Howarth Personality Questionnaire (HPQ) (Howarth, 1973).--The HPQ provides a personality profile rating each S on a 12\point scale for 10 bipolar factors. It consists of 120 questions. Mean reliability for the ten factors is .72. Complete table of Canadian norms and reliabilities for individual factors appears in Appendix A. A low score on any of the ten measures indicates a low degree and a high score a high degree of that quality. The test was chosen in

preference to the 16PF because of the purity of the factors, its Canadian standardization and its brevity. The factors being measured with a brief description are as follows:

1. Sociability (SY) measures the degree to which a person tends to seek out the company of others. This factor would be analagous to an introversion-extraversion dichotomy.

2. Adjustment-Emotionality (AE). An anxiety factor which includes a number of aspects of "neuroticism." Its main focus is on adjustment and emotional control.

3. Ascendence-Dominance (AD). The degree to which an individual is independent minded and assertive.

4. Super Ego (SG). Freudian terminology analagous to conscience measures responsibility, concern about moral standards and rules as well as other traits.

5. Hypochondriac-Medical (HM). An anxiety factor expressed in concern over bodily functions. This factor is separable from AE in orthogonal solutions.

6. Impulsiveness (IP). Important aspect of extraversion. Degree to which individual acts on impulse rather than exercising control.

7. Cooperativeness-Considerateness (CC). Contains some aspects of tender mindedness (Cattell, 1957) and also of tolerance.

8. Inferiority (IF). Adlerian terminology--degree to which individual feels inferior to others.

9. Persistence (PS). Measure of persistence in one's work, activities and life goals.

10. Trust vs. Suspicion (TS). Paranoia-like factor which has

been replicated in normal Ss.

Michigan Alcoholism Screening Test (MAST) (Selzer 1971).--This is an interview instrument devised for the detection of alcoholism consisting of 25 questions dealing both directly and indirectly with the use of alcohol. The MAST was chosen because its scoring system yielded a minimum number of false positives and false negatives. This and its brevity made it an obvious choice. Information concerning validity of the test and percentage of alcoholics correctly identified appears in Appendix A.

Personal Information Questionnaire (PIQ).--This is a biographical data questionnaire consisting of 40 items concerning educational, occupational and marital status and history, background and current problems related to drinking compiled for the Attorney General's Impaired Drivers' Program (I.D.P.). A subset of these questions were selected as being relevant to the purposes of this study.

All tests were completed by every S.

Procedure

Groups ID-A and ID-NA.--Subjects (Ss) were tested at the regular group meetings of the I.D.P. Each course met on Monday or Tuesday evening for a duration of four weeks. As all of the Ss had previously completed the PIQ after their court appearance only two questionnaires remained. These were group administered on two separate evenings at what was considered to be an appropriate break in the meeting.

Group A.--All three questionnaires were left with the psychologist at Henwood. Each male patient was asked on admission to complete a short form indicating whether or not he: 1. had a valid Alberta

drivers license, 2. had ever been convicted of a drinking-driving offense, 3. had an accident for which he was responsible in the past two years and 4. took any special driving precautions while drinking. If he answered yes to the first question and no to questions two and three he was requested to fill out the three questionnaires. This was usually completed within five days of admission and returned to the nurse to be held until they were collected. The driving history of each person that completed the three forms was then checked through the Highway Traffic Board to validate his statement concerning his unmarked driving record.

Group C.--The three questionnaires were mailed to the Attorney General's Department and all out of town R.C.M.P. detachments that had volunteered to serve as Ss. Nine volunteers from the Edmonton detachment were tested in a group at the R.C.M.P. Edmonton detachment.

Scoring

The scoring procedure used for the MAST was slightly modified from Selzer's original study. Whereas he alloted a score of two for an impaired driving offense, that was not considered practical in this study. The nature of the study made it necessary to deal with persons with at least one conviction. Had the present citation been counted against them they would have been half way to the criterion of four. Rather than raise the cut off point it was decided to ignore all present offenses and count only past ones. The impaired drivers were divided into the two groups ID-NA and ID-A on the basis of their MAST scores. Subjects having a MAST score of > 4 were included in group ID-A and Ss having a MAST socre of < 4 were included in group ID-NA. A score

of four was considered a buffer score. Subjects with a score of four were not included in the study. It was surprising to find that using this criterion approximately one half of the impaired drivers fell into each group. The MAST scores of Ss being considered for groups A and C were also examined to substantiate their group membership. Subjects having a score of < 4 were not included in Group A. Subjects having a score of > 4 were not included in Group C.

Results and Discussion--Study I

An analysis of variance was performed on the three groups; Alcoholic (A), Controls (C) and the combined group of Impaired Drivers (ID) (i.e., prior to differentiation on the basis of the MAST). Table 1 sets forth means and standard deviations for the demographic data.

Although groups ID and C were of a comparable age, group A differed from both of the other groups at the $p < .001$ level. This might be expected as alcoholism is a disorder more readily recognized and admitted in its advanced stages; thus, younger Ss tend to be under represented in this group. Education level of Group C was significantly higher than groups ID ($p < .001$) and A ($p < .05$), but the education levels of groups A and ID were comparable. The difference in age level was approximately ten years whereas the education difference reflected one grade level. The latter difference may be related to the general population trend toward higher education levels during that ten year period.

Present income showed a large discrepancy but could be considered a biased indicant of socioeconomic status (SES) due to complete employment at the time of testing by Group C. Groups A and ID-A showed high rates of unemployment. Because of the large disparity this measure of SES was not considered in further analyses. As a potentially valid measure

Table 1

Demographic Data for Three Groups, Alcoholics, Impaired Drivers and Controls

		Groups			
		A	ID	C	
Age	- Mean (SD)	44(12.8)	35(12.6)	36(10.4)	A > ID++
	Range	23-67	18-70	21-63	A > C ++
Education	- Mean (SD)	10.56(2.57)	10.38(2.22)	11.61(1.57)	A < C **
	Range	4-16	3-20	8-16	C > ID++
Total Sibs	- Mean (SD)	3.59(2.65)	4.11(2.80)	2.66(2.26)	A > C **
	Range	1-12	1-13	1-11	
Age of First Drinking Experience	- Mean (SD)	17(6.42)	18(3.72)	17.39(2.48)	
	Range	7-48	6-45	12-25	
Marital Status %					
Never Married		12.3%	32%	10%	
Married		56%	55%	88.3%	
Divorced		21.1%	5%	1.7%	
Widowed		1.8%	1%		
Separated		8.8%	7%		
Times Married					
Once		82.2%	86%	98%	
Twice		15.6%	12%	1.9%	
Three		2.2%	2%		
Present Income					
not employed		41.5%	12%		
$0-25			0.5%		
$26-50			2%		
$51-75		3.8%	2%		
$76-100			5.7%	14%	
$101-125		13.2%	12%	3.4%	
$126-150		3.8%	18%	3.4%	
$151-175			11%	15.5%	
$176-over			30%	77.6%	

Table 1 (cont'd)

	Groups			
	A	ID	C	
Highest Income Ever				
not employed	3.9%			
$0-25				C > ID
$26-50				ID > A
$51-75	2%	1%		
$76-100	7.8%	11%		C > A
$101-125	9.8%	11%	5%	
$126-150	5.9%	12%	3.3%	
$151-175	11.8%	11%	11.7%	
$176-over	58.8%	54%	80%	
Portion of Family That Drinks				
none	19.6%	14%	10%	
some	56.9%	49%	45%	
most	9.8%	18%	23.3%	
all	13.7%	19%	21.7%	

$p < .1$*
$p < .05$**
$p < .01$+
$p < .001$++

of SES one might consider only the "Highest Income Ever" of the Ss. SES differences still prevailed with group C having a higher SES than group ID ($p < .01$) and group ID having a higher SES than group A ($p < .05$). Thus, by two measures there are SES differences that are confounded with other criteria of group identification.

While there was no reason to expect any difference in total number of siblings, a significant difference was found. Individuals in group C average less than three siblings whereas for individuals in group A the average was closer to four ($p < .05$). This supports the previous suggestion of a higher socioeconomic status in group C.

The average age of first drinking experience was between 17 and 18 for all groups but the ranges differed markedly. Group C was more homogeneous with a range of 12-25, while the two remaining groups (A and ID) had ranges from 7-48 and 6-45 respectively.

The final variable to be discussed is marital status. While 12% of group A and 10% of group C had never married, 32% of group ID fell into this division. In addition group A showed a higher divorce rate reflecting, perhaps, the family problems associated with alcoholism. This difference in divorce rate was reflected in the greater percentage of second marriages in group A although group ID was comparable on this variable.

Although several of the differences in the demographic variables reach significance, it should also be pointed out that the acquisition of a control group matched to the characteristics of both alcoholics and impaired drivers is difficult. Alcoholics in particular are an extremely heterogeneous group. For this reason studies of this nature

have been conducted without a control group.

Means and standard deviations for the ten factors of the HPQ for groups A, ID and C are set forth in Table 2. These are plotted as mean profiles in Figure 1.

Alcoholics gave a distinctly different profile from the other groups being lower on SY ($p < .001$) and PS ($p < .001$) and higher on anxiety factors AE ($p < .001$), HM (Group A > ID, $p < .01$; Group A > C, $p < .001$), TS (Group A > C, $p < .1$)[1], IP ($p < .001$), IF ($p < .001$) as well as being higher than ID on AD ($p < .05$) and lower than Group C on CC ($p < .05$).

Impaired drivers as a group showed a remarkably similar profile to the controls but with significant differences on the following dimensions, C < ID anxiety factor HM ($p < .01$) and IF ($p < .1$), C > ID on SG ($p < .01$) and AD ($p < .05$). It was apparent from the preceding comparison that three very distinct personality profiles were present.

To assess the degree of discrimination between the profiles a stepwise discriminant analysis was computed on the factors (Sampson, 1970).

Using all ten of the factors of the HPQ, discriminant functions were derived that classified the groups as indicated in Table 3. The overall, function correctly classified 61% of the Ss and was highly significant ($F = 28.34$, df 20/590, $p < .01$). Of the three classifications, Ss were correctly identified in group A 79% of the time, in group C, 64% of the time and group ID, 55% of the time.

