

THE RELATIONSHIPS OF RESPONSES
TO THE MANN INVENTORY AND THE
ACCIDENT EXPERIENCES OF A
SELECT GROUP OF COMMERCIAL DRIVERS

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ABSTRACT

THE RELATIONSHIPS OF RESPONSES TO THE MANN INVENTORY AND THE ACCIDENT EXPERIENCES OF A SELECT GROUP OF COMMERCIAL DRIVERS

By

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The economy and welfare of the United States have become increasingly dependent upon its highway transportation system. The numbers and frequency of accidents which have occurred on our nation's highways have become a critical situation.

An extensive variety of research investigations has been completed in selected predictive variables which include: age, fatigue, sensory perception, psychomotor skills, physiological characteristics, psychological aspects, alcohol, and combinations thereof.

The primary purpose of this study was to determine the relationship between the accident categories of commercial truck drivers and behavioral categories as identified by the Mann Inventory; determine which items included in the Mann Inventory which differentiate between commercial drivers within one of three accident experience

categories; determine if there was a significant relationship between accident categories and the total (raw) scores obtained on the Mann Inventory.

The sample population for this study consisted of 420 male drivers who were employed by Schwan's Sales Enterprises, Inc., Marshall, Minnesota. Ninety-nine per cent of the sample population were married and between the ages of 25 and 35. This group included individuals from a 23-state area and consisted of approximately 99 per cent of the drivers employed by the company.

The Mann Inventory and the reason for administering it were explained to the drivers. They were assured that the results of their responses would be kept confidential and that no one in management, at any level, would see their personal inventory results.

The hypotheses were tested by means of Chi square, Cell Square Contingency, and One-Way Analysis of Variance.

Statistical analysis revealed:

1. When the sample population of this study was analyzed by accident experience and behavioral categories, chi square analysis showed there was no significant relationship between the three accident-experience categories and the three behavioral categories at the .05 level.

2. When employing the cell square contingency analysis of variance, eleven of the sixty-three items in the Mann Inventory were identified to be significant at or above the .10 level.
3. When using the one-way analysis of variance with accident experience categories and the total (raw) scores obtained on the Mann Inventory, there was no significant relationship at the .05 level. However, the significant level was .051 which indicates the possibility of a significant relationship.

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CHAPTER I

THE PROBLEM

The economy and welfare of the United States have become increasingly dependent upon its highway transportation system. At present, there are more than 115 million licensed motor vehicles and 114 million licensed drivers operating on the streets and highways.¹

The numbers and frequency of accidents which have occurred on our nation's highways have become a critical situation. The number of accidents has increased with the increased production of automobiles and trucks; increased mileage of highway systems; increased number of licensed drivers; increased number of miles driven.

The National Safety Council's 1971 estimated death toll for motor vehicle accidents reached a total of 54,700. Injuries resulting from accidents were

¹National Safety Council, Accident Facts (Chicago, Ill.: National Safety Council, 425 N. Michigan Avenue, 1972), p. 40.

estimated at nearly 2,000,000 with a total personal injury and property cost of 15.8 billion dollars.²

It has become increasingly more important that programs must be identified and developed which will reduce and eliminate the quantity and severity of these accidents. During the past two decades, many investigations have been made to ascertain the underlying causes of these accidents.

When examining the cause of motor vehicle accidents, some of the factors to consider are basic vehicle control tasks; interaction capabilities with other highway users; control of the consequences of highway collisions; vehicle readiness; highway system improvement; operator fitness--both physical and mental.

An attempt to identify the characteristics of problem drivers has been the theme of numerous research theses. An extensive variety of research investigations has been completed in selected predictor variables which include: age, fatigue, sensory perception, psychomotor skills, physiological characteristics, psychological aspects, alcohol, and combinations thereof.³

²Ibid.

³L. F. Goldstein, "Human Variables in Traffic Accidents," Highway Research Board (Washington, D.C.: National Research Council, 1962), pp. 1-5.

Such investigations, in predicting accident involvement, have shown that errors by drivers are the major cause. Evidence to support a definite relationship and personality pattern has been shown by a number of studies.

Kenel found that a personality inventory could identify individuals who have poor driving records.⁴ In addition to others, Brody indicated that significant factors related to driver performance are driver personality and observed behavior.⁵

The personality characteristics and accident records of commercial drivers provide an important aspect for further investigation. These factors may be of utmost importance in reducing the fatalities and property damage on our streets and highways.

Statement of the Problem

The purpose of this study is to determine if there is a significant relationship between the established behavioral categories as identified by responses to the Mann Inventory and the accident records of

⁴F. Kenel, "The Effectiveness of the Mann Inventory in Classifying Young Drivers Into Behavioral Categories and Its Relationship to Subsequent Drivers Performance" (unpublished Ph.D. dissertation, Michigan State University, 1967).

⁵L. Brody, "Personal Characteristics of Chronic Violators and Accident Repeaters," Bulletin No. 152, National Academy of Sciences, National Research Council.

commercial truck drivers; to determine if there is a significant relationship between the responses of truck drivers to items on the Mann Inventory and their accident or accident-free experiences; to determine if there is a significant difference between the driver's total (raw) scores on the Mann Inventory and their accident categories.

Importance of the Problem

In 1971, trucks were involved in 3,400,000 collisions in which 12,000 fatalities occurred.⁶ Approximately 20 per cent of the motor vehicles used on American highways are commercial vehicles. These vehicles are driven approximately twice the annual mileage of the family automobile.⁷ During 1970, U.S. truck registrations increased by more than 850,000 for a national total of 18,747,781. The total truck miles traveled in 1969 was estimated at nearly 207 billion miles.⁸ Traffic accidents are more common than any other type of accident.⁹ With the increasing loss of lives and the number of people

⁶National Safety Council, op. cit.

⁷A. C. Finch, "The Community Is Where the Action Is," Traffic Safety, January 30, 1970, p. 20.

⁸Automobile Manufacturers Assoc., Inc., Motor Truck Facts (Detroit, Mich.: 320 New Center Building, 1971), p. 32.

⁹National Safety Council, op. cit.

being permanently injured, it has become more important for research to provide information which may be used for the reduction of these losses.

Basic Assumptions

The investigation of the problem was based on the following assumptions:

1. The drivers' responses to the Mann Inventory were honest and reliable responses.
2. The Mann Inventory is a valid instrument for identifying selected aspects of commercial drivers.
3. The selected group of drivers provides an adequate sample for research purposes.

Hypotheses

The hypotheses tested in this study, stated in the null form, are:

Hypothesis 1:

There is no significant relationship between established behavioral categories identified by the Mann Inventory and the accident records of commercial truck drivers.

Hypothesis 2:

There is no significant relationship between the response of truck drivers to items on the Mann Inventory and their accident or accident-free experience.

Hypothesis 3:

There is no significant relationship between the total (raw) scores obtained by truck drivers on the Mann Inventory and their accident records.

Definitions

Mann Inventory.--A personality inventory, consisting of sixty-three items which attempts to measure an individual's feeling towards himself, others, and established social conventions.