This would suggest that the impaired driver per se has a personality profile that distinguishes him from either of the other groups. The concern of this study, however, is investigating what has been

Table 2

Table of Means and Standard Deviations for HPQ Factors on Three Groups, Alcoholics, Impaired Drivers and Controls

Factors	Groups A n=57 Mean (SD)	ID n=194 Mean (SD)	C n=56 Mean (SD)	
SY	4.96(3.67)	7.51(3.07)	7.85(3.53)	A < ID^{++} A < C^{++}
AE	8.29(3.45)	3.83(3.19)	3.17(2.85)	A > ID^{++} A > C^{++}
AD	5.56(3.07)	4.44(2.44)	5.50(2.77)	A > ID** ID < C **
SG	7.22(2.35)	6.86(2.24)	7.92(2.18)	C > ID^{+}
HM	6.78(2.96)	3.30(2.46)	2.64(2.33)	A > ID^{++} A > C^{++}
IP	5.24(3.17)	4.00(2.42)	2.82(2.25)	A > ID^{+} A > C^{++} C < ID^{+}
CC	7.77(2.47)	8.27(2.16)	8.85(2.03)	A < C *
IF	6.64(3.10)	3.27(2.59)	2.39(2.17)	A > ID^{++} A > C^{++} ID > C *
PS	5.91(2.83)	8.28(2.32)	8.83(1.96)	A < ID^{++} A < C^{++}
TS	6.68(2.79)	6.14(2.75)	5.42(2.76)	A > C *

p < .1*
p < .05**
p < .01^{+}
p < .001^{++}

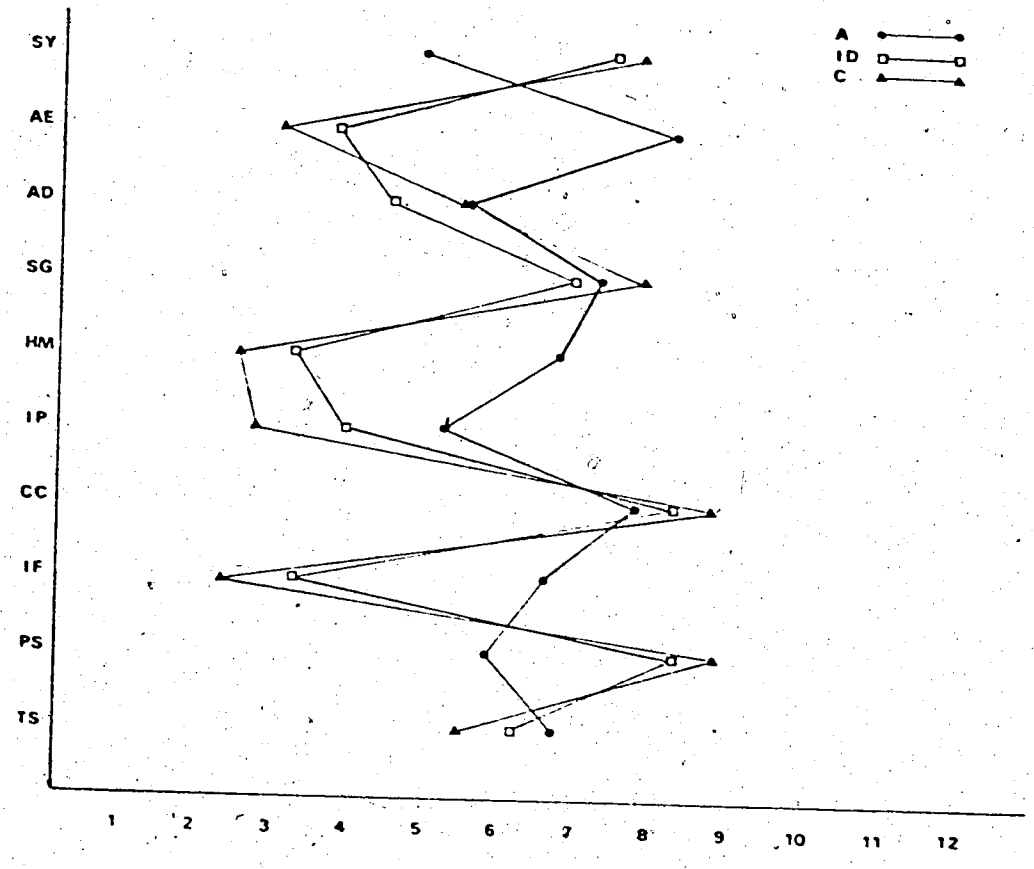

Figure I. Means for the HPQ Factors Plotted for Three Groups, Alcoholics, Impaired Drivers and Controls.

Table 3

Classification of Subjects Into Groups for Three Groups, Alcoholics, Impaired Drivers and Controls

	Number of Cases Classified Into Groups			
Group	A	ID	C	
A	79%	12%	9%	n=57
ID	16.5%	55.2%	28.3%	n=194
C	13%	23%	64%	n=56

$F = 28.34$, df 20/590, $p < .01$

Total Correctly Classified 61%

termed the high risk driver where the definition itself presupposes alcoholism on the part of the driver.

The groups of major interest in this study were the four which resulted from the division of the ID group on the basis of the MAST into Impaired Driver--Alcoholic (ID-A) and Impaired Driver-Non-alcoholic (ID-NA), plus groups A and C as in the previous analysis. Table 4 sets out the means, standard deviations and ranges for the four groups on age, marital status, education, income, family size and drinking experience. Some interesting differences emerged as a result of this differentiation.

Once again the age range of the four groups was comparable but the average age for group A was higher than the other three groups ($p < .001$). The separation of group ID into ID-A and ID-NA revealed an interesting difference on the variable "Never Married." Both ID groups were still greater than groups A and C, but whereas the ID-A group showed only 21% never married the ID-NA group revealed 43.6% in this category.

The rate of second marriages was, as pointed out in the previous analysis, higher for both groups A and ID. It became apparent that the high rate in group ID was due to the alcoholic portion of that group, with ID-NA totaling only 5.7% and ID-A 15.4% of their respective groups. The indication is that alcoholics whether impaired drivers or not have a greater number of marital problems.

Another interesting difference brought out by division of the ID group was the age of first drinking experience. Group C was the most homogeneous with a range from 12-25. ID-NA had a slightly greater

Table 4

Demographic Data for Four Groups, Alcoholics, Impaired Driver-Alcoholics, Impaired Driver-Non-Alcoholics and Controls

	Groups			
	A	ID-A	ID-NA	C
Age - Mean (SD)	44(12.8)	36(12.09)	34(12.5)	36(10.4)
Range	23-67	18-70	23-65	19-63
Education - Mean (SD)	10.56(2.57)	10.16(1.86)	10.61(2.5)	11.61(1.57)
Range	4-16	4-16	3-20	8-16
Total Sibs- Mean (SD)	3.59(2.65)	4.19(2.66)	4.34(2.82)	2.66(2.26)
Range	1-12	1-12	1-13	1-11
Age of First Drinking Experience				
- Mean (SD)	17(6.42)	18.1(4.13)	17.9(3.25)	17.39(2.48)
Range	7-48	8-45	6-33	12-25
Marital Status				
never married	12.3%	21%	43.6%	10%
married	56%	64%	45.7%	88.3%
divorced	21.1%	5%	4.3%	1.7%
separated	8.8%	9%	5.3%	
widowed	1.8%	1%	1.1%	
Times Married				
once	82.2%	83.3%	90.6%	98%
twice	15.6%	15.4%	5.7%	1.9%
three	2.2%	1.3%	3.8%	
Highest Income Ever				
not employed	3.9%			
$0-25				
$26-50				
$51-75	2%	1%	2.2%	
$76-100	7.8%	11%	10.8%	
$101-125	9.8%	11%	10.8%	5%
$126-150	5.9%	10%	14.0%	3.3%
$151-175	11.8%	8%	14.0%	11.7%
$176-over	58.8%	59%	48.4%	80%

Table 4 (cont'd)

	Groups			
	A	ID-A	ID-NA	C
Portion of Family That Drinks				
none	19.6%	16%	12%	10%
some	56.9%	44%	54.3%	45%
most	9.8%	20%	16.3%	23.3%
all	13.7%	20%	17.4%	21.7%

range of 6-33 but the most remarkable differences were found in the two alcoholic groups with some not experiencing their first drink until 45 in the ID-A and 48 in the A group.

Analysis of the HPQ was computed for the four groups. Means and standard deviations are set forth in Table 5 with the mean profiles based on the four groups plotted in Figure 2. Whereas in the previous analysis four dimensions showed significant differences between impaired drivers and controls, this analysis found no significant differences between the control and the ID-NA on any of the factors. Whereas Ss comprising the ID-A group showed a distinct profile which could be differentiated from both of the other groups. Significant differences were found between the ID-A and ID-NA. The ID-A had greater mean scores on AE ($p < .001$), IF ($p < .001$), HM ($p < .1$) and TS ($p < .1$) and lower mean scores on CC ($p < .05$) and PS ($p < .01$). When the ID-A group was compared to the A group, significant differences were found as follows; the scores of alcoholics were greater than ID-A Ss on AD ($p < .05$) HM ($p < .001$), IF ($p < .001$), AE ($p < .001$) and less than ID-A Ss on SY ($p < .01$) and PS ($p < .001$).

Once again, group profiles were compared by means of discriminant analysis. All ten factors were again incorporated into discriminant functions that significantly separated the four groups ($F = 26.9$, $df = 30/863$, $p < .01$). The classifications are shown in Table 6. Using the obtained function 54% of all Ss were correctly classified. Group A proved again to have the highest percentage of Ss correctly classified (75%). Groups ID-NA and C were classified correctly 57% and 55% respectively. Only 39% of group ID-A were correctly classified.

Table 5

Table of Means and Standard Deviations for HPQ Factors on Four Groups Differentiated on the Basis of the MAST

Factors	Groups				
	A n=57 Mean (SD)	ID-A n=100 Mean (SD)	ID-NA n=94 Mean (SD)	C n=56 Mean (SD)	
SY	4.96(3.67)	7.08(2.93)	7.96(3.17)	7.85(3.53)	A < ID-A^{+} A < ID-NA^{++} A < C^{++}
AE	8.29(3.45)	4.80(3.33)	2.80(2.70)	3.17(2.85)	A > ID-A^{++} A > ID-NA^{++} A > C^{++} ID-A > ID-NA^{++} ID-A > ID-NA^{++}
AD	5.56(3.07)	4.32(2.44)	4.57(2.44)	5.50(2.77)	A > ID-A** ID-A < C*
SG	7.22(2.35)	6.62(2.18)	7.11(2.29)	7.92(2.18)	ID-A < C^{+}
HM	6.78(2.96)	3.77(2.75)	2.81(1.99)	2.64(2.33)	A > ID-A^{++} A > ID-NA^{++} A > C^{++} ID-A > ID-NA* ID-A > C*
IP	5.24(3.17)	4.22(2.56)	3.77(2.26)	2.82(2.25)	A > ID-NA^{+} A > C^{++} ID-A > C**
CC	7.77(2.47)	7.80(2.16)	8.77(2.06)	8.85(2.03)	A > ID-NA* A > C* ID-A > ID-NA** ID-A > C**
IF	6.64(3.10)	4.17(2.76)	2.31(2.01)	2.39(2.17)	A > ID-A^{++} A > ID-NA^{++} A > C^{++} ID-A > ID-NA^{++} ID-A > C^{++}

Table 5 (cont'd)

Factors	Groups A n=57 Mean (SD)	ID-A n-100 Mean (SD)	ID-NA n-94 Mean (SD)	C n=56 Mean (SD)	
PS	5.91(2.83)	7.69(2.43)	8.91(2.02)	8.83(1.96)	A < ID-A^{++} A < ID-NA^{++} A < C^{++} ID-A < ID-NA^{+} ID-NA < C**
TS	6.68(2.79)	6.63(2.74)	5.62(2.69)	5.42(2.76)	ID-AL > ID-NA* ID-AL > C*

p < .1*
p < .05**
p < .01^{+}
p < .001^{++}

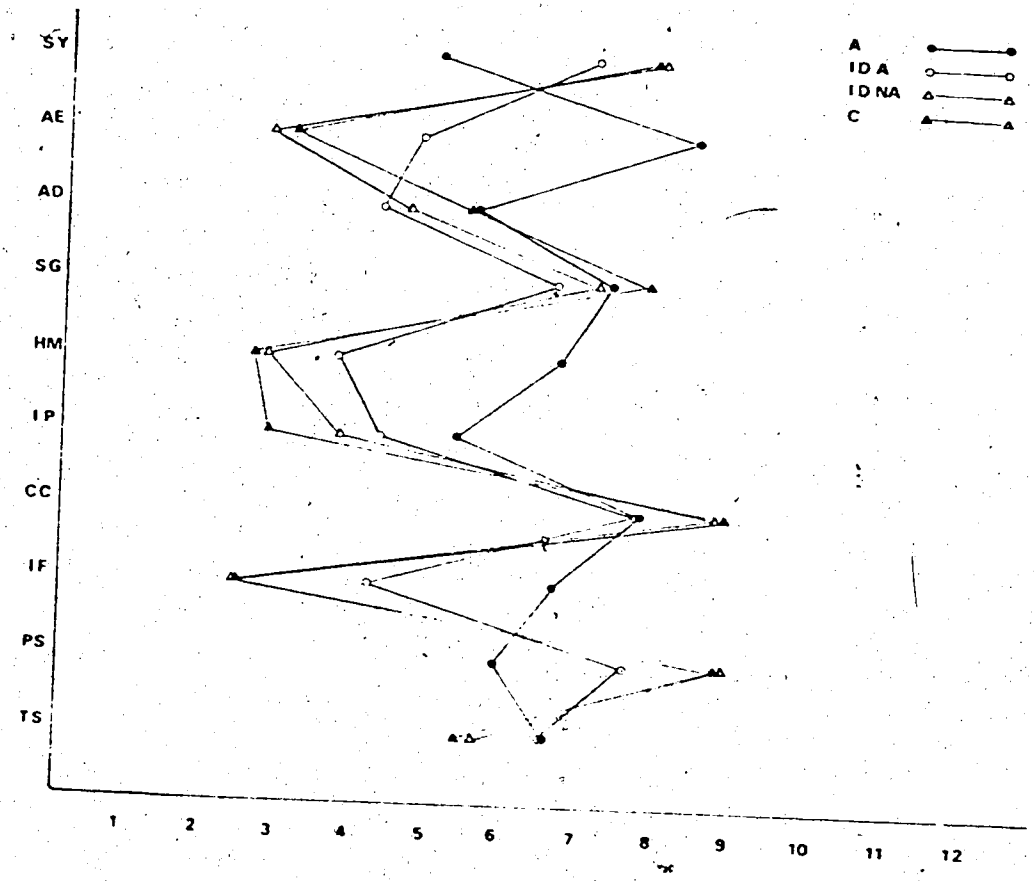

Figure II. Means for the HPQ Factors Plotted for Four Groups, Alcoholics, Impaired Drvier-Alcoholics, Impaired Driver-Non-Alcoholics and Controls.

Table 6

Classification of Subjects Into Four Groups, Alcoholics, Impaired Driver-Alcoholics, Impaired Driver-Non-Alcoholics and Controls

	Number of Cases Classified Into Groups				
Group	A	ID-A	ID-NA	C	
A	75%	11%	5%	9%	n=57
ID-A	20%	39%	25%	16%	n=100
ID-NA	7%	15%	57%	20%	n=94
C	9%	16%	20%	55%	n=56

$F = 26.901$, df 30/863, $p < .01$

Total Correctly Classified 54%

The misclassified Ss for the latter group fell primarily into groups A (20%) and ID-NA (25%).

A further discriminant analysis (Dixon, 1970) compared the two alcoholic groups alone (Groups A and ID-A) to ascertain the degree of discriminability between high risk and low risk alcoholic drivers. The two groups were found to be highly differentiable, ($F = 11.03$, df 10/146, $p < .01$). The six factors contributing to the differentiation were: Sociability, Adjustment-Emotionality, Ascendence-Dominance, Hypochondriac-Medical, Inferiority, and Persistence.

Because no significant differences were found on any measures when comparing groups ID-NA and C, as predicted, these groups were pooled for further comparisons. This larger control group (CC) more closely approximated the two alcoholic groups on demographic variables. Means and standard deviations for the revised demographic data are given in Table 7. The groups for this analysis were the original alcoholic group (A), the impaired driver alcoholic group (ID-A) and the combined control group (CC). It should be noticed here that demographic variables which previously indicated large significant differences were somewhat modified. Age continued to show significant differences with the alcoholics being on the average ten years older ($p < .001$). Education level was equalized to some extent with the only difference now between ID-A and CC ($p < .05$). Highest income still showed significant differences with alcoholics earning less than ID-A ($p < .01$) and CC ($p < .001$) but no significant difference was found between groups CC and ID-A.

Table 8 shows means and standard deviations for the new groups

Table 7

Demographic Data for Three Groups, Alcoholics, Impaired Driver-Alcoholics, and Combined Controls

	Groups A n=57	ID-A n=100	CC n=150	
Age - Mean (SD)	44(12.8)	36(12.09)	35(12.16)	All sig < .001
Range	23-67	18-70	21-65	
Education - Mean (SD)	10.56(2.57)	10.16(1.86)	11(2.26)	ID-A < CC*
Range	4-16	4-16	3-20	
Total Sibs- Mean (SD)	3.59(2.65)	4.19(2.66)	3.73(2.72)	
Range	1-12	1-12	1-13	
Age of First Drinking Experience				
- Mean (SD)	17(6.42)	18.1(4.13)	17.7(3.9)	
Range	7-48	8-45	6-33	
Marital Status				
never married	12.3%	21%	31%	
married	56%	64%	62%	
divorced	21.1%	5%	3%	
separated	8.8%	9%	3%	
widowed	1.8%	1%	1%	
Times Married				
once	82.2%	83.3%	94%	
twice	15.6%	15.4%	4%	
three	2.2%	1.3%	2%	
Highest Income Ever				
not employed	3.9%			
$0-25				
$26-50				A < ID-A**
$51-75	2%	1%	1%	A < CC++
$101-125	9.8%	11%	8%	
$126-150	5.9%	10%	10%	
$151-175	11.8%	8%	13%	
$176	58.8%	59%	61%	

Table 7 (cont'd)

	Groups A n=57	ID-A n=100	CC n=150
Portion of Family That Drinks			
none	19.6%	16%	11%
some	56.9%	44%	51%
most	9.8%	20%	19%
all	13.7%	20%	19%

$p < .05$*
$p < .01$**
$p < .001$++

Table 8

Table of Means and Standard Deviations for HPQ Factions on Three Groups Differentiated on the Basis of the MAST with Combined Control Group

Factors	Groups A n=57 Mean (SD)	ID-A n=100 Mean (SD)	CC n=150 Mean (SD)	
SY	4.96(3.67)	7.08(2.93)	7.92(3.30)	A < ID-A^{++} A < C^{++}
AE	8.29(3.45)	4.80(3.33)	2.94(2.75)	A > ID-A^{++} A > C^{++} ID-A > C^{++}
AD	5.56(3.07)	4.32(2.44)	4.92(2.60)	A > ID-A**
SG	7.22(2.35)	6.62(2.18)	7.42(2.28)	ID-A < C**
HM	6.78(2.96)	3.77(2.75)	2.75(2.12)	A > ID-A^{++} A > C^{++} ID-A > C^{+}
IP	5.25(3.17)	4.22(2.56)	3.42(2.30)	A > ID-A* A > C^{++} ID-A > C*
CC	7.77(2.47)	7.80(2.16)	8.80(2.04)	A < C^{+} ID-A < C^{+}
IF	6.64(3.10)	4.17(2.76)	2.34(2.06)	> ID-A^{++} > C^{++} ID-A > C^{++}
PS	5.91(2.83)	7.69(2.43)	8.88(1.99)	A < ID-A^{++} A < C^{++} ID-A < C^{++}
TS	6.68(2.79)	6.63(2.74)	5.55(2.71)	A > C** ID-A > C^{+}

p < .1*
p < .05**
p < .01^{+}
p < .001^{++}

on the HPQ. The mean profile of the three groups (Figure 3) now more clearly defines group differences. It appeared that there were two definite alcoholic types that could be identified by the HPQ. The alcoholic with a clean driving record (low risk driver) was characterized as less sociable ($p < .001$), more anxious and less well adjusted ($p < .001$), more dominant ($p < .05$) but with greater feelings of inferiority ($p < .001$) and less persistent in his life goals ($p < .001$).