Accident.--For the purpose of the investigation, an accident refers only to collisions, including roll-overs, involving a motor vehicle in motion that resulted in death, personal injury, or property damage.¹⁰

Commercial Driver--driversalesman.--A man who is employed for the purpose of selling and delivering food products.

Accident-free Driver.--A driver who has not been involved in an accident while operating a truck.

¹⁰J. S. Baker and W. R. Stebbins, Jr., Dictionary of Highway Traffic (Evansville, Ill.: Traffic Institute, Northwestern University, 1964), p. 134.

Nonchargeable Accident Driver*--A driver who has been involved in an accident while operating a truck and was judged not responsible for the collision.

Chargeable Accident Driver*--A driver who has been involved in an accident while operating a truck and was judged responsible for the collision.

Average Behavior--Behavior characterized by well-adjusted interaction with other persons and consistent with the norms of the society in which the individual lives, not exhibiting extremes in personality.

Overcontrolled Behavior--Behavior characterized by withdrawal from communication with other persons with efforts to have everything under control so that they cannot be criticized by others.

Undercontrolled Behavior--Behavior characterized by forceful, outgoing action, or vigorous effort to assert oneself over others, with little consideration of the results.

Organization of the Study

Chapter II will present a review of the literature pertinent to the driving performance and the relationship

*When the situation develops, the safety department personnel of Schwan's Sales Enterprises, Inc. determine chargeability.

of personality, and personal or social adjustment. Chapter III contains an account of the methods used in collecting, organizing and tabulation of the data, a description of the test instrument, and statistical techniques applied when analyzing the data. Chapter IV is a report and analysis of the findings. Chapter V is the summary, conclusions, and implications for further study.

CHAPTER II

REVIEW OF LITERATURE

The accident-prone concept has led many investigators to explore alternate explanations concerning the human factors which relate to the great number of accidents occurring daily. Since the idea of accident proneness was introduced as a scientific concept during the early 1930's, much research has been done to substantiate this theory. These studies attempted to find characteristics which might distinguish individuals who are susceptible to accidents.

Using the accident involvement of London bus drivers, Farmer and Chambers¹¹ concluded that accident proneness of some individuals contributed to the cause of motor vehicle accidents in which they were involved. They concluded also that the accident proneness phenomenon was present regardless of the environmental conditions or the type of accidents.

¹¹E. Farmer and E. Chambers, "A Study of Accident Proneness Among Motor Drivers," in Accident Research Methods and Approaches, ed. by Haddon (Great Britain: Medical Research Council, Industrial Research Board), Report No. 84, 1939, pp. 410-17.

Greenwood and Woods¹² completed a study to establish a basis for the accident proneness concept. Their results indicate that individuals differed in susceptibility to accidents in varying degrees, and to remove the workers would eliminate a large number of accidents.

"A man works or drives as he lives," is a concept of many writers. McFarland,¹³ Ribicoff,¹⁴ and Bishop¹⁵ feel that behavioral patterns and personality remain unchanged while a person is driving a motor vehicle. Research indicates that the chronic offender's ability to handle a moving vehicle is characterized by a record of contact with credit agencies, courts, and social maladjustments such as antisocial attitudes.

¹²M. Greenwood and H. Woods, "The Incidence of Industrial Accidents with Special Reference to Multiple Accidents," in Accident Research Methods, ed. by Hadden (Great Britain: Medical Research Committee, Industrial Fatigue Research Board, 1919), Report No. 4, pp. 389-97.

¹³R. A. McFarland, "The Role of Preventive Medicine in Highway Safety," American Journal of Public Health, XLII, No. 3 (March, 1957), 288-96.

¹⁴A. Ribicoff, "You Drive As You Live," Analogy, Winter, 1966-67, pp. 16-18.

¹⁵R. W. Bishop, "A Theory of Driving Behavior" (unpublished material, Michigan State University, Highway Traffic Safety Center).

Hanner¹⁶ reported on an insurance company's underwriting program based on the use of attitude scales. The prediction devices were psychological inventories and personal inventory forms. A significant relationship was found between the degrees of seriousness of the injury in collisions when the insured was primarily at fault.

"A man drives as he lives," was concluded by Tillman and Hobbs¹⁷ in one of the most notable studies on accident proneness. Their study consisted of Canadian taxi drivers with reference to personality characteristics and high or low accident rates.

The taxi-cab drivers were classified into average, high and low frequency groups. Information on these drivers was gathered from the insurance company for the taxi firm, management of the taxi firm, and drivers as they related their own experiences. This information was dependent upon memory except for the records from the insurance company.

From this taxi-cab company, forty drivers were personally interviewed for a period of three months. During this period of time, the esteem in which he was

¹⁶C. Haner, "Use of Psychological Inventory in Writing Insurance for Youthful Male Drivers," Traffic Safety Research Review, VII, No. 1 (March, 1963), 5-9.

¹⁷W. Tillman and G. Hobbs, "The Accident Prone Automobile Driver, A Study of Psychiatric and Social Background," American Journal of Psychiatry, CVI, No. 5 (1949), 321-33.

held by other drivers and the adjustment of the driver to his fellow workers was observed. Adolescent history, subsequent adult adjustment, childhood, and parental background were observations noted from these interviews.

Comparisons of the results between the low accident group and the high accident group personality characteristics showed a remarkable difference. The drivers in the low accident group were stable and well-adjusted individuals. The drivers in the high accident group were disrespectful of authority, impulsive, and aggressive.

A group of accident repeater Air Force personnel was studied by Rainey¹⁸ and Conger.¹⁹ This group consisted of highly selected accident-free and accident-repeater groups of airmen. No significant differences were found between the groups involving psychomotor functions or physiological reactions to stress such as coordination and discrimination, or simple and complex reaction times. Using the Allport, Vernon, and Lindzey Study of values, the results showed a tendency for the

¹⁸R. Rainey, et al., "An Investigation of the Role of Psychological Factors in Motor Vehicle Accidents," Bulletin 212, Highway Research Bulletin, 1959.

¹⁹J. Conger, et al., "Psychological and Psychophysiological Factors in Motor Vehicle Accidents," The Journal of American Medical Association, CLXIX (April, 1959), 1,581-87; J. Conger, "Personal and Interpersonal Factors in Motor Vehicle Accidents," American Journal of Psychiatry, CXIII (1957), 1,069-75.

accident repeaters to respond to other persons or events in a highly emotional manner. The high accident group did show an over-emphasis on self-sufficiency and self-determination which could have reflected a rejection of conventional modes of behavior and conformity standards.

The accident-free group showed tendencies towards behavior which conformed to social customs and ability to resolve conflicts within conventional practices and standards.

An extensive study was carried out by Schuster and Guilford²⁰ relevant to chronic violator and accident repeater behavioral traits.

They conducted a study in California which tested accident repeater, chronic violators, and better-than-average drivers. A significant difference appeared between the better drivers and the accident-violator drivers with respect to age and annual mileage driven.

In comparison with the better-than-average drivers, the accident repeater groups were more self-reliant, sociable, self-assertive, active, ambitious, adventuresome, and more emotionally unstable.

There were no significant differences in the better-than-average group of selected drivers who had

²⁰D. Schuster and J. Guilford, "An Analysis of Accident Repeater and Chronic Violator Drivers," National Safety Council Transactions, XXIV (October, 1958), 126-29.

driven more miles per year as contrasted with the same group who had driven fewer miles.