The opposite picture held for the ID-A. When compared with the A group he appeared to be more sociable, less anxious, less dominant, with fewer feelings of inferiority and with greater persistence in his life goals. When he is compared to the CC group another picture emerges. He is less well adjusted ($p < .001$), has a more inadequate super ego ($p < .05$), is more anxious ($p < .01$), more impulsive ($p < .1$), less considerate ($p < .01$), has greater feelings of inferiority ($p < .001$), is less persistent ($p < .001$) and more suspicious ($p < .01$).

The CC group when compared with the A group showed significantly different scores indicating group C was more sociable ($p < .001$), less neurotic and more stable, less dominant, less impulsive ($p < .001$), more considerate ($p < .01$), with fewer feelings of inferiority ($p < .001$), was more persistent in life goals ($p < .001$) and was less suspicious ($p < .05$). When compared with the ID-A group they were less neurotic and more stable ($p < .05$), had a more adequate super ego ($p < .05$) were less impulsive ($p < .1$), more considerate ($p < .01$), had fewer feelings of inferiority ($p < .001$), were more persistent in life goals ($p < .001$) and were less suspicious ($p < 01$). The C group generally appears to have a more stable personality as measured by the

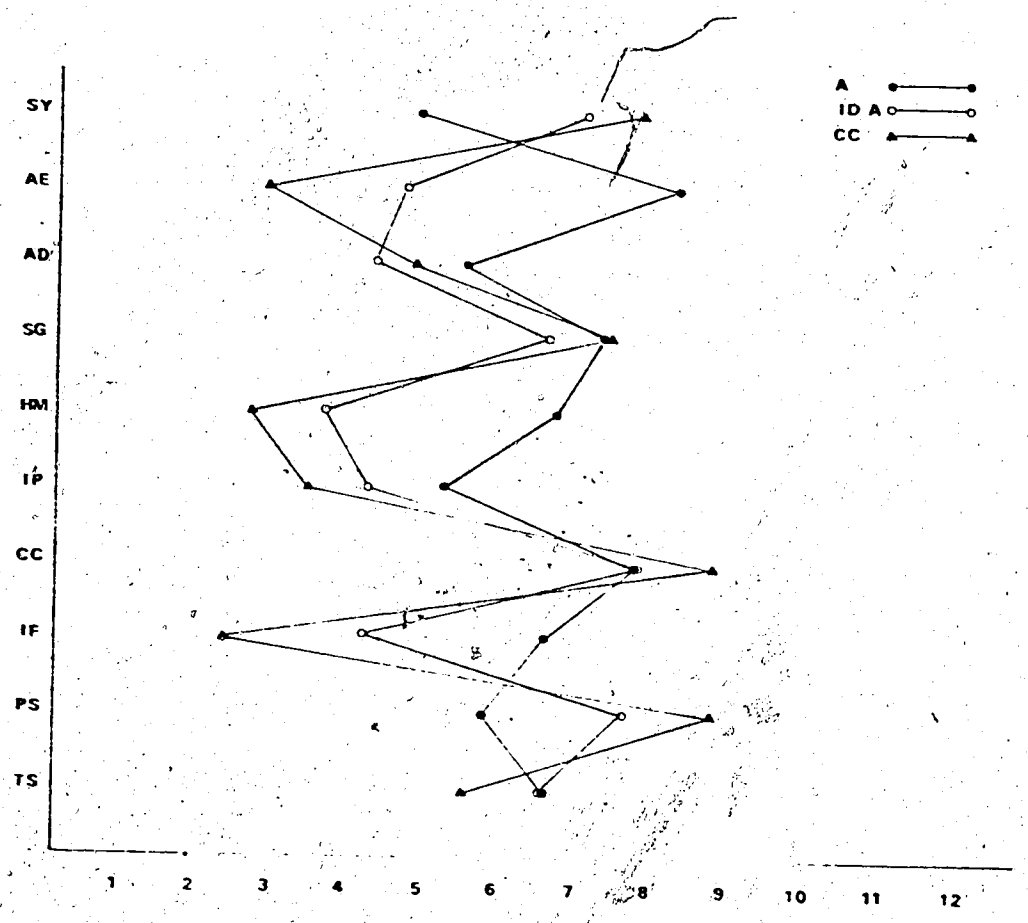

Figure III. Means for the HPQ Factors Plotted for Three Groups, Alcoholics, Impaired Drivers-Alcoholic and Combined Controls.

leaf 43 omitted in page numbering.

HPQ.

Analysis of the three groups using the discriminant analysis indicated that the groups were significantly different ($F = 30.00$, df 20/590, $p < .01$) and could be discriminated on that basis (Table 9). Subjects in group A were correctly classified 77% of the time and group CC, 70% of the time, whereas group ID-A was classified correctly 42% of the time. Group ID-A appeared to be a more heterogeneous group with an almost equal likelihood of being classified CC as ID-A. Overall classification for the three groups was 62%.

The discriminant function based on an initial differentiation of Ss according to the MAST resulted in correct classification of approximately 40% of the ID-A group and 75% of the A group. While these were statistically reliable it was felt that a more direct behavioral index of the high risk driver might permit the derivation of a function which would accurately classify a greater proportion of the Ss. Such a function would of course be more useful in identifying the high risk driver. For this reason the criterion for group membership was changed from one based on the MAST to one based on question 37 on the PIQ. The question read; "How many of the arrests in #36 involved alcohol?"[2] If the answer was > 1 the Ss were categorized High Risk (HR) and if ≤ 1 they were categorized Low Risk (LR). The A group remained the same as the criterion had already been met for the first study, however the ID groups changed noticeably. There were now only 46 Ss in the HR group whereas the CC group rose to 204. The MAST in this analysis was included as a variable bringing the number of variables to 11. Means for the HPQ factors are plotted in

Table 9

Classification of Subjects Into Groups for Three Groups, Alcoholics, Impaired Driver-Alcoholics and Combined Controls

	Number of Cases Classified Into Groups			
Group	A	ID-A	CC	
A	77%	11%	12%	n=57
ID-A	20%	42%	38%	n=100
CC	9%	21%	70%	n=150

$F = 30.00$, df 20/590, $p < .01$

Total Correctly Classified 62%

Figure 4, with means and standard deviations set forth in Table 10.

A discriminant analysis was computed and the results are set forth in Table 11. Using the behavioral index 68% of the Ss are correctly classified. Groups LR, CC and HR were categorized correctly 79%, 67% and 59% of the time respectively. It should be noted that while 3% fewer controls were classified correctly when compared to the analysis in Table 9, 17% more of what is termed the high risk driver and 2% more of the low risk drivers were correctly classified. The indications are that this is the preferred criterion for differentiating high and low risk drivers.

A survey of the individual factors on the HPQ indicated that Factor 2 (AE) discriminated both low risk alcoholics (A) and controls (CC) 72 and 67% respectively with a total classification of 55%. It should be noted that the four group classification based on all ten factors correctly classified only 54% of the Ss (Table 6). It was surmised that the 12 items of the AE scale alone combined with Ss score on the MAST would provide adequate discrimination of the HR driver. With the identification of the two groups the ID-A could be isolated by the process of elimination. Controls that are incorrectly classified into either group ID-A or A could be removed by use of the MAST. This would be feasible only if the individual items responsible for the discrimination are not already alcohol related questions. Examination of the individual items that weighted more heavily on the alcoholics score revealed items that would be expected to discriminate but were not confined to the alcoholic syndrome. For example "I sometimes feel that life is not worth living" was answered in the

Table 10

Table of Means, and Standard Deviations for HPQ Factors on Three Groups Differentiated on the Basis of Alcohol Related Arrests

	Groups		
Factors	High Risk n=46 Mean (SD)	Low Risk n=57 Mean (SD)	Control n=204 Mean (SD)
SY	7.47(2.87)	4.96(3.67)	7.61(3.25)
AE	4.52(3.35)	8.29(3.45)	3.50(3.05)
AD	4.15(2.28)	5.56(3.07)	4.79(2.60)
SG	6.56(2.27)	7.22(2.35)	7.22(2.26)
HM	3.78(2.94)	6.78(2.96)	3.01(2.30)
IP	4.04(2.52)	5.24(3.17)	3.67(2.41)
CC	7.80(2.29)	7.77(2.47)	8.53(2.09)
IF	4.54(3.17)	6.64(3.10)	2.74(2.24)
PS	7.65(2.29)	5.91(2.83)	8.57(2.21)
TS	6.84(2.95)	6.68(2.79)	5.78(2.69)
MAST	47.39(29.01)	45.78(32.23)	24.60(26.07)

Table 11

Classification of Subjects Into Groups for Three Groups, High Risk, Low Risk and Controls Using the MAST as a Factor

	Number of Cases Classified Into Group			
Group	HR	LR	C	
HR	59%	13%	28%	n=46
LR	14%	79%	7%	n=57
C	21%	12%	67%	n=204

$F = 28.71$, df 22/588, $p < .01$

Total Correctly Classified 68%

affirmative by a greater percentage of alcoholics than individuals in other groups.

This method of categorizing resulted in a much larger group of drivers that were suspect. It however correctly eliminated the drivers termed "low risk" (see Table 12).

The two alternatives for discrimination then, appear to be either the final analysis of the HR driver as indicated by driving convictions or the one factor AE plus the MAST. The major concern would be one of false positives and negatives. The first method would result in considerably more false negatives while the second would reveal more false positives. If the purpose of the discrimination is assignment of the individuals to a treatment program or an impaired drivers course then false positives are not a major problem. However, if the discrimination results in suspension of drivers licenses then the problem increases.

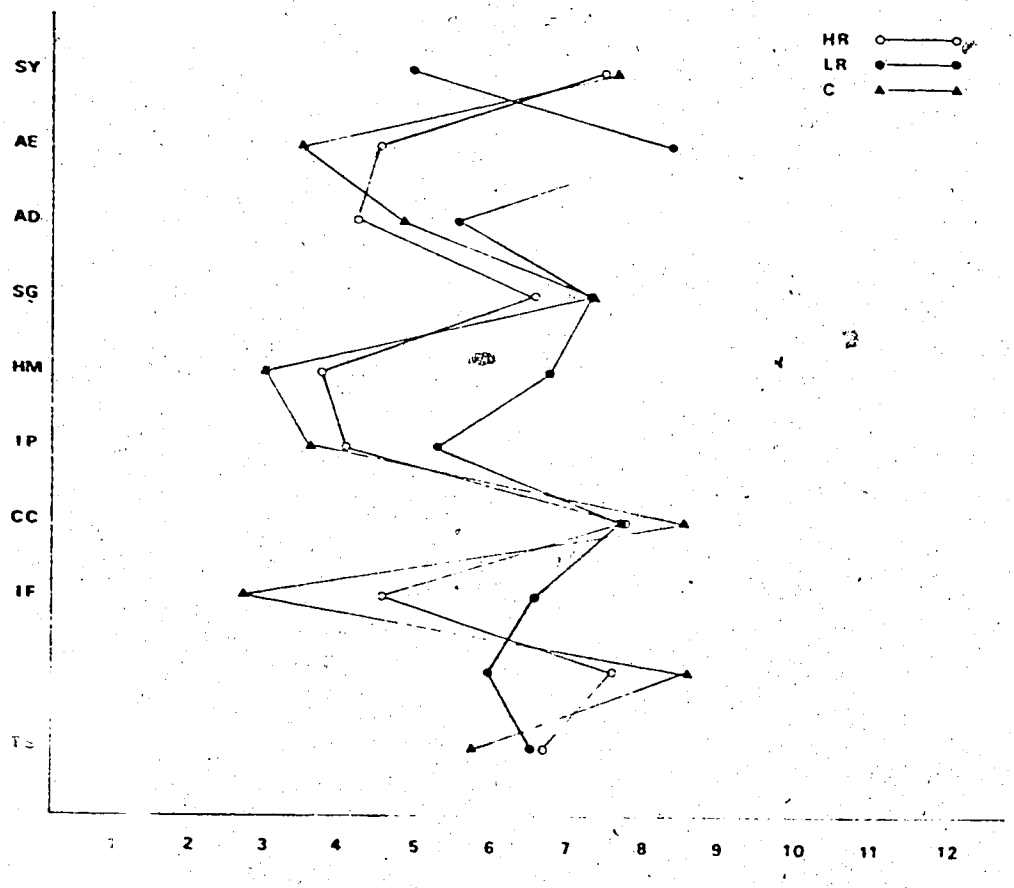

Figure IV. Means for the HPQ Factors Plotted for Three Groups, Low Risk Drivers, High Risk Drivers and Combined Controls.

Table 12

Classification of Subjects Into Groups for Three Groups, Alcoholics, Impaired Driver-Alcoholics and Controls Using Factor AE

	Number of Cases Classified Into Group			
Group	A	ID-A	CC	
A	72%	14%	14%	n=57
ID-A	28%	27%	45%	n=100
C	14%	19%	67%	n=150

F = 187.62, df - 2/304, p < .01

Total Correctly Classified 55%

Method--Study II

Subjects

Sixty-three male Ss that had completed all of the necessary requirements for Study I also served in this study.

Impaired Drivers. Thirty seven volunteers participated. The Ss were tested before the regular group meetings commenced. The original group was divided into ID-NA (n=20) and ID-A (n=17) on the basis of their MAST scores.

Alcoholics (A). Seventeen Ss from Henwood meeting the same criteria as in Study I participated. The Ss were tested during their free period (12:30-2:00 p.m.) at the rehabilitation center.

Controls (C). Nine Ss from the R.C.M.P. meeting the same criteria as in Study I served in this group. The Ss were tested at the Edmonton Detachment after completing the questionnaires for Study I.

Design

A 2 X 2 factorial design with factors of Alcoholics vs. Non-Alcoholics and Impaired Drivers vs. Non-Impaired Drivers was used.

Apparatus and Procedure

A simplified device to measure the autokinetic illusion (AKI) as described by Nelson (1971) was used with minor alterations. The apparatus consisted of a vertical rod 18" in height, attached to a weighted stand. The data sheet was affixed to a tentest board by means of two metal clamps. The board was in turn attached to the vertical rod and was adjusted to position the target at eye level. The entire apparatus was painted black to preclude any reflections. The data sheet was a 9 X 6 piece of black construction paper with a

piece of luminous paper placed behind a 1 mm hole located centrally. The luminous point was activated by a flasher unit in the dark so as to facilitate the AKI.

The testing of all Ss was uniform except for the use of different testing rooms. In all cases it was necessary for the experimenter (E) to locate a room that could be made totally dark. The S was seated a comfortable distance from the apparatus which was placed on a table. He was requested to place a rubber finger with a tack protruding, on the index finger of his preferred hand (complete instructions in Appendix B). The Ss was then asked to aim at and puncture the target (luminous dot) ten times at one second intervals as counted by E. After each trial S was to place his hand in a relaxed position in his lap to eliminate any motor set which may have developed. The procedure was completed in both a light and a dark condition. The light condition does not facilitate the AKI as does the dark therefore the scores in the light condition were subtracted from the scores in the dark condition to eliminate any motor effects leaving only the measurement of the illusion.

Scoring. Each S had two cards representing his data, one for the light and one for the dark condition. Three measurements were taken from each data card:

1. Maximum distance from target to the nearest 1/10".
2. Average distance from target to the nearest 1/10".
3. Area covered by responses. This measurement was obtained by joining the outermost responses to form an area.

Two derived measurements were employed; one involved the difference

in area covered between the light and the dark condition and the other involved the difference in average distance between the light and the dark condition. This latter measure represents the AKI.

Results and Discussion--Study II

Means and standard deviations for all of the variables are to be found in Appendix C. Results of a sign test indicated that all Ss obtained more accurate scores in the light condition as opposed to the dark ($p < .001$). Group C was noticeably more accurate on every dimension, except autokinesis where no group differences were evident.

Analysis of variance tables (Appendix C) indicated there were no significant main effects and only one significant interaction. This was obtained on the variable area covered in the light condition ($F = 4.49$, df 1/58, $p < .05$). This difference was traced to a low score for Group C as compared with the other three groups indicating a more controlled performance on their part.

Some interesting effects appeared, however, when the scores on the eight variables were intercorrelated (Table 13). Group ID-A, ID-NA and C showed significant correlations on most of the related measures. Group A, however, failed to indicate positive correlations on several of the measures. The cells enclosed with a darker line indicate the problem areas. It was hypothesized that this discrepancy might be attributed to the more erratic performance of Ss in group A. Inspection of the raw data revealed some support for this hypothesis. Five of the 17 Ss appeared to account for most of the discrepancy. Two of the five covered a large area in both the light and the dark condition. With the type of measurement employed this would yield a small difference area and a large maximum distance score resulting in a reduced correlation between the two variables. The remaining three Ss covered either extremely large areas in the dark as compared

Table 13. Intercorrelations for all Autokinetic Variables

	Average Distance Light	Area Light	Maximum Distance Dark	Average Distance Dark	Area Dark	Area Difference	AKI
Maximum Distance Light	A .69^{+} I .8^{++} N .8^{++} C .81^{+}	A .93^{++} I .78** N .74^{++} C .77**	A .26 I .20 N .34 C .30	A .04 I .33 N .31 C .34	A .20 I .14 N .16 C .59*	A -.08 I .06 N .08 C .49	A -.23 I .13 N .20 C .22
Average Distance Light		A .54^{++} I .76^{++} N .71^{++} C .93^{++}	A .41* I .13 N .27 C .43	A .23 I .27 N .32 C .31	A .27 I .13 N .01 C .51	A .10 I .05 N -.05 C .40	A .02 I .06 N .20 C .16
Area Light			A .10 I .38 N .12 C .43	A .05 I .53** N .12 C .31	A .12 I .36 N .02 C .63*	A -.18 I .25 N -.07 C .52	A -.32 I .37 N .02 C .18
Maximum Distance Dark				A .86^{++} I .89^{++} N .96^{++} C .92^{++}	A .33 I .53** N .55^{+} C .66**	A .29 I .50** N .54** C .63*	A .76^{++} I .89^{++} N .96^{++} C .89^{++}
Average Distance Dark					A .01 I .49** N .58^{+} C .65*	A .03 I .45* N .56^{+} C .63*	A .95^{++} I .97^{++} N .99^{++} C .98^{++}
Area Dark						A .95^{++} I .99^{++} N .99^{++} C .98^{++}	A -.04 I .50** N .57^{+} C .59*
Area Difference							A .05 I .47* N .57^{+} C .59*

Note: A=Alcoholic, I=Impaired Driver-Alcoholic, N=Impaired Driver-Non-alcoholic, C=Control
* $p < .1$, ** $p < .05$, $^{+}p < .01$, $^{++}p < .001$

with the light conditions or in one case an area completely unrelated to the target area with not one hit scoring within 1 - 1/10" of the target. Although these phenomena were also evident in the other groups the deviation was never so great nor were there as many Ss exhibiting the pattern. The problem could be accounted for by a defective motor control resulting in spastic responses under both conditions.

That Ss in group A were more erratic lends support to the position advocated by Miller and Nelson (1972). However, the effect does not appear to be attributable to autokinesis inasmuch as there was a complete lack of a significant difference between any of the groups on this variable. One possible explanation for this failure to find a difference in the AKI may be that the technique employed was not sufficiently sensitive to the AK phenomena.

Although Ss were asked before debriefing whether or not the light appeared to move, no official tally was kept. There were however a greater number of "No" responses. In all fairness it should be mentioned that the testing situation would probably elicit more negative responses whether movement had been witnessed or not. Volunteers from the I.D.P. in some instances inquired of E whether or not she could reinstate their license. This seemed to indicate that the circumstances were such that they felt E had some affiliation with the court although this was denied. The alcoholics were possibly wary of moving lights especially when they were required to fill out a form regarding driving behavior. Once again the implication could have been license suspension if they failed the perceptual task.

A counter hypothesis could be offered that the phenomenon being

observed was one of impairment of visually guided behavior. An implication of this hypothesis is that, if the alcoholics visually guided behavior is impaired, the area covered by the points in the dark should be more widely scattered about the target. The failure to find any difference in mean area fails to support this. A possible explanation is that the alcoholic is not for the most part spastic i.e., the responses are not scattered over a wide area. This seems to indicate that his motor memory is intact whereas his perceptual memory is impaired. Once he has located the target perceptually his response appears to be fairly consistent.

General Discussion

All of the four hypotheses presented for Study I have received support.

> Hypothesis I. There are two distinct personality types present in a population classified as alcoholic.

The data definitely supported the view that two personality types were present in the alcoholic population used in this study. This was evident both in the significant differences on individual factors and in the significant discrimination obtained using a discriminant function. Therefore two distinct alcoholic personality types can be identified by the HPQ.

> Hypothesis 2. Of the two types of alcoholics there will be a greater number of alcoholics described as type Z (Lawlis and Rubin, 1971) in a group of persons charged with driving while impaired (DWI) or drunken driving (DD).