Schuster and Guilford²¹ conducted a later study in California using a Driver Attitude Survey and a multiple regression scale. The purpose of this study was an attempt to predict the behavior of problem drivers.

They found that violator drivers and accident repeating drivers, in contrast to the better-than-average driver, could be predicted to the extent of 64 per cent and 75 per cent by the use of cross validation. For predictive purposes, the biographical data items were relatively more important and the attitude survey had little significance.

In an attempt to determine the effectiveness of predicting future driver behavior procedures, a follow-up study of the same groups of drivers was studied. In this follow-up study, it was reported by Schuster²² that attitude scales could be used significantly to predict follow-up accidents and moving violations. He also indicated that when the previous driving record of

²¹D. Schuster and J. Guilford, "The Psychometric Prediction of Problem Drivers," Traffic Safety Research Review, VI (December, 1962), 16-20.

²²D. Schuster, "Prediction of Follow-Up Driving Accidents and Violations," Traffic Safety Research Review, XII, No. 2 (March, 1968), 17-21.

accidents and moving violations were combined with attitude scales, an even better prediction could be made.

The Minnesota Multiphasic Personality Inventory was used by Rommel²³ in a study to compare accident-free and accident-repeater high school students. There were eight items of the 257 in this inventory on which the accident-free group scored low, while the accident-repeating group scored high.

These eight items were:

- (1) A desire to leave home;
- (2) An urge to do something harmful and shocking;
- (3) A tendency to be influenced by people about them;
- (4) Association with peers to whom people object;
- (5) A desire to frighten people for the fun of it;
- (6) A tendency to become impatient with people;
- (7) A tendency to become suspicious of over friendly people;
- (8) A possibility of having been in trouble with the law.

²³R. Rommel, "Personality Characteristics and Attitudes of Youthful Accident-Repeating Drivers," Traffic Safety Research Review, III, No. 1 (March, 1959), 13-14.

At the Center for Safety Education, the Eno Foundation²⁴ conducted a study in which accident-free drivers were compared with a similar number of drivers with high accident records. Those drivers were matched as to driving experience, age, mileage, and type of vehicle driven. The drivers with high accident records were found to have a poor knowledge of safe driving practices and poor attitudes. The accident-free group showed better motor control under frustration and noise conditions as well as under normal conditions.

In the greater Cleveland area, Beamish and Malfetti²⁵ compared nonviolator and violator automobile drivers in the 16- to 19-year age group.

The purpose of their study was to: determine whether, in adolescents, certain traffic nonviolator psychological characteristics compared or differed from those of the traffic violators; to see if those characteristics affect the violator's responsiveness to therapeutic training; and to determine if those characteristics are related with attitude quality and relationships with his society and family.

²⁴H. Stack and J. Elkow, Education for Safe Living (Englewood Cliffs, N.J.: Prentice Hall Inc., 1957), p. 49.

²⁵J. Beamish and J. Malfetti, "A Psychological Comparison of Violator and Non-Violator Automobile Drivers in the 16 to 19 Year Age Group," Traffic Safety Research Review, VI, No. 1 (March, 1962), 12-14.

The violator group of this study was composed of 84 males who had incurred two or more traffic violations and had been referred to the Juvenile Court. The non-violator group consisted of 186 males who had not received a moving violation and had held an Ohio drivers license for at least one year.

A personal history form was administered to both groups in addition to psychological tests. The results obtained showed differences between nonviolators and violators. These differences in personality traits were objectivity, conformity, mood, and emotional stability. The nonviolator group rated higher on all variables.

Several researchers express the belief that many drivers have problems of which they are not aware. Brody²⁶ found differences in characteristics among accident repeaters and chronic violators to be significant. These characteristics are: a tendency to reject authority, appear to have an exaggerated opinion of themselves, tend to resent authority, and act impulsively and lack responsibility.

²⁶L. Brody, "The Psychology of Problem Drivers" (unpublished material, Michigan State University, Highway Traffic Safety Center, 1965).

Mann²⁷ pointed out that the problem drivers get into trouble because of lack of knowledge, poor perception and attention, or as a result of their projection of personality characteristics. The average problem driver is lacking in social and personal responsibilities and has no real concern in the area of safety.

In a review of research findings on the behavioral and psychological aspects of automobile accidents, McFarland stated that accidents result from interactions between the characteristics of the vehicle, environment, and the driver. He concluded that prediction of accident behavior has been difficult on the basis of tests because attitude and basic personalities are hard to measure.²⁸

Kenel²⁹ used the Mann Inventory in gathering data for his research. He determined that the Mann Inventory disclosed a reliability correlation value ranging from .697 to .986.³⁰

²⁷William A. Mann, "The Nature of the Problem Driver" (unpublished material, Driver Improvement Conference, Michigan State University, Highway Traffic Safety Center, 1965).

²⁸R. McFarland, "Psychological and Behavioral Aspects of Automobile Accidents," Traffic Safety Research Review, XII, No. 3 (September, 1968), 71-78.

²⁹Kenel, op. cit.

³⁰Ibid., p. 72.

Thompson³¹ administered the Mann Inventory to an adult population of 331 Michigan drivers. His statistical data revealed that when the combined male and female population of his study was analyzed by accident and violation experience categories, Chi square values for 13 of 63 items were significant at or better than the .10 level.

Dunn conducted a study of 500 male drivers from the metropolitan area of Detroit and the Wayne County area of Michigan. The groups from this sample population consisted of 223 traffic violators and 227 nontraffic violators. In his conclusions he stated that "no one area of traffic safety knowledge appeared to be weaker than another" and recommended that "more emphasis must be placed on knowledge of driving attitudes."³²

Covert completed a study of 668 driver education students from three large city high schools in Central Michigan. The sample for his study consisted of 332 male and 336 female students. He investigated the relationships of average, overcontrolled, and

³¹A. F. Thompson, "The Effectiveness of the Mann Inventory in Classifying Adult Drivers into Accident-Violation Experience Categories and Its Relationship to Past Driver Performance" (unpublished Ph.D. dissertation, Michigan State University, 1970).

³²L. Dunn, "The Development of an Instrument to Measure Knowledge of Traffic Safety Concepts Found to Differentiate Between Violators and Non-Violators" (unpublished Ph.D. dissertation, Michigan State University, 1963).

undercontrolled by their instructor raters and the Mann Inventory.³³ His statistical analysis of the data revealed:

1. Significant differences do exist in male student self concepts of personality characteristics they possess when they are categorized into behavioral groups by either teacher raters or the Mann Inventory.
2. Males who were characterized as under-controlled and having disturbed personalities indicated they were: expedient, forthright, affected by feelings, suspicious, assertive, self-sufficient, apprehensive and as having undisciplined self conflict.
3. Males who were classified as average and having non-disturbed personalities saw themselves as: humble, conservative, relaxed, sober, adventure-some, emotionally stable, conscientious and more intelligent.
4. Those males categorized as over-controlled indicated strength on the following personality dimensions: conscientious, emotionally stable, controlled, shrewd and self sufficient.³⁴

Summary

From observations that some individuals appear to have more accidents than others, the concept of accident proneness developed. The nature of accident-involved drivers has been researched in numerous studies. These studies have dealt with such concepts as psychological, social, and personal adjustments. Many of these studies

³³W. Covert, "Relationships Between Self Concepts of the Young Driver and Ratings of Behavior by Driver Education Instructors and the Mann Inventory" (unpublished Ph.D. dissertation, Michigan State University, 1972).