Type Z was described by Lawlis and Rubin (1971) as "aggressive or unsocialized aggressive persons" as indicated by higher scores on "aggression, tough-mindedness, suspiciousness and undisciplined self conflict" (p. 321). Members of the Z group were found by Zelhart to have a greater number of traffic citations than group X. The analagous group in the present study was group ID-A as its members were selected on the basis of their current traffic citation. This group on the basis of the HPQ, was characterized as extraverted, persistent, having fewer feelings of inferiority and a less adequate super ego.

While the two profiles are not obviously inconsistent it is difficult to compare them because of the lack of similarity of the scales. It should be pointed out that group ID-A was found to have a personality profile which resembled that obtained for the control

group. While there were several statistically reliable differences in factor scores the overall personality profiles paralleled one another.

> Hypothesis 3. The type of alcoholic defined as type X will predominate in a population of alcoholics with unmarked driving records.

The present study found that the alcoholic with a clean driving record exhibited the following traits: a profile of high anxiety, greater assertiveness, emotional instability, feelings of inadequacy or inferiority with little persistence toward his life goals. This may be compared to the alcoholic personality defined as type X (Lawlis and Rubin, 1971) which was described as comprising "inhibited or maladaptive, frustrated persons" (p. 320) based on higher scores on "emotional instability, apprehension, undisciplined self conflict and tenseness" (p. 320). It should be recalled that this latter group had also been found to have few driving citations (Zelhart, 1972).

There seemed to be essential agreement between the two studies in the characterization of the "low risk" alcoholic as typically neurotic. One point of disagreement that should be mentioned is the high score on ascendence dominance attained by group A individuals in the present study. Group X individuals in the Lawlis and Rubin study scored lower on aggressive tendencies than group Z. The HPQ however, is measuring a trait more clearly defined as assertiveness which is not usually equated with aggression. It should also be pointed out that in the present study members of group A were found to differ in age from those in group ID-A by about ten years. It is possible that the profile obtained reflected their advanced age, or perhaps, advanced alcoholism.

Hypothesis 4. Persons charged with DD or DWI who are not classified as alcoholic have a personality profile similar to that of the general population or control group and different from either type of alcoholic.

This was supported by the failure to find significant differences on any of the factors between group ID-NA and group C. The similarity of their profiles led to the pooling of the two groups to form a new control group which more closely approximated the two alcoholic groups on demographic variables.

It must be remembered that a different personality test was employed in this study from that of Lawlis and Rubin. The 16PF has 16 factors, whereas the HPQ has only ten. The reduction of the factors makes it difficult to extract the same traits from both tests. It must also be kept in mind that the total profile is of more importance than any single trait as the interactions between traits can change the interpretation of the profile. It is evident however, that two separate groups have been extracted and their profiles were differentiated on the basis of the HPQ. The descriptions applied to the profile are not of primary relevance to this study as the profiles are being used with the intention of developing a predictive instrument for detection of the "high risk" alcoholic and thus to promote safety on our highways.

The failure to find any statistically reliable effects in Study II did not support hypotheses of differences in AKI for the four groups. These findings were contrary to findings of Nelson and Miller (1972) who found alcoholics perceived more extensive and more erratic movement than other groups. However, it appeared to this experimenter that the method employed was not sensitive enough to produce the AKI.

Minor differences in methodology could account for the lack of confirmation. This E deemed it necessary to control for sex differences based on the findings of Chaplin (1955) which was accomplished by the use of only male Ss. In contrast both males and females were employed in Nelson's study. As the groups did not have equal proportions of the sexes some confounding might have occurred. Research indicated that the latency period of the phenomenon extended over a considerable range of time. In the present study an attempt was made to allow for the latency period to subside in as many Ss as possible. This was achieved by giving them an additional set of instructions in the dark, which took approximately 13 seconds. It is not known whether a similar procedure was employed in Nelson's study. Although instructions were used to produce an expectancy that the light might move in both studies the implication might have been different, for example Nelson's group told Ss that the light may or may not appear to move while this researcher told Ss the light might appear to move. These were minor alterations but they could have accounted for some of the disparities.

Some of the problems encountered that should be controlled for in future research are the following:

1. It was difficult to monitor Ss behavior as the sudden darkening of the room meant that E was dark adapting during the same period of time as the S. For this reason more rigid controls should be employed. Head movements should be controlled by a bite board or head rest as the position of the eye (Karwaski et al., 1948, Luchins, 1954) and the body (Battersby et al., 1956) during testing have been shown

to be important.

2. That some Ss take this type of task more seriously than others creates a necessity for motivating instructions. This particular problem did not seem relevant to the present study as all Ss expressed an interest in what was happening.

3. Tests of visual acuity should be employed.

Controls in the above areas should allow for more meaningful results and perhaps lead to a reliable diagnostic instrument for detection of the high risk driver.

The problem itself does seem worth pursuing. Both Voth (1965) and Miller and Nelson (1972) have demonstrated differences between alcoholics and other groups using the autokinetic illusion (albeit in different directions). Regardless of whether or not it is actually the illusion that is perceived differently or rather some difference in visual motor feedback the test could still be of some diagnostic value.

References

Adby, L. and Nelson, T. Autokinetic movement in various groups of alcoholics. Counter Measures for Alcoholism and Drug Abuse, 1972, 189-201.

Bakan, D. The relationship between alcoholism and birth rank. Quarterly Journal of Studies in Alcohol, 1949, 10, 434-440.

Battersby, W.S., Kahn, R.L., Pollack, M. and Bender. Effects of visual, vestibular and somatosensori-motor deficit on autokinetic perception. Journal of Experimental Psychology, 1956, 52, 398-410.

Brosgole, Leonard and Hansen, Karen H. The effect of change in body orientation upon the perceived direction of autokinesis. Psychonomic Science, 1969, 15(4), 204.

Button, A.D. A Roschach study of 67 alcoholics. Quarterly Journal of Studies in Alcohol, 1956, 17, 35-52.

Carr, H.A. The autokinetic sensation. Psychological Review, 1910, 17, 42-75.

Cattell, R.B. and Stice, G.F. Handbook for the Sixteen Personality Factor Questionnaire. Institute for Personality and Ability Testing, Champaign, Illinois, 1957.

Cautela, Joseph and Vitro, Francis. The effect of instructions on appearance of the autokinetic effect. Journal of Psychology, 1964, 58, 85-88.

Chaplin, James P. Sex differences in the perception of the autokinetic phenomenon. Journal of General Psychology, 1955, 52, 149-155.

Chodorkoff, Bernard. Alcoholism and ego function. Quarterly Journal of Studies in Alcohol, 1964, 25, 292-299.

Clement, J. Autokinetic phenomenon experienced by alcoholics and others. Symposium Perception and Alcoholism, 1968, 20-26.

Clement, Joseph. Autokinesis revisited: final results of last year's study. Symposium on Alcoholism, 1969, 25-29.

Connor, R.G. The self concepts of alcoholics. In : Pittman, D.J. and Snyder, C.R. (Eds.) Society, Culture and Drinking Patterns, Wiley, New York, 1962, 455-467.

Corotto, Loren V. An exploratory study of the personality characteristics of alcoholic patients who volunteer for continued treatment. Quarterly Journal of Studies in Alcohol, 1963, 24, 432-442.

Corteen, R.S. The autokinetic effect and signal detection. Journal of General Psychology, 1970, 82, 77-80.

Dahlstrom, W.G. and Welsh, G.S. An MMPI handbook. A Guide to Use in Clinical Practice and Research. The University of Minnisota Press, Minneapolis, 1962.

Darrohn, L.D. The pre-psychotic personality traits of alcoholic patients as compared with dementia praecox and manic depressive patients. Cited in Bakan, D. The relationship between alcoholism and birth rank. Quarterly Journal of Studies in Alcohol, 1949, 10, 434-440.

Dixon, W.J. (Ed.) Discriminant analyses for two groups. In BMD-Biomedical Computer Programs, University of California Press, Berkely, 1970.

Drever, James. A dictionary of psychology. Penguin Reference Book, Hazell Watson and Viney Ltd., 1967.

Edwards, W. Autokinetic movement of very large stimuli. Journal of

Experimental Psychology, 1954, 48, 493-495(b).

Edwards, W. Two and three dimensional autokinetic movements as a function of size and brightness of stimuli. Journal of Experimental Psychology, 1954, 48, 5, 391-398(a).

Edwards, W. Information and autokinetic movement. Journal of Experimental Psychology, 1959, 57, 89-90.

Finney, J.C., Smith, D.F., Skeeters, D.E. and Auvenshine, C.D. MMPI alcoholism scales factor structure and content analysis. Quarterly Journal of Studies in Alcohol, 1971, 32, 1055-1960.

Fisher, Seymour. Achievement themes and directionality of autokinetic movement. Journal of Abnormal and Social Psychology, 1961, 63, 64-68.

Fitzgerald, B.J., Pasework, R.A. and Tanner, C.E. Use of the Edwards Personal Preference Schedule with hospitalized alcoholics. Journal of Clinical Psychology, 1967, 23, 194-195.

Fleeson, W. and Gildea, C.F. A study of the personalities of 289 abnormal drinkers. Quarterly Journal of Studies in Alcohol, 1942, 3, 409-432.

Goss, Allen and Morosko, Thos E. Relation of internal external control and MMPI. Journal of Consulting and Clinical Psychology, 1970, 34, 189-192.

Haggard, Ernest A. and Rose, Gilbert J. Some effects of mental set, and active participation in the conditioning of the autokinetic phenomenon. Journal of Experimental Psychology, 1944, 34, 45-59.

Hampton, Peter J. A psychometric study of drinkers. Journal of Consulting Psychology, 1951, 15, 401-504.

Harris, R.E. and Ives, V.M. A study of the personality of alcoholics. American Psychologist, 1947, 2, 405.

Hart, H. Personality factors in alcoholism. Archives of Neurological Psychiatry, Chicago, 1930, 24, 116-134.

Hewitt, Chas C. A personality study of alcohol addiction. Quarterly Journal of Studies in Alcohol, [illegible] 369-386.

Hoch, P.H. Personality factors in [illegible] psychoses. Psychiatric Quarterly, 1940, 14, 338-346.

Hoffmann, Helmut. Personality characteristics of alcoholics in relation to age. Psychological Reports, 1970, 27, 167-170.