³⁴Ibid.

support evidence that relationships are found between accident involvement, personalities, and behavioral patterns.

CHAPTER III

DESIGN AND METHODOLOGY

This study was initiated to determine if there is a significant relationship between the accident or accident-free experiences of a select group of commercial truck drivers and their social attitudes. Attitude behavioral categories were determined by the use of the Mann Inventory and accident categories were determined from the accident records of these drivers.

Sample

The sample for this study consisted of 420 male drivers. These drivers are employed by Schwan's Sales Enterprises, Inc., whose home office is located in Marshall, Minnesota. The drivers' duties consist of selling and distributing frozen food products to whole-sale and retail customers and are classified as driver-salesmen. These driver-salesmen are operating trucks with the following specifications: gross vehicle weight of 16,000 to 22,000 pounds, power steering, vacuum booster brakes. This equipment is classified as heavy-duty, two-ton trucks.

At the time of their initial employment, these drivers were screened by management personnel. They are asked to complete an employment application form with at least three personal work references. Management personnel contact the individual work references by telephone prior to hiring the employment applicant.

The subjects who participated in the study are from a twenty-three state area. This area covered states including Montana, east through New York, and from North Dakota, south through Texas. Ninety-nine per cent of the driver population were married and between the ages of 25 and 35. This group includes individuals from the various ethnic, socio-economic, and cultural groups in these areas.

Schwan's Sales Enterprises, Inc. is divided geographically into management divisions for the purpose of sale and distribution of frozen food products. For example, the Central Division includes the states of Illinois and Wisconsin. Each division holds an annual winter meeting within that division which includes all driver-salesmen and management personnel. The raw data for this study were collected at these meetings.

The Mann Inventory and the reason for administering it were explained to the drivers. They were assured that the results of their responses would be kept confidential and that no one in management, at any level,

would see their personal inventory results. They were provided with an inventory (MI), answer sheets, table and chair, pencils, and asked to answer all items as honestly as possible.

The responses of each driver to the items on the Mann Inventory were gathered. The driving record of each employee was taken from the driver records at the home office in Marshall, Minnesota. Each driver was classified into one of the three accident experience categories by the safety department personnel. The inventory answer sheets were then scored and each driver was placed into one of the three behavioral categories.

The Attitude Inventory

The Mann Inventory is a personal attitude survey which consists of sixty-three items that appear to reflect an individual's feelings towards established social customs, others, and himself. Responses to items on the Mann Inventory are expressed by checking one of five choices: always, usually, sometimes, rarely, or never. The inventory was developed under the direction of Dr. William A. Mann, Professor, Michigan State University. While graduate students in the field of Traffic Safety and Driver Education at Michigan State University were enrolled in a course, "Personality Factors in Traffic Safety," Dr. Mann initiated a class project. As a result of the project, the Mann Inventory was developed.

Dr. Mann originally selected 100 items on the basis of face validity. The original items were the result of an analysis of feelings expressed by 100 Michigan high school students with poor attitudes towards family, police, school, automobiles, self-expectations, society, desires, and habits. Extensive case studies and personal interviews were made with each of these 100 students. The 100 students were selected by driver education teachers in the public high schools as the worst drivers in their respective schools.

A pilot study was then conducted to determine which items from the list of 100 were significantly different. The M.I. was administered by 20 driver education teachers and the results were evaluated. The criteria established by this group of teachers for identifying three behavioral categories were: very aggressive, very reserved, and average.

Following are the criteria for evaluation:

1. Very aggressive: any student who, in the opinion of the driver education instructor through personal observation in the classroom and/or during practice driving instruction, displays behavior that is extremely egotistical or tempermental.
2. Very reserved: any student who, in the opinion of the driver education instructor through personal observation in the classroom and/or during practice driving instruction, displays behavior that is exceedingly cautious and timid.
3. Average: all students who do not fall into either of the other classifications.³⁵

³⁵J. Schaff, "Personal Attitude Survey" (unpublished Master's dissertation, Michigan State University, 1957).

The sample population was composed of 451 students. Of this population, 80 were classified as very aggressive, 86 were very reserved, and 285 were average.

The significance of each item according to the three categories is: Four items were at the .01 level; one was at the .001 level; eight were at the .05 level; and four were at the .10 level of significance. Thirty-seven items were eliminated as almost all students gave similar responses. Further analysis indicated that 85 per cent of the average population deviated seven to nineteen points from the average response. Based on the average responses, an adjustment scale was developed. As a result of the pilot study, the remaining sixty-three items were refined and became the instrument employed.

When Kenel³⁶ used the Mann Inventory he determined that a significant relationship between an individual's response to the MI items and observed behavior was evident.

In addition to the study mentioned above, Kenel administered this form of the Mann Inventory (see Appendix A) to forty-two individuals who were referred to the Ingham County Driver Safety School, Lansing, Michigan. Using the previously established criteria, he found that:

³⁶Kenel, op. cit.

Fifteen were very reserved, 21 were very aggressive, and four were average. The remaining two scored four and five of the six lie items incorrectly and deviated 46 points each on the adjustment scale. Their responses to significant items vacillated from marked aggression to very reserved.³⁷

Kenel stated that the Mann Inventory appeared helpful in identifying basic behavior patterns and predicting driving behavior. He felt that a greater discrimination than the very aggressive, very reserved, and average behavioral categories should be used. He used the following six categories of behavior for purposes of classification:

1. Behavior characterized by well adjusted interaction with persons and consistent with the norms of the society in which the individual lives.
2. Behavior generally characterized by satisfactory interaction with persons and society, but with periodic withdrawal from contact with people.
3. Behavior generally characterized by satisfactory interaction with persons and society, but with periodic efforts toward assertive action.
4. Behavior characterized by forceful, outgoing action or vigorous efforts to assert oneself over others.
5. Behavior characterized by withdrawal from contact with other persons.
6. Behavior characterized by a pendulum effect, vacillating between extremes of aggression and withdrawal.³⁸

Analysis of Procedure

The Chi square test of significance procedure will be used to analyze the data for Hypothesis 1. It will be used to determine if there is a significant

³⁷Ibid., p. 32.

³⁸Ibid., pp. 32-33.

difference between the three Mann Inventory categories and the three accident experience categories. An .05 level of significance will be used to determine the significance of the difference between the Mann Inventory categories and the driver experience categories. A chi square significance level of 9.49 is needed to determine acceptance or rejection of the null hypothesis.

A chi square contingency analysis of variance will be used to analyze the data for Hypothesis 2. It will be used to determine if there is a significant difference between an individual driver's response to individual items on the Mann Inventory and his accident experience category. A significance level of .10 is needed to determine acceptance or rejection of the null hypothesis.

A one-way analysis of variance will be used to analyze the data for Hypothesis 3. It will be used to determine if there is a significant difference between the total (raw) score obtained on the Mann Inventory and the driver accident category. A significance level of .05 is needed to determine acceptance or rejection of the null hypothesis.

Null Hypotheses

The null hypotheses are restated:

Hypothesis 1:

There is no significant relationship between established behavioral categories identified by the Mann Inventory and the accident records of commercial truck drivers.

Hypothesis 2:

There is no significant relationship between the responses of the truck drivers to items on the Mann Inventory and their accident or accident-free experience.

Hypothesis 3:

There is no significant difference between the total (raw) scores obtained by truck drivers on the Mann Inventory and their accident records.

Summary

The sample population was from driver-salesmen employees of Schwan's Sales Enterprises, Inc. who were located within a twenty-three state area.

Accident experience data were obtained from the home office of Schwan's Sales Enterprises, Inc. The drivers were then classified into one of the three accident experience categories and also assigned to one of the three behavioral categories.

The chi square test of significance was used to determine the significance between the accident categories and the behavioral categories.

A cell square contingency analysis of variance was employed to determine which response or responses, by accident category, contributed most significantly to each of the sixty-three items on the Mann Inventory.

A one-way analysis of variance was employed to determine significance between the total (raw) scores on the Mann Inventory and the accident categories.

CHAPTER IV

STATISTICAL ANALYSIS

The analysis of data is presented in this chapter and is relevant to a sample population of 420 commercial truck drivers and their response to the Mann Inventory. The degree of relationship was established between the accident categories and the behavioral categories, item analysis, and the total scores. All members of the sample population were encouraged to respond to the question at the bottom of the answer sheet: "How do you feel about the Inventory?" There were no derogatory remarks written in response to this question. Of those who responded to this question, their responses were of a positive nature. Therefore, it is believed that each man made an honest effort when responding to the items in the Mann Inventory.

Relationship Between Accident Experience Categories and Behavioral Categories

The following is a restatement of the null hypothesis which was tested in this study:

Hypothesis 1:

There is no significant relationship between established behavioral categories as identified by the Mann Inventory and the accident records of commercial truck drivers.

When the accident experience categories were divided into behavioral categories, the chi square test of significance³⁹ was administered to determine the relationship between the accident and behavioral categories. A chi square value of 9.49 was needed to demonstrate a significance at the .05 level; a value of 8.02 was obtained. On the basis of the obtained chi square value presented in Table 1, the null hypothesis of no significant relationship between categories must be retained.

Relationship Between Accident Experience
Categories and Responses to Individual
Items on the Mann Inventory

The null hypothesis tested for each item in the Mann Inventory was:

Hypothesis 2:

There is no significant relationship between the responses of truck drivers to items in the Mann Inventory and their accident or accident-free experience.

³⁹M. D. Engelhart, Methods of Educational Research (Chicago, Ill.: Rand McNally and Co., 1972), pp. 164-268.

TABLE 1.--The chi square analysis of the relationship between the accident experience categories and the behavioral categories as identified by the Mann Inventory.

	1 2 3						
	None	Nonchargeable	Chargeable	Total	Mean	Standard Deviation	
1 Average	202	29	40	271	1.40	.73	
2 Over con- trolled	61	6	5	72	1.22	.56	
3 Under con- trolled	55	5	17	77	1.51	.84	

Variables = Mann behavioral categories, down; accident categories, across.

Chi square = 8.024

Chi square needed for significance at .05 level = 9.49

Driver category:

- (1) Accident free;
- (2) Nonchargeable accident;
- (3) Chargeable accident.

The cell square contingency analysis⁴⁰ was used to determine which of the inventory items, by accident experience, contributed most significantly to the total chi square value for each of the items which were significant at or above the .10 level. Values for eleven of the sixty-three items were found to be significant at or above the .10 level. The remaining fifty-two items were not significantly different than zero at the .10 level. Therefore, the null hypothesis of no significant relationship between the responses of the truck drivers to items on the Mann Inventory and their accident or accident-free experience must be accepted for these fifty-two items.

For the remaining eleven items, the null hypothesis must be rejected since responses to the items were significantly different from zero at the following levels:

1. Responses by accident experience categories to the items (24) I have been tempted to cheat on tests at school; (32) I like to put extras on my

⁴⁰Ibid.

car to attract attention; (40) I have been wrong in an argument but wouldn't admit it to my opponent; were significantly different at the .02 level.

2. Responses by accident experience categories to the items (30) Passing on hills and curves is exceedingly dangerous; (57) I think courtesy towards others is a good reflection of a person's character; were significantly different at the .05 level.

3. Responses by accident experience categories to items (13) I get a feeling of real power when driving a car; (14) Courses in school are set up to meet the needs and interests of the student; (35) I (am) (was) popular with most of the students in my class; (39) I have as good table manners at home as when I eat out; (46) Our family spends a great deal of time together; (54) I become concerned about what other people think of me; were significantly different at the .10 level.

Through the use of a cell square contingency analysis of variance, an attempt was made to identify a specific response or responses that contributed most significantly and positively to the probability value

for each of the significant items in this study. Investigation revealed that eleven items were significantly related to accident experience categories; the cell square contingency test of equality and the level of significance for those items which had a probability value indicating a significance at or beyond the .10 level. Tables 2 through 13 contain the figures relevant to Hypothesis 2.

TABLE 2.--Chi square values obtained and probabilities for a significant relationship between accident categories and each individual item in the Mann Inventory which are significant at or better than the .10 level.

Item	Chi Square	P
13	14.450	.10
14	13.472	.10
24	19.366	.02
30	17.408	.05
32	19.056	.02
35	13.386	.10
39	14.295	.10
40	18.528	.02
46	14.141	.10
54	13.486	.10
57	17.703	.05

TABLE 3.--The chi square analysis of the relationship between the accident experience categories and the behavioral categories relevant to item (24) I have been tempted to cheat on tests at school.

	1 Always	2 Usually	3 Sometimes	4 Rarely	5 Never	Total
1 Average	3	8	68	113	126	318
2 Over con- trolled	1	0	12	9	18	40
3 Under con- trolled	3	2	17	29	11	62
Total	7	10	97	151	155	420

Variables = Mann behavioral categories, down; responses to the item, across.

Chi square = 19.366; Chi square needed for $P = .02$, 18.17 or greater.

Degrees of freedom = 8; Probability = .02.

TABLE 4.--The chi square analysis of the relationship between the accident experience categories and the behavioral categories relevant to item (32) I like to put extra's on my car to attract attention.

	1 Always	2 Usually	3 Sometimes	4 Rarely	5 Never	Total
1 Average	3	6	33	110	166	318
2 Over controlled	3	0	3	8	26	40
3 Under controlled	0	2	10	17	33	62
Total	6	8	46	135	225	420

Variables = Mann behavioral categories, down; responses to the item, across.

Chi square = 19.056; Chi square needed for $P = .02$, 15.51 or greater.

Degrees of freedom = 8; Probability = .02.

TABLE 5.--The chi square analysis of the relationship between the accident experience categories and the behavioral categories relevant to item (40) I have been wrong in an argument but wouldn't admit it to my opponent.