Howarth, E. Howarth Personality Questionnaire (HPQ3) Test Manual, 1973.

Hoyt, D.P. and Sedlacek, G.M. Differentiating alcoholics from normals and abnormals with the MMPI. Journal of Clinical Psychology, 1958, 14, 69-74.

Jellinek, E.M. Phases of alcohol addiction. Quarterly Journal of Studies in Alcohol, 1952, 13, 673-684.

Karwoski, T.F., Redner, H. and Wood, H.O. Autokinetic movement of large stimuli. Journal of General Psychology, 1948, 39, 29-37.

Knight, R.P. The dynamics and treatment of chronic alcohol addiction. Bulletin Meninger Clinic, 1937, 1, 233-250.

Lewis, N.D.C. Personality factors in alcohol addiction. Quarterly Journal of Studies in Alcohol, 1940, 1, 21-44.

Lawlis, G. Frank and Rubin, Stanford. The alcoholic personality: a research in differential personality patterns. Quarterly Journal of Studies in Alcohol, 1971, 32, 2, 318-327.

Luchins, A.S. The autokinetic effect and gradation of illumination of the visual field. Journal of General Psychology, 1954, 50, 29-37(a).

Luchins, Abraham S. The autokinetic effect in central and peripheral vision. Journal of General Psychology, 1954, 50, 39-44(b).

MacAndrew, Craig. The differentiation of male alcoholic outpatients from non alcoholic psychiatric outpatients by means of the MMPI. Quarterly Journal of Studies in Alcohol, 1965, 26(2), 238-246.

MacAndrew, Craig and Geertsma, Robert H. An analysis of responses of alcoholics to scale 4 of MMPI. Quarterly Journal of Studies in Alcohol, 1963, 24, 23-38.

MacAndrew, C., and Geertsma, R.H. A critique of alcoholism scales derived from the MMPI. Quarterly Journal of Studies in Alcohol, 1964, 25, 68-76.

Manson, M.P. A psychometric differentiation of alcoholics from non alcoholics. Quarterly Journal of Studies in Alcohol, 1948, 9, 175-206.

Manson, M.P. A psychometric analysis of psychopathic characteristics of alcoholics. Journal of Consulting Psychology, 1949, 13, 111-118.

Marone, Joseph G. and Coutu, Eileen W. Effects of color on latency of the autokinetic phenomenon. Perceptual and Motor Skills, 1969, 29, 105-105.

Marshall, H. A study of the personality of alcoholic m les. American Journal of Psychology, 1947, 2, 289.

Miller, A. and Nelson, T. A comparative study of the autokinetic

phenomenon in alcoholics and drug abusers. Counter Measures for Alcoholism and Drug Abuse, 1972, 175-188.

Mowrer, H.R. Alcoholism and the family. Journal of Criminal Psychopathology, 1941, 3, 90-99.

Nash, T. Pierce penniless, his supplication to the devil. Cited in Lewis, N.D.C., Personality Factors in Alcohol Addiction. Quarterly Journal of Studies in Alcohol, 1963.

Nelson, Thomas M. Short form measurement of autokinetic illusion in alcoholics, Symposium on Alcoholism EDS: T.M. Nelson and B.K. Sinha, 1971, 47-54.

Orgler, Hertha. Alfred Adler-The Man and His Work-Triumph over the inferiority complex, New American Library, Inc., Scarborough, Ontario, 1972.

Partington, J.T. and Johnson, F.G. Personality types among alcoholics. Quarterly Journal of Studies in Alcohol, 1969, 30, 21-33.

Pryor, Margaret W. and Distefano, M.K., Jr. Further evaluation of the EPPS with hospitalized alcoholics. Journal of Clinical Psychology, 1970, 26, 205.

Quaranta, J.V. A study of emotional maturity and homosexuality as related factors in compulsive drinking. Quarterly Journal of Studies in Alcohol, 1949, 10, 354.

Reiter, Henry H. Note on some personality differences between heavy and light drinkers. Perceptual and Motor Skills, 1970, 30, 762.

Reeves, John L., Cogan, Rosemary and Cogan, Dennis C. Autokinetic movement as a function of color. Perceptual and Motor Skills, 1970, 31, 210.

Rethlingshafer, Dorothy and Sherrer, Thos I. Supplementary report: effect of practice on an illusion. Journal of Experimental Psychology, 1961, 62, 95-96.

Rohan, WM. P., Tatro, R.L. and Rotman, S.R. MMPI changes in alcoholics during hospitalization. Quarterly Journal of Studies in Alcohol, Vol. 30, 1969, 389-400.

Rosen, Alex C. A comparative study of alcoholic and psychiatric patients with the MMPI. Quarterly Journal of Studies in Alcohol, 1960, 21, 253-266.

Royce, Joseph R., Stayton, William R., Kinkade, Robert G. Experimental reduction of autokinetic movement. American Journal of Psychology, 1962, 75, 221-231.

Rubin, Harold. The MMPI as a diagnostic aid in a veterans hospital. Journal of Consulting Psychology, 1948, 12, 251-254.

Sadler, T.G., Mefferd, R.B. and Wieland, B.A. Extent, direction and latency of autokinetic movement as a function of placement of an adjacent light. Perceptual and Motor Skills, 1966, 23, 1087-1096.

Sampson, Paul. Stepwise discriminant analysis. BMD07M.

Schooler, Carmi. Birth order effects: not-here, not now! Psychological Bulletin, 1972, 78, 3, 161-175.

Selzer, Melvin D. The Michigan Alcoholism Screening Test: the quest for a new diagnostic instrument. American Journal of Psychiatry, 1971, 127:12.

Sexton, M.C. The autokinetic test: its value in psychiatric diagnosis and prognosis. American Journal of Psychiatry, 1945, 102, 399-402.

Sherif, M. Group influences upon the formation of norms and attitudes. In E.E. Macoby, T.M. Newcomb and L. Hartley (Eds). Readings in Social Psychology, New York: Holt, 1958, 218-232.

Sutherland, E.H., Schroeder, H.G. and Tordella, C.L. Personality traits and the alcoholic: a critique of existing studies. Quarterly Journal of Studies in Alcohol, 1950, 11, 547-561.

Sveen, M. A quick measure of autokinesis for diagnosis of suspected alcoholism. Symposium on Alcoholism, 1969, 30-50.

Syme, L. Personality characteristics and the alcoholic critique. Quarterly Journal of Studies in Alcohol, 1957, 18, 288-302.

Thompson, C.E. and Arms, Robert. Characteristics of alcoholics. American Psychology, 1948, 3, 365.

Vaught, Glen M. and Hunter, William. Autokinetic word writing (AWT) and field dependence. Psychonomic Science, 1967, 7(10), 335-336.

Voth, A.C. Individual differences in the autokinetic phenomenon. Journal of Experimental Psychology, 1941, 29, 306-322.

Voth, A.C. An experimental study of mental patients through the autokinetic phenomenon. American Journal of Psychiatry, 1946-47, 103, 793-805.

Voth, A.C. and Mayman, M. A dimension of personality organization. Archives of General Psychiatry, 1963, 8, 366-380.

Voth, A.C. Autokinesis and alcoholism. Quarterly Journal of Studies of Alcohol, 1965, 26, 412-422.

Wall, James H. A study of alcoholism in men. American Journal of Psychiatry, 1936, 93, 1389.

Walters, R.H. and Quinn, M.J. The effects of social and sensory

deprivation on autokinetic judgements. Journal of Personality, 1960, 28, 210-219.

Wexberg, L.E. Psychodynamics of patients with chronic alcoholism. Journal of Clinical Psychopathology, 1949, 10, 147-157.

Williams, A.F. Self concepts of college problem drinkers. Quarterly Journal of Studies in Alcohol, 1965, 26, 586-594.

Worthy, Morgan and Kahn, Gay. The effects on situational and personal variables on vertical autokinesis. Psychonomic Science, 1968, 11, 144.

Zelhart, P.F. Types of alcoholics and their relationship to traffic violations. Quarterly Journal of Studies in Alcohol, 1972, 811-813.

Footnotes

[1] "Scheffé suggests that with his test one might consider taking $\alpha = 0.10$ rather than $\alpha = 0.05$" (Edwards, 1968).

[2] #36, "Including the present offense, how many times have you been arrested for any reason?

APPENDIX A

Norm Tables--HPQ3 (Howarth, 1973)

Group Tested		SY	AE	AD	SG	HM	IP	CC	IF	PS	TS
N = 631 Students	Mean	7.39	5.31	5.10	5.49	3.84	4.20	8.28	4.22	7.28	5.80
	S.D.	3.44	3.34	2.92	2.90	2.45	3.09	2.33	2.89	2.98	2.73
N = 188 Army Male Soldiers[3]	Mean	8.85	3.84	5.33	7.49	3.37	4.26	9.13	2.65	8.53	6.76
	S.D.	2.75	2.95	2.87	2.11	2.52	2.89	2.18	2.33	2.49	2.54
N = 331 Female[1] Students	Mean	7.29	5.71	4.34	5.94	3.99	4.07	8.55	4.72	7.19	5.36
	S.D.	3.48	3.28	2.71	2.94	2.45	3.10	2.20	2.80	2.67	2.66
N = 300[1] Male Students	Mean	7.52	4.86	5.88	5.01	3.67	4.35	7.98	3.68	7.37	6.30
	S.D.	3.40	3.36	2.93	2.78	2.44	3.08	2.45	2.89	3.30	2.73
N = 538 Francophone[2] Students	Mean	7.00	4.86	6.14	5.01	3.22	4.14	7.87	3.61	8.05	6.22
	S.D.	3.23	3.12	2.61	2.27	2.60	2.86	2.32	2.37	2.78	2.67
N = 110 Army Male Officers[3]	Mean	8.26	3.19	7.16	6.62	1.95	4.38	8.87	2.55	9.11	6.06
	S.D.	3.26	2.80	2.38	2.18	1.74	2.83	1.94	2.66	2.30	2.74

(Note: All above data was obtained in Canada.)

[1]Anglophone, cross-Canada sample; [2]Quebec Universities, [3]Tested, 1972.

Appendix A (cont'd)

Reliabilities N = 631 (Howarth, 1973)

Scale	Female	Male	Combined
SY	.82	.85	.84
AE	.80	.80	.80
AD	.71	.72	.72
SG	.70	.72	.72
HM	.61	.73	.66
IP	.78	.78	.78
CC	.42	.43	.43
IF	.78	.78	.78
PS	.66	.70	.68
TS	.75	.70	.74

Mean reliability = .72.