	1 Always	2 Usually	3 Sometimes	4 Rarely	5 Never	Total
1 Average	10	17	100	127	64	318
2 Over controlled	0	1	13	20	6	40
3 Under controlled	0	1	17	40	4	62
Total	10	19	130	187	74	420

Variables = Mann behavioral categories, down; responses to the item, across.

Chi square = 18.528; Chi square needed for $P = .02$, 18.17 or greater.

Degrees freedom = 8; Probability = .02.

TABLE 6.--The chi square analysis of the relationship between the accident experience categories and the behavioral categories relevant to item (57) I think courtesy towards others is a good reflection of a person's character.

	1 Never	2 Usually	3 Sometimes	4 Rarely	5 Never	Total
1 Average	193	99	17	5	4	318
2 Over controlled	26	11	0	0	3	40
3 Under controlled	29	28	4	0	1	62
Total	248	138	21	5	8	420

Variables = Mann behavioral categories, down; responses to the item, across.

Chi square = 16.703; Chi square needed for $P = .05$, 15.51 or greater.

Degrees of freedom = 8; Probability = .05.

TABLE 7.--The chi square analysis of the relationship between the accident experience categories and the behavioral categories relevant to item (30) Passing on hills and curves is exceedingly dangerous.

	1	2	3	4	5	
	Always	Usually	Sometimes	Rarely	Never	Total
1 Average	285	15	4	0	14	318
2 Over controlled	38	0	1	1	0	40
3 Under controlled	57	3	2	0	0	62
Total	380	18	7	1	14	420

Variables = Mann behavioral categories, down; responses to the item, across.

Chi square = 17.408; Chi square needed for $P = .05$, 15.51 or greater.

Degrees freedom = 8; Probability = .05.

TABLE 8.--The chi square analysis of the relationship between the accident experience categories and the behavioral categories relevant to item (46)
Our family spends a great deal of time together.

	1 Always	2 Usually	3 Sometimes	4 Rarely	5 Never	Total
1 Average	87	123	81	21	6	318
2 Over controlled	10	16	8	4	2	40
3 Under controlled	11	21	19	11	0	62
Total	108	160	108	36	8	420

Variables = Mann behavioral categories, down; responses to the item, across.

Chi square = 14.141; Chi square needed for $P = .10$, 13.36 or greater.

Degrees of freedom = 8; Probability = .10.

TABLE 9.--The chi square analysis of the relationship between the accident experience categories and the behavioral categories relevant to item (39)
I have as good table manners at home as when I eat out.

	1 Always	2 Usually	3 Sometimes	4 Rarely	5 Never	Total
1 Average	99	158	45	13	3	318
2 Over controlled	12	19	5	4	0	40
3 Under controlled	10	33	17	2	0	62
Total	121	210	67	19	3	420

Variables = Mann behavioral categories, down; responses to the item, across.

Chi square = 14.295; Chi square needed for $P = .10$, 13.36 or greater.

Degrees freedom = 8; Probability = .10.

TABLE 10.--The chi square analysis of the relationship between the accident experience categories and the behavioral categories relevant to item (35) I (am) (was) popular with most of the students in my class.

	1 Always	2 Usually	3 Sometimes	4 Rarely	5 Never	Total
1 Average	31	193	67	25	2	318
2 Over controlled	2	25	11	2	0	40
3 Under controlled	1	42	19	0	0	62
Total	34	260	97	27	2	420

Variables = Mann behavioral categories, down; responses to the item, across.

Chi square = 13.386; Chi square needed for P = .10, 13.36 or greater.

Degrees of freedom = 8; Probability = .10.

TABLE 11.--The chi square analysis of the relationship between the accident experience categories and the behavioral categories relevant to item (54)
I become concerned about what other people think of me.

	1 Always	2 Usually	3 Sometimes	4 Rarely	5 Never	Total
1 Average	94	95	105	23	1	318
2 Over controlled	14	15	9	1	1	40
3 Under controlled	12	26	22	1	1	62
Total	120	136	136	25	3	420

Variables = Mann behavioral categories, down; responses to the item, across.

Chi square = 13.486; Chi square needed for $P = .10$, 13.36 or greater.

Degrees of freedom = 8; Probability = .10.

TABLE 12.--The chi square analysis of the relationship between the accident experience categories and the behavioral categories relevant to item (14) Courses in school are set up to meet the needs and interests of the student.

	1 Always	2 Usually	3 Sometimes	4 Rarely	5 Never	Total
1 Average	83	206	22	5	2	318
2 Over controlled	16	20	1	3	0	40
3 Under controlled	20	38	4	0	0	62
Total	119	264	27	8	2	420

Variables = Mann behavioral categories, down; responses to the item, across.

Chi square = 13.742; Chi square needed for $P = .10$, 13.36 or greater.

Degrees of freedom = 8; Probability = .10.

TABLE 13.--The chi square analysis of the relationship between the accident experience categories and the behavioral categories relevant to item (13) I get a feeling of real power when driving a car.

	1 Always	2 Usually	3 Sometimes	4 Rarely	5 Never	Total
1 Average	7	3	49	128	131	318
2 Over controlled	1	3	9	17	10	40
3 Under controlled	1	1	14	25	21	62
Total	9	7	72	170	162	420

Variables = Mann behavioral categories, down; responses to the item, across.

Chi square = 14.450; Chi square needed for $P = .10$, 13.36 or greater.

Degrees freedom = 8; Probability = .10.

Relationship of Accident Experience
Categories and the Total (raw)
Scores on the Mann Inventory

The null hypothesis tested for the raw score on the Mann Inventory was:

Hypothesis 3:

There is no significant difference between the total (raw) score obtained by truck drivers on the Mann Inventory and their accident records.

When the total (raw) scores were analyzed by accident experience categories, an analysis of variance⁴¹ was administered to determine the probability of significance. A probability significance value was needed at the .05 level; a value of .051 was obtained. On the basis of meeting the .05 level presented in Table 3, the null hypothesis of no significant difference between categories and total (raw) score must be retained.

⁴¹Ibid., pp. 412-19.

TABLE 14.--Analysis of total (raw) score value obtained,
and probability for a significant relationship
between accident categories and the total (raw)
score on the Mann Inventory.

Accident Category	Frequency	Mean	Standard Deviation
None	318	48.7	4.38
Nonchargeable	40	49.4	3.46
Chargeable	62	50.2	4.13
Source of Variance	Degrees Freedom	Mean Square	Significance Probability
Between Categories	2	57.19	.051

CHAPTER V

SUMMARY, CONCLUSIONS, DISCUSSION, AND RECOMMENDATIONS

Summary

The primary purpose of this study was to determine the relationship between the accident categories of commercial truck drivers and behavioral categories as identified by the Mann Inventory; determine which items included in the Mann Inventory which differentiate between commercial drivers within one of three accident experience categories; determine if there was a significant relationship between the accident categories and the total (raw) score obtained on the Mann Inventory.

The three null hypotheses tested were:

Hypothesis 1:

There is no significant relationship between established behavioral categories identified by the Mann Inventory and the accident records of commercial truck drivers.

Hypothesis 2:

There is no significant relationship between the responses of the truck drivers to items on the Mann Inventory and their accident or accident-free experiences.