Appendix A (cont'd)

Distribution of MAST Scores Yielding a Minimum Number of False Positives and False Negatives (Selzer, 1971)

Score	Controls	Hospitalized Alcoholics	Drunk Drivers	Drunk and Disorderly	License Review
0-3	87%	1%	39%	34%	84%
4	8%	1%	6%	7%	5%
5-50	5%	98%	55%	59%	11%

Distribution of Validation Scores Based on Medical, Legal, and Social Agency Records (Selzer, 1971)

Score	Controls	Drunk Drivers	Drunk and Disorderly	License Review
0-3	84%	46%	31%	67%
4	1%	9%	5%	
5-50	1%	25%	40%	11%
No Record Found	14%	19%	27%	21%

APPENDIX B

Appendix B

Instructions to Subjects

I want you to place one of these rubber fingers on the first finger of your preferred hand (the hand you use the most). There are several sizes here just choose the one that fits your finger best and be careful not to poke yourself with the tack. (E points to the tack).

Are you comfortable?

What I want you to do is to reach up and poke that target for me ten times. I will count for you from 1-10. Please poke it hard enough for the tack to leave a hole in the paper. I don't want you to rest your fingers like this (E demonstrates). When I say "one" I want you to reach up and poke it, then when I say "down", place your hand back down in your lap. "Two and down" etc.

Do you understand?

All right then one and down. . .

Upon completion E removed the piece of data for the light condition. E said to S "Good!" I want you to do that for me once again only this time in the dark.

E walked over to activate luminous point with flasher unit. E then attached clean data sheet and said "I am going to turn out the light. I want you to stare at that little dot while I give you your instructions one more time. Please don't begin until I start counting. (Lights out)

Do you see the little dot?

This time I want you to do exactly the same as you did last

Appendix B (cont'd)

time only this time that little light might appear to move. Even if it does appear to move I want you to reach up and poke it the same way you did before. Are you ready?

"One and down. . ."

APPENDIX C

Appendix C

Table I

AKI

	Alcoholics	ID-ALC	ID-NON ALC	Cont.
Variables	$\bar{X}$ (SD)	$\bar{X}$ (SD)	$\bar{X}$ (SD)	$\bar{X}$ (SD)
1) MAX	2(2.15)	1.64(1.32)	1.95(1.09)	1.22(0.83)
2) AVER	0.69(0.81)	0.52(0.636)	0.78(0.49)	0.41(0.36)
3) AREA	0.07(0.108)	0.046(0.043)	0.065(0.04)	0.02(0.017)
4) MAX	9.76(4.33)	9.235(4.43)	9.549(4.62)	8.44(3.50)
5) AVER	5.20(3.38)	4.788(2.86)	5.385(3.37)	4.72(2.43)
6) AREA	0.51(0.34)	0.47(0.38)	0.502(0.387)	0.20(0.139)
7) AVER AREA	0.439(0.351)	0.42(0.37)	0.438(0.387)	0.19(0.12)
8) AKI	4.37(3.41)	4.21(2.67)	4.645(3.36)	4.31(2.34)

Appendix C (cont'd)

Table II

Analysis of Variance: Light Condition

Maximum Distance

Source	df	MS	F
Impaired Drivers (A)	1	0.504	0.22
Alcoholics (B)	1	0.808	0.36
A x B	1	4.189	1.89
Error	59	2.20	

Average Distance

Source	df	MS	F
A	1	0.15	0.40
B	1	0.0027	0.00
A x B	1	1.04	2.693
Error	59	0.386	

Area

Source	df	MS	F
A	1	0.0010	0.23
B	1	0.0046	1.09
A x B	1	0.019	4.49*
Error	59	0.004	

$p < .05$*
$p < .01$**
$p < .001$+

Appendix C (cont'd)

Table III

Analysis of Variance: Dark Condition

Maximum Distance

Source	df	MS	F
Impaired Drivers (A)	1	1.19	0.06
Alcoholics (B)	1	3.63	0.19
A x B	1	9.58	0.50
Error	59	19.00	

Average Distance

Source	df	MS	F
A	1	0.217	0.02
B	1	0.047	0.00
A x B	1	4.187	0.42
Error	59	9.78	

Area

Source	df	MS	F
A	1	0.23	1.87
B	1	0.27	2.24
A x B	1	0.41	3.35
Error	59	0.12	

$p < .05$*
$p < .01$**
$p < .001$+

Appendix C (cont'd)

Analysis of Variance

Average Area

Source	df	MS	F
Impaired Drivers (A)	1	0.193	1.59
Alcoholics (B)	1	0.196	1.61
A x B	1	0.251	2.07
Error	59	0.121	

Autokinesis

Source	df	MS	F
A	1	0.10	0.01
B	1	0.50	0.05
A x B	1	0.87	0.09
Error	59	9.49	

$p < .05$*
$p < .01$**
$p < .001$+

AUTOKINETIC DATA

Alcoholics

Subject Number	Light Condition			Dark Condition			Area Difference	Autokinesis
H720-	Maximum	Average	Area	Maximum	Average	Area	*D-L=Area	D-L=AK
006	03	1.5	.05	15	07.0	0.56	0.51	05.5
001	07	3.1	.31	10	03.8	0.72	0.41	00.7
002	02	1.3	.09	10	06.2	0.36	0.27	04.9
019	03	1.3	.08	16	05.7	1.39	1.31	04.4
009	03	1.3	.08	20	15.8	0.20	0.12	14.5
044	02	0.5	.03	07	03.5	0.38	0.35	03.0
012	01	0.2	00	09	04.5	1.22	1.22	04.3
042	01	0.8	.08	09	06.3	0.75	0.67	05.5
038	01	0.1	00	05	01.6	0.17	0.17	01.5
040	07	0.3	.38	09	03.4	0.48	0.10	00.4
030	00	0.0	00	15	09.6	0.61	0.61	09.6
031	02	0.8	.09	09	04.3	0.47	0.38	03.5
020	00	0.0	00	08	05.4	0.14	0.14	05.4
054	01	0.5	.05	04	02.1	0.26	0.21	01.6
052	00	0.0	00	08	02.6	0.38	0.38	02.6
053	01	0.1	.03	07	03.3	0.25	0.22	03.2
060	00	0.0	00	05	03.4	0.40	0.40	03.4

*D-L=Dark-Light

AUTOKINETIC DATA (cont'd)

Impaired Drivers--Alcoholic

Subject Number	Light Condition			Dark Condition			Area Difference	Autokinesis
E720-	Maximum	Average	Area	Maximum	Average	Area	*D-L=Area	D-L=AK
116	02	0.3	.08	08	04.9	0.59	0.51	04.6
080	00	0.0	.00	01	00.8	0.05	0.05	00.8
189	03	0.1	.08	15	08.7	0.50	0.42	07.7
690	03	1.4	.11	09	05.6	1.06	0.95	04.2
682	01	0.1	.00	10	02.6	0.31	0.31	02.5
694	01	0.4	.05	08	03.4	0.44	0.39	03.0
561	01	0.2	.06	06	04.3	0.27	0.21	04.1
557	00	0.0	.00	09	02.8	0.08	0.08	02.8
558	02	1.0	.08	07	04.4	0.35	0.27	03.4
679	01	0.1	00	11	04.7	1.11	1.11	04.6
563	01	0.2	.00	07	02.1	0.20	0.20	01.9
677	05	2.2	.09	08	05.8	0.19	0.10	03.6
683	02	0.5	.05	06	02.7	0.23	0.18	02.2
633	02	0.7	.03	05	01.5	0.11	0.08	00.8
651	00	0.0	.00	15	10.0	0.36	0.36	10.0
758	01	0.3	.05	12	06.4	1.30	1.25	06.2
777	03	1.5	.14	20	10.7	0.86	0.72	09.2

*D-L=Dark-Light

AUTOKINETIC DATA (cont'd)

Impaired Drivers-Non-Alcoholic

Subject Number	Light Condition			Dark Condition			Area Difference	Autokinesis
E720-	Maximum	Average	Area	Maximum	Average	Area	D-L=Area	D-L=AK
089	01	0.7	.06	10	07.3	0.47	0.41	06.6
087	02	0.8	.06	15	09.9	1.78	1.72	09.1
195	03	0.8	.05	14	09.2	0.94	0.89	08.4
510	01	0.5	.08	04	01.4	0.16	0.08	00.9
136	01	0.1	.05	07	03.4	0.48	0.43	03.3
162	02	0.8	.08	04	01.3	0.17	0.09	00.5
267	01	0.8	.05	03	01.6	0.17	0.12	00.8
305	04	1.5	.13	08	03.6	0.55	0.42	02.1
550	03	1.8	.09	20	14.9	0.36	0.27	13.1
463	01	0.6	.00	04	02.9	0.41	0.41	02.3
485	02	1.0	.03	07	03.5	0.36	0.33	02.5
556	03	1.4	.09	07	03.6	0.44	0.35	02.2
702	01	0.2	.03	07	03.1	0.50	0.47	02.9
268	02	1.1	.09	09	04.3	0.16	0.07	03.2
692	02	0.3	.03	10	04.8	0.16	0.13	04.5
562	03	1.3	.11	13	07.4	0.63	0.52	06.1
452	00	0.0	.00	08	04.0	0.27	0.27	04.0
695	02	0.5	.03	13	05.8	0.39	0.36	05.3
706	04	1.2	.16	11	06.5	0.58	0.42	05.3

*D-L=Dark-Light

AUTOKINETIC DATA (cont'd)

Controls

Subject Number	Light Condition			Dark Condition			Area Difference	Autokinesis
A730-	Maximum	Average	Area	Maximum	Average	Area	D-L=Area	D-L-AK
025	00	0.0	00	04	01.4	0.05	0.05	01.4
028	01	0.5	.03	06	02.6	0.08	0.05	02.1
046	02	1.0	.05	10	04.3	0.41	0.36	03.3
029	02	0.4	.02	07	03.7	0.20	0.18	03.3
030	01	0.3	.02	11	07.4	0.25	0.23	07.1
027	00	0.0	.00	12	06.3	0.22	0.22	06.3
031	02	0.5	.03	11	07.7	0.41	0.38	07.2
026	01	0.1	.00	03	02.1	0.11	0.11	02.0
032	02	0.9	.03	12	07.0	0.16	0.13	06.1

*D-L=Dark-Light