Hypothesis 3:

There is no significant difference between the total (raw) scores obtained by truck drivers on the Mann Inventory and their accident records.

The Chi square test was used to determine the relationship between accidents, behavioral categories, and scores on the Mann Inventory. A cell square contingency analysis of variance was used to determine the significance of relationships of the responses to individual items on the Mann Inventory and the accident categories. An analysis of variance was used to determine the significance level between the total (raw) scores on the Mann Inventory and the accident categories.

The sample population for this study consisted of 420 male drivers who were employed by Schwan's Sales Enterprises, Inc., Marshall, Minnesota. Ninety-nine per cent of the sample population were married, and between the ages of 25 and 35. This group included individuals from a twenty-three state area.

Conclusions

The following conclusions are based upon the findings from this investigation:

1. No significant difference existed between categories on fifty-two of the sixty-three items on the Mann Inventory and the accident records of the sample population of this study. The

remaining eleven items were significant at or above the .10 level. Investigation of the eleven items which were significant appeared to reveal no cluster of items which could be used to identify a profile for any one category.

2. The Mann Inventory is not an effective instrument for identifying differences between accident and accident-free commercial truck drivers. This may be due to good employment selection criteria of the sample population. The selection process may have possibly eliminated individuals who would have scored poorly on the Mann Inventory.
3. The study also appeared to reveal that behavior as identified by the Mann Inventory cannot predict accident experience probability, and that commercial truck drivers, regardless of their outlook on life, get involved in accidents. However, it must be pointed out that persons may get involved in accidents for reasons other than personality.

Discussion

The results of this study appear to negate the usefulness of the Mann Inventory, as presently constructed, in predicting accident probability with the use of past driving records of commercial drivers. This may be due to good employment selection criteria of the

sample population. The selection process may have eliminated individuals who would have scored poorly on the Mann Inventory.

The fact that eleven of the sixty-three items were significant at or above the .10 level would indicate that other items in the "Inventory" could be rewritten and oriented towards the commercial driver. To validate such changes would require testing and retesting the results over a period of time with several sample populations to validate the use of the "Inventory" for predictive purposes.

The "Inventory," when used to predict future driving behavior of teenagers, has been successful. This appears to indicate that written tests can be used to predict future driver performance and that different tests and inventories should be used when analyzing the various driver classifications.

Recommendations for Further Study

1. A follow-up study of the 420 drivers included in this study should be undertaken to determine the value of the Mann Inventory in predicting the future accident experiences of commercial truck drivers.

2. The Mann Inventory could be used to test employment applicants to determine if it can identify differences between individuals who are employed or rejected by present selection methods.
3. A revision of the Mann Inventory to change some of the items to a commercial driver orientation. The changes should be checked by test construction experts and administered to similar groups.
4. A study to determine if there are geographic regional differences in the attitudes of commercial drivers.
5. A study to determine if there are significant differences between the commercial drivers and their management supervisory personnel.

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APPENDICES

APPENDIX A

**THE MANN INVENTORY USED BY KENEL
IN HIS STUDY**

APPENDIX A
THE MANN INVENTORY USED BY KENEL
IN HIS STUDY

Name _____ Age ____ Sex ____ Months Driving
Experience _____

The following statements reflect your attitude and feelings about yourself and your relations to others. There are no right or wrong answers. Fill in on the answer sheet the answer that reflects your feelings the best.

Do not mark on test booklet

A. always B. usually C. sometimes D. rarely
E. never

1. I (like) (liked) to take part in organized extra-curricular activities in school.
2. Young people are much better drivers than middle-aged people.
3. Policemen are sincere in enforcing the laws.
4. My parents (are) (were) reasonable in their relations with me.
5. My community is a happy place to live.
6. I put off until tomorrow things I should do today.
7. I like to daydream.
8. I feel full of pep when I get behind the wheel.
9. I (live) (lived) in a home that (is) (was) happy.
10. If I see a police officer, I am more careful.
11. Over-careful drivers cause more accidents than the so-called reckless ones.
12. I enjoy being out late at night and sleeping mornings.
13. I get a feeling of real power when driving a car.

14. Courses in school (any grade level) are set up to meet the needs and interests of the student.
15. I am concerned about the way my clothes look.
16. Slow drivers should be kept off the highways.
17. All new drivers should be required to take a course in driver education.
18. Unsafe drivers should be deprived of the right to drive.
19. Accidents don't just happen; they are caused.
20. I like to get everything out of a car that it has in it.
21. The chief work of most policemen should be traffic control.
22. My parents (exert) (exerted) too much control over me.
23. The people in my community want all traffic laws enforced.
24. I have been tempted to cheat on a test.
25. I get impatient in heavy traffic.
26. There are times when it seems like everyone is against me.
27. Old, defective cars should be kept off the road.
28. Drivers should be given more freedom in obeying traffic signs.
29. People should drive when they are angry.
30. Passing on hills and curves is exceedingly dangerous.
31. It is necessary to stop at "stop" signs if no other cars are in sight.
32. I like to put extras on my car to attract attention.
33. I am good at talking myself out of trouble.
34. Strong discipline in practice makes a better team.

35. I (am) (was) popular with most of the students in my class.
36. Police officers are rougher on teenagers than on adults.
37. Teachers want to help students with their problems.
38. My (father) (principal driver in family) gets traffic tickets for moving violations.
39. I have as good table manners at home as when I eat out.
40. I have been wrong in an argument but wouldn't admit it to my opponent.
41. Society should have the right to question the way I drive.
42. I like to razz a team when it is losing.
43. I am proud of my reputation in the community.
44. I am considered a friendly person.
45. I like most of my work.
46. Our family (spends) (spent) a great deal of time together.
47. Attitudes toward driving are more important than ability to handle a car.
48. I like to take chances when I'm driving.
49. Traffic laws are set up to promote safety.
50. Courtesy toward other drivers is important.
51. I like a great deal of freedom.
52. I don't mind being told what to do.
53. My grades in school (are) (were) a good indication of my ability.
54. I become concerned about what other people think of me.
55. I find that older people tend to be too bossy.

- 56. I feel somewhat nervous when I drive a car.
- 57. I think courtesy towards others is a good reflection of a person's character.
- 58. I get more fun out of driving a car than in any other activity.
- 59. The police are only trying to do the job for which they were hired.
- 60. My folks (insist) (insisted) that I spend most week-day evenings at home.
- 61. I am considered a reliable person.
- 62. I like to help a person who is in trouble.
- 63. I am more courteous than the average driver.

APPENDIX B

THE PERSONAL ATTITUDE SURVEY AND RESPONSE
SHEET USED IN THIS STUDY

APPENDIX B

PERSONAL ATTITUDE SURVEY

The following statements reflect your attitude and feelings about yourself and your relations to others. There are no right or wrong answers. Fill in on the answer sheet the answer that reflects your feelings the best.

Please do not mark on the test booklet:

A. always B. usually C. sometimes D. rarely
E. never

1. I like to take part in organized social activities in my community.
2. Young people are much better drivers than middle-aged people.
3. Policemen are sincere in enforcing the laws.
4. My parents were reasonable in their relations with me.
5. My community is a happy place to live.
6. I put off until tomorrow things I should do today.
7. I like to daydream while I am driving.
8. I feel full of pep when I get behind the wheel.
9. I live in a home that is happy.
10. If I see a police officer when I am driving I am more careful.
11. Over-careful drivers cause more accidents than the so-called reckless ones.
12. I enjoy being out late at night and sleeping mornings.
13. I get a feeling of real power when driving a car.
14. Work requirements, on my job, are reasonable.
15. I am concerned about the way my clothes look.
16. Slow drivers should be kept off the highways.

17. All new drivers should be required to take a course in driver education.
18. Unsafe drivers should be deprived of the right to drive.
19. Accidents don't just happen; they are caused.
20. I like to get everything out of a car that it has in it.
21. The chief work of most policemen should be traffic control.
22. When I was younger, my parents exerted too much control over me.
23. The people in my community want the traffic laws enforced.
24. I have been tempted to cheat in a test situation.
25. I get impatient when driving in heavy traffic.
26. There are times when it seems like everyone is against me.
27. Old, defective cars should be kept off the road.
28. Drivers should be given more freedom in obeying traffic signs.
29. People should drive when they are angry.
30. Passing on hills and curves is exceedingly dangerous.
31. I think it is necessary to stop at "stop" signs if no other cars are in sight.
32. I like to put extras on my car to attract attention.
33. I am good at talking my way out of trouble.
34. Strong discipline in training makes a better team.
35. I am popular with most of my social group.
36. Police officers are rougher on teenagers than on adults.
37. My supervisors want to help me with my problems.

38. My friends get traffic tickets for moving violations.
39. I have as good table manners at home as when I eat out.
40. I have been wrong in an argument but wouldn't admit it to my opponent.
41. The state should have the right to question the way I drive.
42. I like to razz a team when it is losing.
43. I am proud of my reputation in the community.
44. I am considered a friendly person.
45. I like most of my work.
46. Our family spends a great deal of time together.
47. Attitudes toward driving are more important than ability to handle the car.
48. I like to take chances when I'm driving.
49. Traffic laws are set up to promote safety.
50. Courtesy toward other drivers is important.
51. I like a great deal of freedom.
52. I don't mind being told what to do.
53. My performance at work is a good indication of my ability.
54. I sometimes become concerned about what other people think of me.
55. I find that older people tend to be too bossy.
56. I feel somewhat nervous when I drive a car.
57. I think courtesy towards others is a good reflection of a person's character.
58. I get more fun out of driving a car than in any other activity.
59. The traffic police are trying to do the job for which they were hired.

- 60. I spend most week-day evenings at home, when I am not working.
- 61. I am considered a reliable person.
- 62. I like to help a person who is in trouble.
- 63. I am more courteous than the average driver.

ANSWER SHEET

Name _____ Age _____
 (Please print)

- | | A | B | C | D | E |
|-----|-----|-----|-----|-----|-----|
| 1. | () | () | () | () | () |
| 2. | () | () | () | () | () |
| 3. | () | () | () | () | () |
| 4. | () | () | () | () | () |
| 5. | () | () | () | () | () |
| 6. | () | () | () | () | () |
| 7. | () | () | () | () | () |
| 8. | () | () | () | () | () |
| 9. | () | () | () | () | () |
| 10. | () | () | () | () | () |
| 11. | () | () | () | () | () |
| 12. | () | () | () | () | () |
| 13. | () | () | () | () | () |
| 14. | () | () | () | () | () |
| 15. | () | () | () | () | () |
| 16. | () | () | () | () | () |
| 17. | () | () | () | () | () |
| 18. | () | () | () | () | () |
| 19. | () | () | () | () | () |
| 20. | () | () | () | () | () |
| 21. | () | () | () | () | () |
| 22. | () | () | () | () | () |
| 23. | () | () | () | () | () |
| 24. | () | () | () | () | () |
| 25. | () | () | () | () | () |
| 26. | () | () | () | () | () |
| 27. | () | () | () | () | () |
| 28. | () | () | () | () | () |
| 29. | () | () | () | () | () |
| 30. | () | () | () | () | () |
| 31. | () | () | () | () | () |
| 32. | () | () | () | () | () |
| 33. | () | () | () | () | () |

- | | A | B | C | D | E |
|-----|-----|-----|-----|-----|-----|
| 34. | () | () | () | () | () |
| 35. | () | () | () | () | () |
| 36. | () | () | () | () | () |
| 37. | () | () | () | () | () |
| 38. | () | () | () | () | () |
| 39. | () | () | () | () | () |
| 40. | () | () | () | () | () |
| 41. | () | () | () | () | () |
| 42. | () | () | () | () | () |
| 43. | () | () | () | () | () |
| 44. | () | () | () | () | () |
| 45. | () | () | () | () | () |
| 46. | () | () | () | () | () |
| 47. | () | () | () | () | () |
| 48. | () | () | () | () | () |
| 49. | () | () | () | () | () |
| 50. | () | () | () | () | () |
| 51. | () | () | () | () | () |
| 52. | () | () | () | () | () |
| 53. | () | () | () | () | () |
| 54. | () | () | () | () | () |
| 55. | () | () | () | () | () |
| 56. | () | () | () | () | () |
| 57. | () | () | () | () | () |
| 58. | () | () | () | () | () |
| 59. | () | () | () | () | () |
| 60. | () | () | () | () | () |
| 61. | () | () | () | () | () |
| 62. | () | () | () | () | () |
| 63. | () | () | () | () | () |

How do you feel about the inventory?
 (Please write on the back of the
 answer sheet)

APPENDIX C

CHI SQUARE VALUES RELEVANT TO INDIVIDUAL
INVENTORY ITEMS

TABLE 15.--Chi square values obtained and probabilities for a significant relationship between accident categories and each individual item in the Mann Inventory.

Item	Chi Square	P	Item	Chi Square	P
1	10.799		33	10.582	
2	4.278		34	5.055	
3	11.112		35	13.386	.10
4	12.638		36	10.003	
5	9.216		37	7.704	
6	11.619		38	7.114	
7	5.064		39	14.295	.10
8	10.125		40	18.528	.02
9	6.853		41	9.108	
10	10.587		42	2.905	
11	3.753		43	5.168	
12	7.783		44	5.073	
13	14.450	.10	45	3.810	
14	13.742	.10	46	14.141	.10
15	3.640		47	8.550	
16	2.186		48	12.327	
17	1.383		49	4.982	
18	6.868		50	5.090	
19	4.939		51	4.512	
20	9.051		52	7.413	
21	9.174		53	1.773	
22	4.753		54	13.486	.10
23	6.003		55	10.125	
24	19.366	.02	56	2.527	
25	4.933		57	17.703	
26	9.122		58	3.667	.05
27	8.309		59	10.352	
28	9.188		60	8.267	
29	6.477		61	3.025	
30	17.408	.05	62	2.755	
31	3.118		63	6.666	
32	19.056	.02			

Degrees of freedom = 8; Level of significance = P

Significance level of: .02, $\chi^2 = 18.17$ or greater; .05, $\chi^2 = 15.51$ or greater; .10, $\chi^2 = 13.36$ or greater.

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